

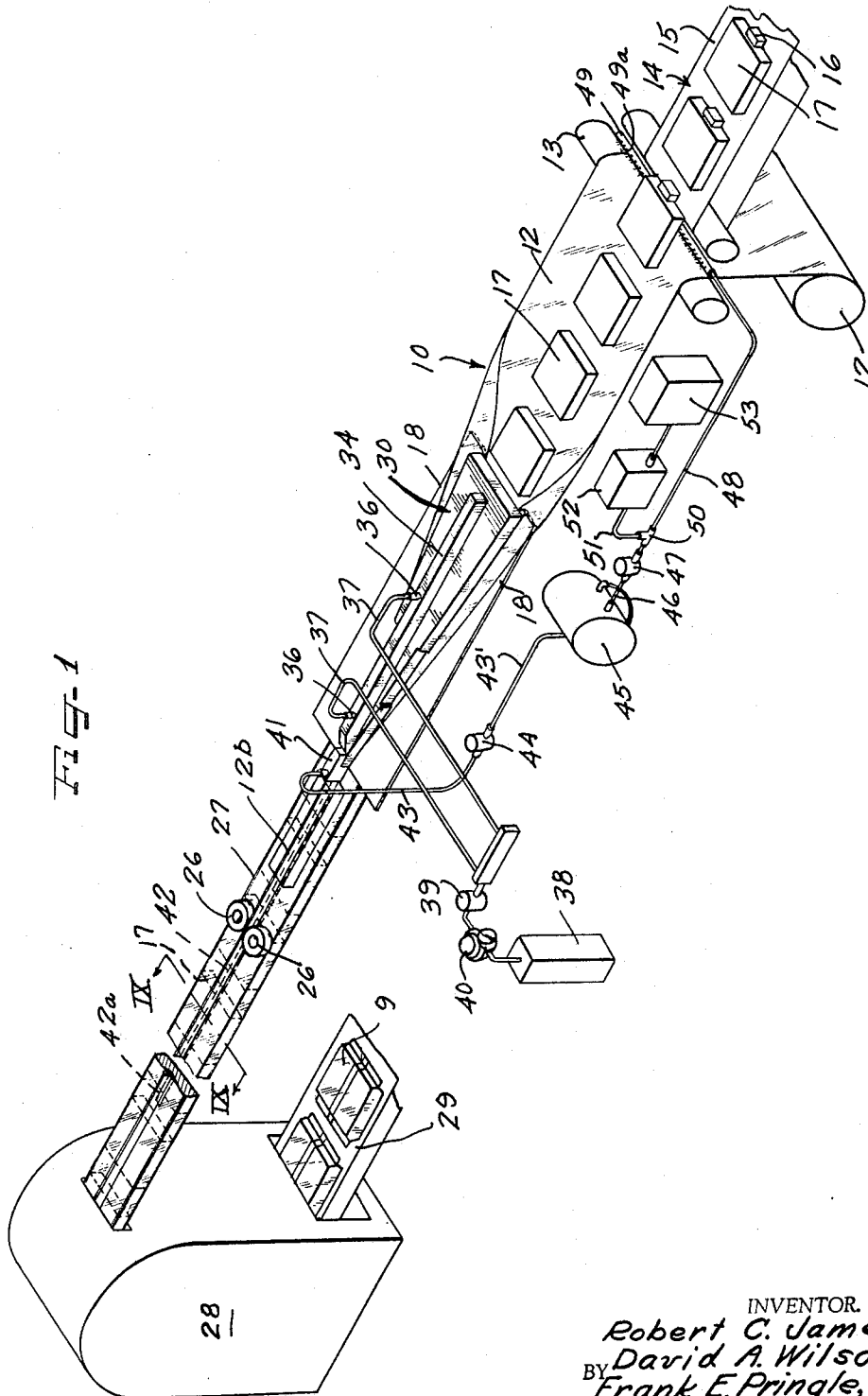
Sept. 27, 1966

R. C. JAMES ET AL
METHOD OF AND APPARATUS FOR PACKAGING UNITS
IN A PRESERVATIVE ATMOSPHERE

3,274,746

Filed Sept. 9, 1963

4 Sheets-Sheet 1



