

Feb. 5, 1963

P. LERNER

3,076,299

PACKAGING APPARATUS

Filed Feb. 13, 1961

3 Sheets-Sheet 2

Fig. 2

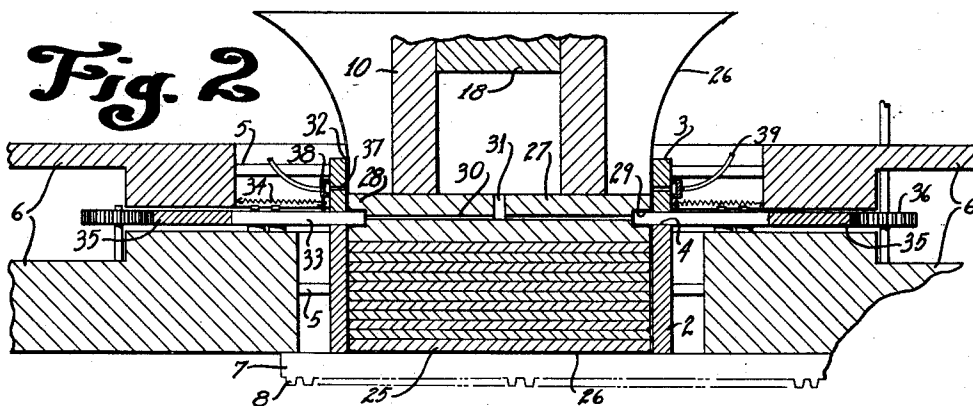


Fig. 3

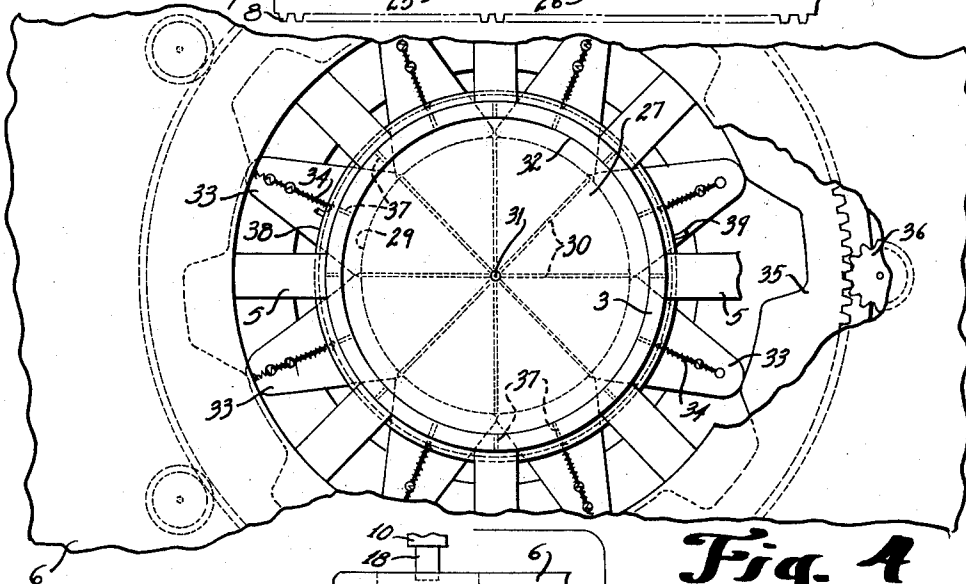
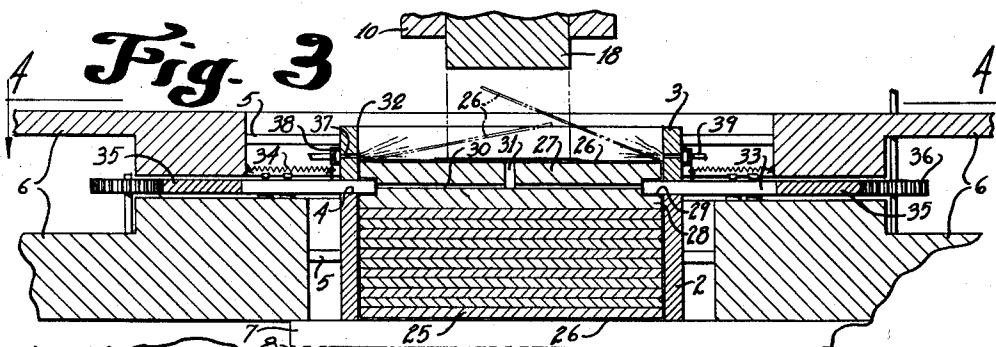