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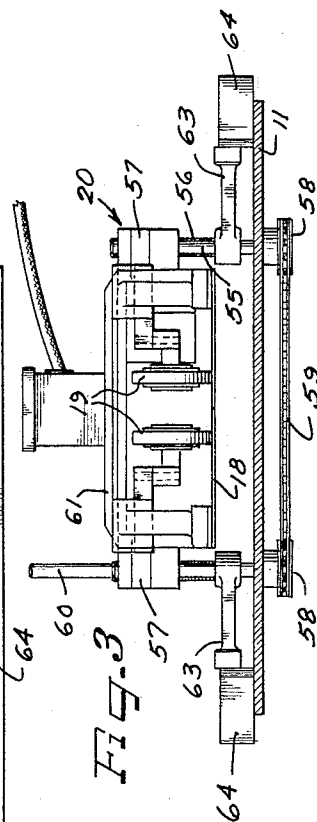
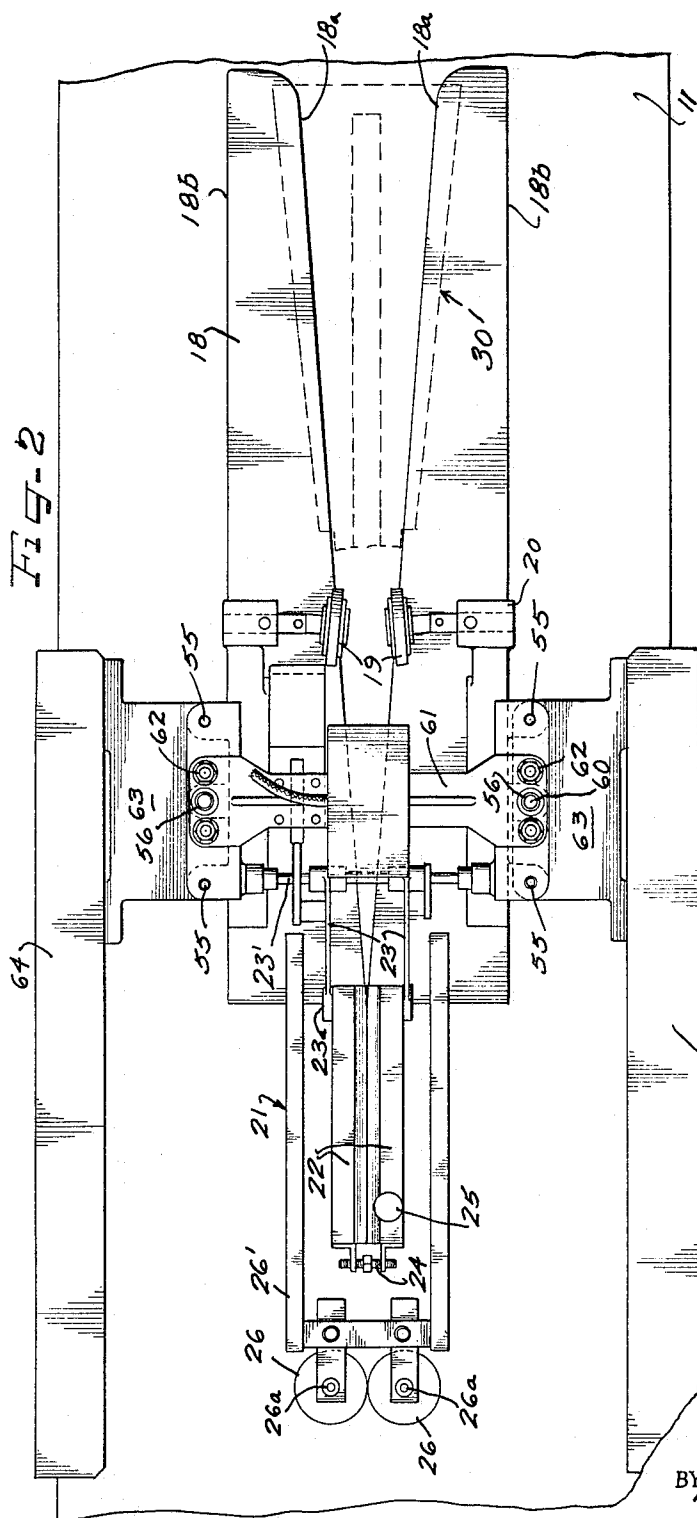
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4 Sheets-Sheet 2



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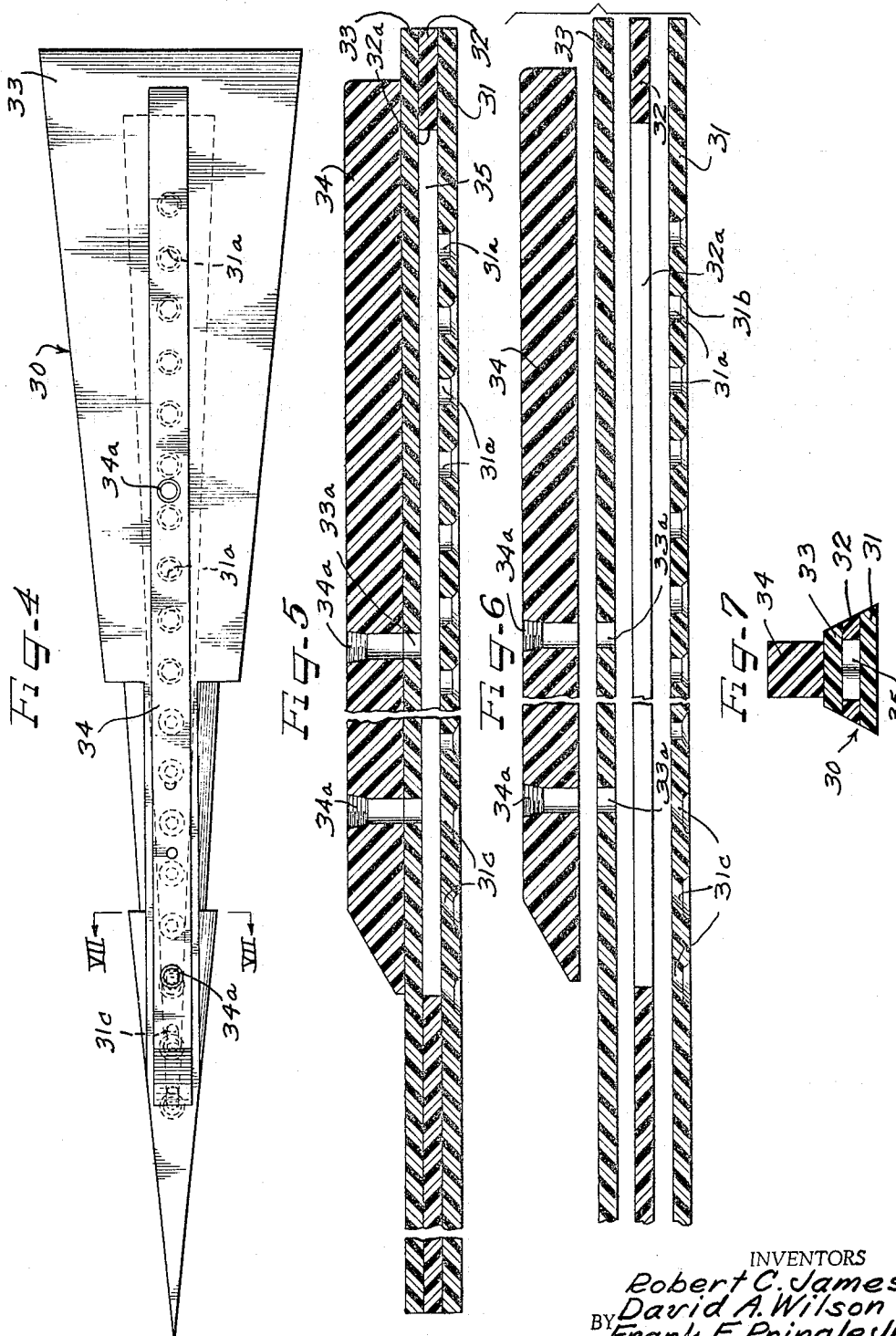
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

Fig-8

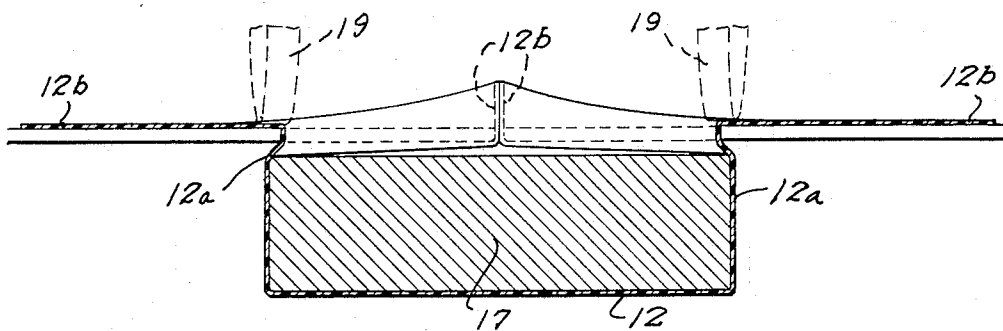
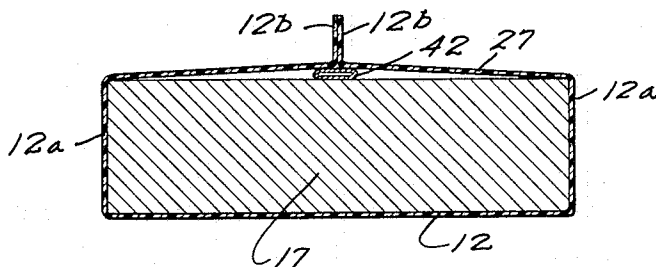


Fig-9



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3,274,746

METHOD OF AND APPARATUS FOR PACKAGING UNITS IN A PRESERVATIVE ATMOSPHERE

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Filed Sept. 9, 1963, Ser. No. 307,406
27 Claims. (Cl. 53—22)

The present invention relates generally to improvements in packaging and more particularly to an improved apparatus and method for wrapping an article in a sealable flexible sheet material. The present invention is particularly suitable to the packaging of food products such as cheese or meat which are susceptible to deterioration. In the packaging of a product of this type, suitable flexible sheet materials are employed.

Various types of flexible sheet materials, plastic films, coated foils, etc., may be used in the present machine and it will be appreciated that the material selected will be particularly adapted for the product to be packaged.

The method and apparatus of the present invention is adapted to package articles in a controlled atmosphere or environment.