Fig. 4

INVENTOR.
PHILIP LERNER

BY

Andrus & Starhe

Attorneys

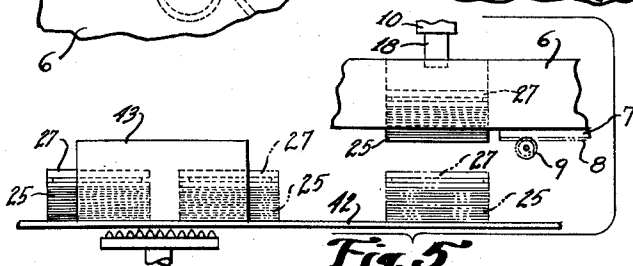


Fig. 5

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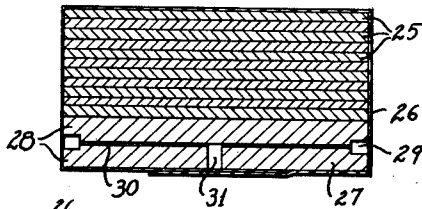


Fig. 6

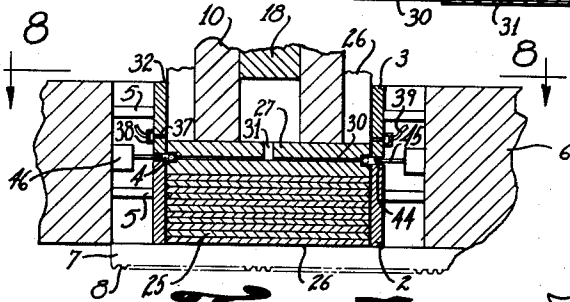


Fig. 7

Fig. 8

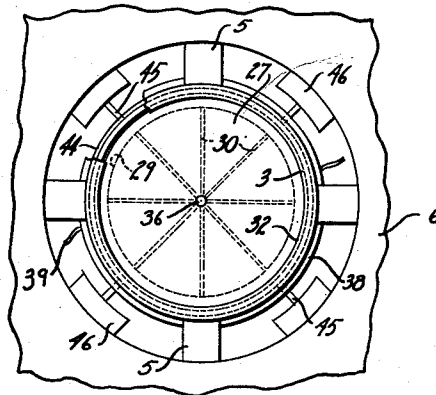


Fig. 10

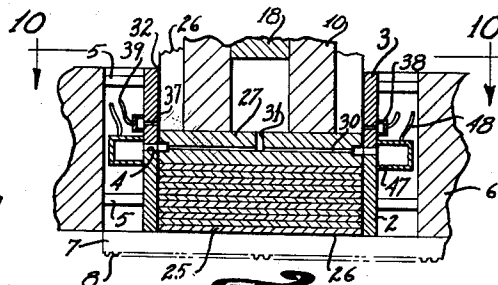
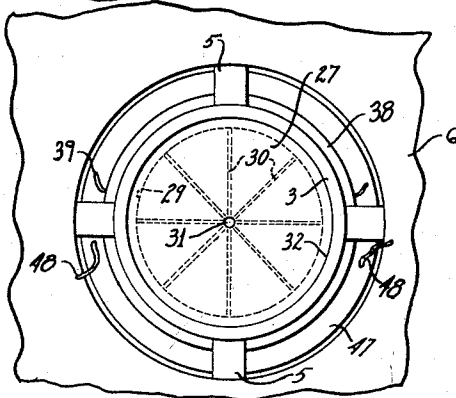


Fig. 9

INVENTOR.
PHILIP LERNER
BY
Andrus & Starke
Attorneys

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3,076,299

PACKAGING APPARATUS

Philip Lerner, 3818 N. 54th Blvd., Milwaukee 16, Wis.

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4 Claims. (Cl. 53-184)

This invention relates to a packaging apparatus, and more particularly to an apparatus for packaging articles in a partial vacuum.

In the industry of food processing and distribution, it is often desirable to enclose perishables in a film wrap which is vacuumized to protect the contents against spoilage.