In the past, different types of machines have been employed for producing packages containing different types of atmosphere and there has been a considerable waste in film and slowdown in operation due to the fact that when the machine is started up, there has been no way to determine whether the condition of the atmosphere within the flexible tube has been satisfactory for the commencement of packaging. An important object of this invention is to improve the prior practice by providing a method and apparatus which is capable of determining whether conditions of the atmosphere within the tube are satisfactory to insure the formation of packaged units having a proper gas analysis. According to the present invention, a controlled atmosphere is caused to flow from an enclosed area immediately adjacent a point where the film is folded to form a tube and which atmosphere is directed upstream over the units contemporaneous with the movement of the units and the tube toward a transverse sealer and cutter. An exhaust pipe is disposed within the film tube and has an inlet positioned immediately adjacent to the closed end of the film tube where the transverse seals are being formed by the transverse-sealer mechanism. This exhaust pipe is connected with an atmosphere analyzer so that atmosphere can flow into the exhaust pipe and be analyzed before any packages are formed. If the operator finds that the analyzer indicates that the condition of the atmosphere within the tube is satisfactory for the commencement of the formation of packages, then the operator starts the machine and units such as cheese are immediately packaged without any loss of wrappers. After production of packages has commenced, the condition of the atmosphere may be checked at any time. Our method constitutes an improvement over prior techniques where it has been necessary for a few packages to be manufactured and taken to a laboratory for gas analysis each day before full speed operation is commenced to determine whether the machine is producing packages having the desired gas analysis. After production has started, it has been the practice in the past to take samples to the laboratory every fifteen minutes or so to provide a further production control. Where the gas or atmosphere has not been satisfactory in the packages manufactured, such packages have been discarded and a loss of material and time results from the aforesaid techniques employed prior to this invention.

In view of the foregoing, an important object of this

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invention is to provide a new and improved method and apparatus for manufacturing packaged units having a controlled atmosphere with a minimum loss of film and operating time incident to the commencement of the operation of the apparatus.

Yet another object of this invention is to provide a new and improved method and apparatus for packaging units where the analysis of the atmosphere of each package is immediately available at the time that the package is being made so that an operator can determine whether packages are being produced having the desired atmosphere or environment without having to take the packages to a laboratory for an independent statistical analysis.

Another and more specific object of this invention is to provide a new and improved method of sweeping cheese units within a film tube with a gas or other suitable atmosphere and then removing the gas or atmosphere from the tube without intermixing the gas being removed with the gas being flushed into the tube so that the gas being removed may be injected into an analyzer to determine whether packages are being produced having desired atmosphere and so that portions of the gas or atmosphere being removed can be directed against undersides of the articles being packaged for scrubbing these undersides to further inhibit deterioration of the article within the package.

Still another important object of this invention is to provide a method and apparatus for manufacturing a packaged food unit having a longer shelf life and which article is more resistant to deterioration.

Other objects and features of this invention will more fully become apparent in view of the following detailed description taken in conjunction with the accompanying drawings illustrating a single embodiment and in which:

FIGURE 1 is a diagrammatic view of an apparatus for the packaging of articles in accordance with this invention;

FIGURE 2 is an enlarged fragmentary top plan view showing in greater detail certain features of the wrapping apparatus shown in FIGURE 1;

FIGURE 3 is a vertical section taken substantially on the line III—III looking in the direction indicated by the arrows as seen in FIGURE 2;

FIGURE 4 is a top plan view of a gas hood for attachment with the apparatus illustrated in FIGURE 2 in the position indicated by the dotted lines in FIGURE 2;

FIGURE 5 is a fragmentary longitudinal section of the gas hood shown in FIGURE 4;

FIGURE 6 is a fragmentary exploded view of the gas hood shown in FIGURES 4 and 5;

FIGURE 7 is a vertical section taken substantially on the line VII—VII looking in the direction indicated by the arrows as seen in FIGURE 4;

FIGURE 8 is a vertical section taken through one of the articles being packaged and the film illustrating in full and dotted lines the method by which the film is folded to form a tube encasing the unit; and

FIGURE 9 is an enlarged cross-sectional view taken substantially on the line IX—IX looking in the direction indicated by the arrows as seen in FIGURE 1.

As shown on the drawings:

The reference numeral 9 indicates generally a package which is adapted to be produced by our novel apparatus 10, as shown in FIGURE 1. The package 9 is preferably made from a suitable flexible material of the type previously described and is characterized as having a longitudinal seal extending the full length of the package. The package 9 further is provided with transverse seals at opposite ends of the package.

The apparatus 10 further includes a frame 11 and a roll of film 12. The roll of film is disposed beneath the

frame with the film being extended up over roll 13 onto a top surface of the frame. A conveyor 14 is disposed at one end of the frame in spaced relation to the end of the frame and includes a belt 15 having belt lugs 16 for carrying units 17 to be packaged. As the conveyor belt 15 moves past the roll 13, the lugs 16 cooperate with the moving film 12 to cause the units 17 to be deposited on top of the film in longitudinally spaced relation along the length of the film strip.

Carried upon the top side of the frame or horizontal bed 11 is a pair of spaced film folding shoes or plates 18 which are provided with opposed converging side edges 18a as well as flat top surfaces 18b. Rubber rollers 19 are adjustably mounted on top of the plates adjacent the converging side edges 18a to assist in the folding of the film and in the forming of a scoop-shaped portion in the length of the film as the film passes longitudinally of the rubber rollers 19. The rollers 19 may be set at an angle (FIGURE 8) to pull the film tightly around the unit or food product. It will be appreciated that the shoes 18 are connected together and carried on a carriage 20 which carriage is movable vertically with respect to the frame to enable the shoes 18 and the rollers 19 to be adjusted vertically in accordance with the size of the units 17 to be packaged. The details of the carriage 20 will be further discussed hereafter.