An improved method of vacuum packaging is disclosed and claimed in the present inventor's Patent No. 2,942,390, entitled "Method of Producing a Partial Vacuum Package." According to that patent a flexible shrinkable film material which surrounds the package contents is placed inwardly of a pocket in the package, the film sealed and then subsequently shrunk out of the pocket to expand the air space within the package without admitting air thereto, thus creating a partial vacuum.

More specifically, the patent discloses a support for a food product or the like, the support providing a peripheral groove into which heat shrinkable film is placed. After sealing of the film, the entire package is heated to cause the film to pull out of the groove, thereby creating the partial vacuum. The groove thereby exemplifies one type of pocket usable with the invention of the patent.

When a meat food product is to be packaged, it is desirable to provide a tight skin over the meat which prevents undesirable deterioration of the surface of the meat.

In order to provide the tightest possible partially vacuumized package, it is important that the fewest possible folds or overlaps exist in the film adjacent the pocket. In addition it is necessary that the film be disposed as close as possible to the walls of the pocket prior to sealing and shrinking so that the smallest possible amount of air remains in the package.

In accordance with the present invention, means are provided for reducing the film overlap to a minimum, and also for disposing the film in substantial contact with the walls of the pocket.

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

FIGURE 1 is a diagrammatic showing of an apparatus constructed in accordance with the invention, with portions in central vertical section, and showing the initial position of the package assembly;

FIG. 2 is a view similar to the lower portion of FIGURE 1 and showing the package assembly in its lower position;

FIG. 3 is a view similar to FIG. 2 showing the film wrapping and sealing procedure;

FIG. 4 is a fragmentary horizontal section taken on line 4-4 of FIG. 3;

FIG. 5 is a diagrammatic showing of the package removal and heating apparatus;

FIG. 6 is a vertical section of a completed package;

FIG. 7 is a view similar to FIG. 2 showing another embodiment of the invention;

FIG. 8 is a horizontal section taken on line 8-8 of FIG. 7;

FIG. 9 is a view similar to FIG. 2 showing still another embodiment of the invention; and

FIG. 10 is a horizontal section taken on line 10-10 of FIG. 9.

As shown in the drawings, the apparatus comprises a

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chamber 1 having cylindrical side walls consisting of two axially aligned sections 2 and 3 which are slightly separated to form an unobstructed annular space or slot 4 therebetween. This chamber is usable in connection with circular packages, but could be changed to a rectangular or other shape to accommodate non-circular packages.

Side wall sections 2 and 3 are held in spaced relation to form slot 4 by a plurality of radial arms 5 secured to an annular support 6.

The floor of chamber 1 is formed by a support plate 7 normally disposed therebeneath and which is connected by a rack 8 and pinion 9 to a motor, not shown. Energization of the motor will cause plate 7 to move laterally from beneath the chamber for purposes to be described.

The top of chamber 1 is open, and disposed thereabove is a vertically movable press member 10 which is adapted to enter the chamber as will be described. For this purpose, press 10 may be mounted on suitable tracks, not shown, and has a follower 11 projecting therefrom. Follower 11 is disposed within an eccentric cam groove 12 in the face of an annular disk 13 mounted for rotation with a shaft 14 having its axis normal to the direction of movement of press 10 toward and away from chamber 1. Disk 13 is driven, to thereby raise and lower press 10, by a pulley belt 15 connecting shaft 14 with the shaft 16 of a motor 17.

Press 10 is provided with a central space which loosely receives a core 18 adapted to move relative to and independently of the press. For this purpose, core 18 is also provided with a follower 19 which is disposed within an eccentric cam groove 20 in the face of an annular disk 21 mounted for rotation with a shaft 22 normal to the direction of movement of press 10. Disk 21 is driven, to thereby raise and lower core 18 by a pulley belt 23 connecting shaft 22 with motor shaft 16.

Core 18 is constructed to enter chamber 1 at desired intervals, and is provided with heating means, such as an electric coil 24, therein.

Vertical translation of both press 10 and core 18 are limited and controlled by the extent of the respective cam grooves 12 and 20.

The above-described construction permits of timed sequential movement of the press and core.

The apparatus shown is adapted for use in forming a package comprising: the contents such as a stack of sliced meat 25, a wrap of shrinkable film 26, and a disc-like support 27.

The support includes a central portion with relatively thin spaced annular marginal flanges 28 extending outwardly from the respective upper and lower surfaces of the support. Flanges 28 form an external pocket in the support which in this instance takes the shape of a peripheral groove 29. The support 27 may be provided with a pocket of different shape and position without departing from the spirit of the invention.