Mounted longitudinally downstream of the shoes 18 is a longitudinal heat sealer 21 which includes heated elements 22—22. The elements 22—22 are pivotally mounted at 23a—23a on pivot brackets 23 carried on a carriage cross rod 23'. Opposite ends of the elements 22—22 are joined by a clamp 24. A handle 25 is provided for pivoting the heating elements 22—22 about the pivot 23 so that the film may be threaded through the apparatus and connected with a transverse sealer and package-separator unit 28 which provides the means for drawing the film longitudinally through the shoes 18 and through the heat sealer 21 as well as through the heat sealer rollers 26—26. The heated elements 22—22 are provided to heat opposite edges 12b—12b of the film after film side portions 12a—12a have been folded about opposite sides of the unit 17 being packaged. The rollers 26 are pivotally mounted at 26a on legs 26b which are mounted on a U-shaped frame 26', which frame is carried or attached to the shoes 18—18. It will further be appreciated that after the film has passed through the rollers 26—26 a sealed film tube is formed about the longitudinally spaced units 17. When the units 17 are conveyed in the film tube 27 into the transverse sealer and package-separator unit 28, the transverse seals are formed in the tube to form individually packaged units and the units are cut apart to form the separate packages 9, as shown in FIGURE 1. The transverse sealer and package-separator unit may be of any suitable type such as is shown in FIGURE 12 of U.S. Patent 3,024,581. After the packages have been separated, they are transmitted from the unit 28 on a conveyor 29 as shown in FIGURE 1.

A wedge-shaped hood 30 is constructed and shaped so as to fit over and to enclose the wedge-shaped opening between the shoes 18 defined between the converging edges 18a. As shown in FIGURES 4—7, the hood 30 is comprised of four separate parts including a base piece 31 having gas outlets 31a and sloped outlets 31c disposed along the length with the outlets 31c at the downstream end of the hood. Each of the outlets 31a have a chamfered edge 31b that is so configured so as to be adapted to direct gas in a direction downstream of the hood 30 into a scoop-shaped portion of the film internally of the film tube 27 toward the transverse sealer 28. The outlets 31c are sloped to create a downstream flow of gas relative to the hood 30. The hood 30 further includes a middle piece 32 having a central relatively large recess 32a that overlies all of the gas outlets 31a and which serves as a header for receiving gas and for distributing gas

through the outlets 31a. Mounted on top of the middle piece 32 is a top piece 33 having gas inlets 33a which are connected at lower ends with the central recess 32a. A gas inlet block 34 having inlet holes 34a is mounted on top of the top piece 33 and the elements or parts 31, 32, 33 and 34 may be suitably secured together by a cement or other type fastener. When the parts are in assembly, the pieces 31, 32 and 33 cooperate together to define a gas header chamber 35 at the area of the central recess 32a which chamber is adapted to receive gas through gas nozzles 36—36 which are connected to gas lines 37—37 and to a pressurized gas cylinder 38. A gas shut-off valve 39 and a gas-pressure regulator 40 are provided to control the gas flow into the hood 30.

As shown in FIGURE 1, a vacuum block 41 is mounted adjacent a forward end of the hood 30 and is supported on the shoes 18—18. A pipe or lance 42 is joined with the block 41 and projects forwardly of a hood internally of the film tube 27 for withdrawing the atmosphere or gas from the tube adjacent the area of the transverse seal. The pipe 42, at its upstream end, is disposed upstream of the closed film tube 27 so as to be capable of being projected into the tube without interfering with the longitudinal seal formed in the tube by the longitudinal heat sealer 21. The pipe 42 has an upstream inlet end 42a that is disposed immediately adjacent the transverse-sealer unit 28 for evacuating atmosphere such as air and gas from a closed end of the tube 27. An atmosphere or gas line or tube 43 is connected to the suction or vacuum block 41 and is joined with a first filter 44 which filter serves as a moisture and cheese particle collector. Another suction or vacuum line 43' joins the filter 44 with a vacuum pump 45 that is provided for the creation of suction or vacuum forces in the tube 42. The pump 45 has a pump line 46 that is joined with a second filter 47 and to another pump line 48 that is connected with a gas scrubber tube 49 disposed between the film-supporting roll 13 and the conveyor 14. The gas scrubber tube 49 has a series of outlets 49a which are upwardly directed for scrubbing bottoms of the units 17 to be packaged as such units are passed over the gap between the conveyor 14 and the moving film strip 12. By scrubbing the underside of the units 17, particularly where such units comprise Swiss cheese, the shelf life of the packaged product can be materially increased. Tests have been performed on packages 9 containing Swiss cheese which have been packaged by scrubbing the bottom side of the Swiss cheese and such tests have revealed that the packages are up to 95% free of oxygen.

An analyzer-intake tap 50 is provided in the pump line 48 for receiving a portion of the exhausted atmosphere or that gas which is flowed through a tap line 51 to an atmosphere or gas analyzer 52 of any suitable type to enable tests to be continuously run to determine an analysis of the atmosphere or gas at the closed end of the film tube 27 immediately adjacent to the transverse sealer. A conventional type tape or disk recorder 53 is connected to the gas analyzer 52 for providing a continuous record of the tests performed by the analyzer during the continuous operation of the apparatus 10. It has been found that by evacuating the atmosphere or gas from the closed end of the tube and moving the evacuated gas in a segregated stream apart from the stream being flowed downstream from the hood 30, that very excellent results can be obtained. Not only can the exhausted gas be used for scrubbing the underside of the units 17 to be packaged, as previously described, but such exhausted gas can be conveniently tested and analyzed to give the operator a continuous control for determining the gas content of the packages 9 being produced by the apparatus. In the past, it has been necessary for a number of packages to be run through the machine whereupon the packages are taken to a laboratory and tested to determine whether the packages contain a satisfactory amount of gas. Ac-

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cording to the new method here developed, the film tube 27 can be flushed with gas before the packaging operation is commenced and the operator can determine the composition of the atmosphere internally of the film tube 27 immediately adjacent to the transverse sealer 28 before any packages are formed. If the gas analysis is not satisfactory, as revealed by dials on the gas analyzer 52, the gas controls can be adjusted so that the gas composition of the closed end of the film tube 27 can be properly regulated. When the closed end of the tube 27 contains the desired atmosphere, the transverse sealer 28 can be turned on by the operator to commence movement of the film 12 with respect to the other components of the machine or apparatus and packages 9 having the desired gas analysis may be produced without any waste of material or film and with a minimum loss of time and effort.

Excellent results may be obtained from the apparatus by producing 140 of the packages 9 per minute. For example, the machine can be operated to use 30 to 40 lbs. of carbon dioxide per hour, in accordance with the amount and type of atmosphere desired in the packages 9. By operating the machine 10 in the described manner and by performing our method, packages can be produced having a slight negative pressure therein so that compact packages are produced. Prior packaging techniques have a tendency to produce puffy-type packages, but where a package is produced having a slight negative pressure therein, this condition can now be eliminated.

The carriage 20 is slidably mounted on four posts (FIGURE 2) disposed at opposite sides of the shoes 18—18. A pair of screws 56—56 is mounted on opposite sides of the shoes 18—18 which screws are threaded through the carriage 20 at 57—57. A pair of sprockets 58—58 is provided on an underside of the top surface of the frame 11 and is joined by a chain 59 so that as screw extension 60 is rotated, the sprockets will rotate together through the chain 59 to cause the carriage 20 to move either up or down, as desired.

The carriage blocks 57 are joined together by a cross piece 61 that is secured at opposite ends with the blocks 57 by bolts 62. Positioned beneath the blocks 57 are a pair of fixed rod support brackets 63—63 that are carried on bracket mounting supports 64—64 secured with the frame 11. The rods or posts 55 extend through the brackets 63 to support the rods 55 on the frame 11.

While the illustrated method and apparatus utilizes exhausted atmosphere or gas for the purpose of scrubbing units to be packaged to conserve the quantity of atmosphere or gas used, this method may be varied with satisfactory results, if desired. To this end, a controlled atmosphere or gas can be directed against the units to be packaged from a source independent from the atmosphere or gas that is caused to be flowed through the film tube. In some cases it may be desirable to use a different type of controlled atmosphere or gas for scrubbing purposes.

In some cases, it may be desirable to employ a moisture and/or gas permeable packaging material. With other products it may be desirable to use a gas and/or moisture impermeable packaging material or film. It will further be appreciated that the controlled atmosphere introduced into the film tube may be of a number of different types, again depending on the product to be packaged. In this respect, the atmosphere may comprise gas, inert gases, nitrogen, CO₂, pure oxygen, cyanide or chlorine gas. For example, if units of fresh red meat are to be packaged, it may be desirable to use pure oxygen in the packages. As another example, where units comprising medical dressings are to be packaged, it will be desirable to create a sterile atmosphere and cyanide or chlorine gases or certain antiseptic powders may be introduced into the film tube. In the present application, the term "controlled atmosphere" has been employed and is intended as a generic term to cover all of the different

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types of substances which may be introduced into the film tube as the units are being packaged.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon, all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. In a method of continuously packaging units in continuous flexible film-like plastic strips, the steps of disposing a plurality of spaced units on a forwardly advancing plastic strip, folding side edges of strip about said units to form a tube housing said units, sweeping said strip and units with a controlled atmosphere in an enclosed area immediately in advance of said folding and in communication with the exterior of the formed tube so that a plurality of units in said tube are likewise swept with gas, sealing the walls of said tube together at a location downstream from said folding to the extent of at least several units, said sealing being transversely of the forward end of the tube with each seal being between spaced units and dividing the tube into sealed segments each accommodating at least one of the units, and applying an exhaust to the interior of the tube between the folding and sealing areas to maintain the flow of the controlled atmosphere downstream in the direction of the advancing strip, and to remove excess atmosphere from the tube prior to sealing.