Preferably included in the support are a plurality of air flow passages 30, for purposes to be described. These passages may suitably extend radially between the base of groove 29 and an axial bore 31 connecting to one outside face of support 27. It is desirable that a relatively large plurality of passages 30 be provided so that a substantial portion of the circumferential extent of the groove base has passage openings therein.

The apparatus shown is adapted to form the package in an inverted position.

In utilizing the apparatus, a piece of film 26 is cut from a roll or other source thereof and placed over the top edge 32 of chamber 1. A stack of meat 25 is then placed thereabove with support 27 resting on the meat. (See FIG. 1). If desired, the package assembly thus created

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could be initially formed adjacent the apparatus and then placed atop the chamber.

In this step of the procedure, film 26 flares slightly upwardly and outwardly from edge 32. The chamber is formed to be only slightly larger in diameter than the meat and support.

Motor 17 is then actuated, and press 10 will move downwardly to push the initial package assembly into and to the bottom of chamber 1 so that the film 26 is in contact with plate 7. (See FIG. 2.) As the assembly moves into the chamber, frictional resistance between film 26 and edge 32 will uniformly pull the film tight around the exposed bottom surface and edges of the meat and also across the edges of groove 29 externally of support 27.

The height of lower chamber 2 below slot 4 is constructed so that when the assembly reaches bottom, support groove 29 will therefore be disposed in horizontal alignment with slot 4. Since meat and some other pack- ageable items are somewhat compressible, cam groove 12 should be constructed to limit the downward extent of press 10 to the position where this slot-groove alignment is obtained.

In accordance with the packaging concept of the in- ventor, it is next desirable to dispose film 26 within the pocket formed, in this instance, by peripheral groove 29. For this purpose, means are provided to fold the film in- wardly and into close engagement with the walls of the pocket uniformly and from all directions simultaneously.

As shown in FIGS. 1-4, a ring-like iris 33 is mounted outwardly of the container and in a plane containing slot 4 and groove 29. Iris 33 may be of any suitable well- known type, such as the variety used in camera shutters, and may be secured to support 6. The maximum edge portion thickness of iris 33 should approach the distance between flanges 28.

As shown, the individual members of iris 33 are dis- posed in a space in support 6 and are biased outwardly by springs 34 against a geared cam ring 35 which is in turn driven by a gear 36 driven from motor 17 if desired.

The normal position of iris 33 is shown in FIG. 1, i.e., with its inner edge concentric to groove 29 and out- wardly of the groove and of slot 4 during insertion of the package assembly into chamber 1.

When support 27 reaches its position adjacent slot 4, iris 33 is actuated by cam 35 to move radially in a chuck- like manner through slot 4 and into the pocket formed by groove 29. As shown in FIG. 2, the iris will thereby push laterally and inwardly on the film extending across the groove edges so that the film will be subsequently disposed in contact with all of the groove walls. Any air originally existing inwardly of film 26 within the pocket will be displaced outwardly of the package assembly between the film and upper flange 28 or through passages 30 and bore 31.

As the film enters the pocket, the excess film there- above will be pulled across the edge of upper flange 28.

Since iris 33 is annular, the film will be folded into the groove uniformly and simultaneously along its entire ex- tent. To prevent tearing of the film, the edges of iris 33 may be rounded, and the iris itself constructed from a very low friction material, such as that bearing the trade- mark "Teflon."

Once the film is disposed in the pocket, it is next neces- sary to seal the wrapping to prevent air entry into the package. With iris 33 within the groove, press 10 may now be raised without changing the position of support 27.

The free edges of film 26 may now be folded over the exposed face of the support, including bore 31. For this purpose, a large plurality of circumferentially spaced air holes 37 are provided in wall 3 just above slot 4. Holes 37 are surrounded by a three-sided air ring 38 which is mounted to the exterior of the chamber wall and which is connected through a line 39 to a rotatable timing valve 40 mounted on shaft 16. Valve 40 is connected to a

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source of compressed air, shown diagrammatically at 41, and may be of any suitable well-known type.

Energization of valve 40 sends compressed air through holes 37 and radially against the upwardly extending film. (See FIG. 3.) The inward force of the air will cause the film to fold downwardly over the exposed surface of support 27. At this moment, cam groove 20 causes heater 18 to move downwardly and to quickly press the over- lapping edges of the film together and against the sup- port. The temperature of heater 18 must be sufficient to cause the film to be completely sealed to itself and to the support.

Iris 33 is then released from groove 29. The low fric- tional characteristics of the iris, together with the sealed space behind the film will prevent the latter from follow- ing the iris out of the groove.

The package is then removed from chamber 1 by actuat- ing pinion 9 so that plate 7 slides laterally from there- beneath allowing the package to fall onto a conveyor belt 42. (See FIG. 5.) Belt 42 carries the package through a suitable film shrinking mechanism, such as an oven 43, so that the film in groove 29 will shrink in an outwardly direction and out of the pocket to provide the partial vacuum within the package.

The completed vacuumized package, in its non-inverted position, is shown in FIG. 6.

Another means for disposing the wrap in the pocket is shown in FIGS. 7 and 8. In this embodiment, the iris is replaced with a resilient flexible elastic O-ring 44 which is normally positioned concentric to groove 29 and out- wardly of the groove and of slot 4 and in the same plane therewith. A plurality of circumferentially spaced metal- lic connectors 45 are secured to O-ring 44 and extend out- wardly therefrom and are normally attracted to a corre- sponding number of electromagnets 46 which are ener- gized together in any suitable well-known manner. Al- though four connectors 46 are shown, spaced circumfer- entially, any other number may be utilized as desired.

When electromagnets 46 are energized, O-ring 44 will be held under elastic tension so that when de-energization of the electromagnets occurs, connectors 45 will be re- leased and the O-ring will immediately contract and pass through slot 4 into groove 29 to dispose film 26 therein.

If desired, a fluid pressure differential may be utilized to dispose the film in the pocket. As shown in FIGS. 9 and 10, a hollow annular three-sided air ring 47 is se- cured to walls 2 and 3 around the outside of slot 4. Ring 47 is connected by a line 48 to a suitable valve which may be similar to valve 40.

When the package assembly is disposed within cham- ber 1, compressed air is supplied through ring 47 and di- rected inwardly to create a higher pressure on the outside surface of film 26 than on the inside surface. The film will therefore be folded into groove 29 as with the other embodiments, with air behind the film discharging through passages 30. The package should be sealed while valve 40 is open if there is any substantial tendency for the film to return out of groove 29 after the air pressure is released therefrom.

When the construction of chamber 1 includes a slot 4, a perforated air ring could be utilized instead of the three- sided ring 47. Slot 4 could be replaced by a plurality of circumferentially spaced holes in the chamber wall.

The pressure differential at the groove 29 may be pro- vided by creating a vacuum at the outlet of bore 31, and air drawn through passages 30 would cause the greater pressure on the outside face of film 26 to fold the film into the groove.

The apparatus of the invention provides a means for applying a novel concept in packaging. The film is wrapped tightly around the contents from all sides simul- taneously and with a minimum of unsightly folds. The partial vacuum is created with the most efficient result, since the film is folded into all portions of the pocket simultaneously and uniformly to the bottom of the pocket.

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Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. Apparatus for enclosing a product and support therefore in a flexible shrinkable wrapping material so that the resulting package is partially vacuumized, the support providing an external pocket therein, said apparatus comprising: means for initially disposing the wrapping material around the exposed portions of the product and uniformly across the edges of the pocket externally of said support, means for then folding the wrapping material in an inward direction and substantially uniformly into the pocket, means for next sealing the wrapping material to prevent entry of air into the package, and means for finally shrinking the wrapping material to thereby displace the same from the pocket in an outward direction and thereby partially vacuumizing the package and tightening the wrapping material across the pocket edges and upon the product.

2. The apparatus of claim 1 which is for use with a support having a peripheral pocket and in which the second-named means comprises: an iris normally disposed

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concentrically and outwardly of the pocket and which is radially movable into and out of the pocket.

3. The apparatus of claim 1 which is for use with a support having a peripheral pocket and in which the second-named means comprises: an elastic member disposed concentrically of the pocket and normally expanded and under tension, and means to remove the tension so that the said elastic member contracts radially into the pocket.

4. The apparatus of claim 1 in which the second-named means comprises: means to provide a fluid pressure differential on each side of the wrapping at the pocket with greater pressure on the outside of the wrapping than on the inside thereof so that the wrapping will be folded into the pocket.

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