2. In a method of continuously packaging units in continuous flexible film-like plastic strips, the steps of disposing a plurality of spaced units on a forwardly advancing plastic strip, folding side edges of strip about said units to form a tube housing said units, flushing said strip and units with a controlled atmosphere in an enclosed area immediately in advance of said folding and in communication with the exterior of the formed tube so that a plurality of units in said tube are likewise swept with the controlled atmosphere, sealing the walls of said tube together at a location downstream from said folding to the extent of at least several units, said sealing being transversely of the forward end of the tube with each seal being between spaced units and dividing the tube into substantially tight segments each accommodating at least one of the units, between the folding and sealing areas applying suction to the interior of the tube to maintain the flow of the controlled atmosphere downstream in the direction of the advancing strip, and to remove excess gas from the tube prior to sealing, and further circulating the thus removed atmosphere and directing the same against the units for scrubbing the units in advance of introduction of the units into the tube.

3. In a method of continuously packaging units in continuous flexible film-like plastic strips, the steps of disposing of a plurality of spaced units on a forwardly advancing plastic strip, folding side edges of strip about said units to form a tube housing said units, flushing said strip and units with a preservative gas in an enclosed area immediately in advance of said folding and in communication with the exterior of the formed tube so that a plurality of units in said tube are likewise swept with gas, sealing the walls of said tube together at a location downstream from said folding to the extent of at least several units, said sealing being transversely of the forward end of the tube with each seal being between spaced units and dividing the tube into substantially gas-tight segments each accommodating at least one of the units, between the folding and sealing areas applying suction to the interior of the tube to maintain the flow of gas downstream in the direction of the advancing strip, and to remove excess gas from the tube prior to sealing, and recirculating the removed gas from the tube and against an underside of the units before the units are moved onto the strip to gas scrub the undersides of the units.

4. The method of continuously producing packaged units which comprises successively disposing a plurality

of the units to be packaged in spaced-apart relationship, continuously forming around the units to be packaged an elongated tube formed of flexible sheet material having a single open end, continuously introducing into the tube a controlled atmosphere selected from a group consisting of nitrogen, carbon dioxide and mixtures thereof, inert gas, oxygen, cyanide, chlorine gases and antiseptic powders or dust, causing the controlled atmosphere to flow downstream along the length of the tube toward a closed end of the tube, evacuating such atmosphere from an area immediately adjacent the closed end of the tube in a separate segregated stream flowing toward an open end of the tube without back flushing the atmosphere over the units in the tube to avoid interference with the downstream flow of atmosphere about said units, and collapsing longitudinally-spaced areas of the tube between the units to divide the tube into sections each enclosing at least one of the units and having the controlled atmosphere therein.

5. The method of continuously producing packaged units which comprises successively disposing a plurality of the units to be packaged in spaced-apart relationship, continuously forming around the units to be packaged an elongated tube formed of flexible sheet material having a single open end, continuously introducing into the tube a controlled atmosphere selected from a group consisting of nitrogen, carbon dioxide and mixtures thereof, inert gas, oxygen, cyanide, chlorine gases and antiseptic powders or dust, causing the controlled atmosphere to flow downstream along the length of the tube toward a closed end of the tube, evacuating such atmosphere from an area immediately adjacent the closed end of the tube in a separate segregated stream flowing toward an open end of the tube without back flushing the atmosphere over the units in the tube to avoid interference with the downstream flow of atmosphere about said units, collapsing longitudinally-spaced areas of the tube between the units to divide the tube into sections each enclosing at least one of the units and having the controlled atmosphere therein, and flowing the evacuated gas against an underside of the units to scrub them prior to the introduction of the units into the tube.

6. The method of continuously producing packaged units which comprises successively disposing a plurality of the units to be packaged in spaced-apart relationship, continuously forming around the units to be packaged an elongated tube formed of flexible sheet material having a single open end, continuously introducing into the tube a controlled atmosphere selected from a group consisting of nitrogen, carbon dioxide and mixtures thereof, inert gas, oxygen, cyanide, chlorine gases and antiseptic powders or dust, causing the controlled atmosphere to flow downstream along the length of the tube toward a closed end of the tube, evacuating such atmosphere from an area immediately adjacent the closed end of the tube in a separate segregated stream flowing toward an open end of the tube without back flushing the atmosphere over the units in the tube to avoid interference with the downstream flow of atmosphere about said units, collapsing longitudinally-spaced areas of the tube between the units to divide the tube into sections each enclosing at least one of the units and having the controlled atmosphere therein, and flowing the evacuated gas through an analyzer and recording the results of the analysis continuously while manufacturing the gas-tight packages.

7. The method of continuously producing packaged units which comprises successively disposing a plurality of the units to be packaged in spaced-apart relation, continuously forming an elongated tube formed of flexible sheet material having a single open end around the units while continuously flowing a controlled atmosphere in a downstream direction toward a closed end of the tube about the units as the tube is being formed, evacuating portions of the controlled atmosphere from the spaces longitudinally between the spaced units at an area adjacent a closed end of the tube without comingling the gas

moving downstream over the units, and transversely collapsing longitudinally spaced areas of the tube between the units closing the end of the tube entrapping the atmosphere between the units in the tube forming sections encasing at least one of said units therein.

8. In a method of continuously packaging units in continuous flexible film-like plastic strips, the steps of disposing a plurality of spaced units on a forwardly advancing plastic strip, folding side edges of strip about said units and sealing the side edges to form a tube housing said units, flushing said strip and units with a preservative gas immediately in advance of said folding and in communication with the exterior of the formed tube so that a plurality of units in said tube are likewise swept with gas, sealing the walls of said tube together at a location downstream from said folding to the extent of at least several units, said sealing being transversely of the forward end of the tube with each seal being between spaced units and dividing the tube into substantially gas-tight segments each accommodating at least one of the units, and between the folding and sealing areas applying suction to the interior of the tube to maintain the flow of gas downstream in the direction of the advancing strip without back flushing, and to remove excess gas from the tube prior to sealing.

9. In an apparatus for continuous gas packaging of units, a first means for continuously folding a flat strip of film about spaced units disposed along the length of the strip of film, a longitudinal sealer cooperable with said first means for sealing opposed longitudinal edges of the thus folded strip of film to form a closed tube of film having longitudinally spaced units therein, a transverse sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a second means for flowing a controlled atmosphere into the longitudinally sealed tube in a downstream direction and about the spaced units as the units are moved downstream toward said transverse sealer, a third means including a suction pipe extended inside of the closed tube of film and having a suction inlet disposed at an area immediately adjacent to said transverse sealer for evacuating the controlled atmosphere flowing downstream in the film tube, and an atmosphere-analyzer unit operatively connected with said third means for analyzing the controlled atmosphere content of the tube of film at said area immediately adjacent to said transverse sealer.

10. In an apparatus for continuous gas packaging of units, a frame, a first means for continuously moving a flat strip of film over said frame, a second means mounted on said frame for continuously folding the film about the spaced units, means defining an enclosed area enclosing the strip and the units on the strip where the film is being folded about the strip, a longitudinal sealer supported by said frame adjacent said second means for sealing opposed longitudinal edges of the thus folded strip to form a closed tube of film having longitudinally spaced units therein, a transverse sealer spaced from said longitudinal sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a third means for flowing a controlled atmosphere through the enclosed area in a downstream direction toward the transverse sealer so that a plurality of units are swept with atmosphere, and a fourth means including an exhaust pipe extending into the tube from a point adjacent to said second means and with said pipe having an inlet adjacent to said transverse sealer for pulling controlled atmosphere from the film tube and for assisting in the downstream flow of controlled atmosphere over the units.

11. In a method of producing packaged units from a continuous length of film carrying spaced units to be packaged thereon, the steps of shaping the film from an essentially flat shape progressively into a tube having a closed-upstream end with the film having an intermediate-funnel shape immediately before being formed into a

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tubular shape, directing a stream of a controlled atmosphere into the funnel-shape portion of film toward the closed end of the tube and thereby wiping the spaced units with the controlled atmosphere prior to commencement of production of packaged units, sucking the controlled atmosphere air from an area immediately adjacent the closed end of the tube and flowing the same in a segregated stream flowing upstream of the tube and through an open end of the tube, analyzing such controlled atmosphere and determining the atmosphere content of the tube at the closed end of the tube, and commencing movement of the film and the tube when the desired atmosphere condition has been found to be present at the closed end of the tube while contemporaneously forming transverse seals in the tube to form a continuous length of packaged units having the desired atmosphere content.

12. In a method of producing packaged units from a continuous length of film carrying spaced units to be packaged thereon, the steps of shaping the film from an essentially flat shape progressively into a tube having a closed-upstream end with the film having an intermediate-funnel shape immediately before being formed into a tubular shape, directing a stream of a controlled atmosphere into the funnel-shape portion of film toward the closed end of the tube and thereby wiping the spaced units with the atmosphere prior to commencement of production of packaged units, sucking the controlled atmosphere from an area immediately adjacent the closed end of the tube and flowing such sucked atmosphere in a segregated stream flowing upstream of the tube and through an open end of the tube, analyzing such controlled atmosphere and determining its content at the closed end of the tube, directing a portion of the controlled atmosphere flowed out of the tube against an underside of the units prior to engaging the undersides on the length of film for flushing such undersides and reducing the less desirable atmosphere thereof, and commencing movement of the film and the tube when the prescribed atmosphere analysis has been found to be present while contemporaneously forming transverse seals in the tube to form a continuous length of packaged units having the desired atmosphere therein.

13. In an apparatus for continuous packaging of units, a first means comprising a pair of shoes having opposed converging edges and a pair of rollers mounted on said shoes for receiving a continuous length of film strip between the rollers and the shoes, a longitudinal sealer co-operable with said first means for sealing opposed-longitudinal edges of the thus folded strip of film to form a closed tube of film having longitudinally spaced units therein, a transverse sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a hood having inclined outlets for flowing a controlled atmosphere into the longitudinally sealed tube in a downstream direction and about the spaced units as the units are moved downstream toward said transverse sealer, and a second means including a suction pipe extended inside of the closed tube of film and having a suction inlet disposed at an area immediately adjacent to said transverse sealer for evacuating the controlled atmosphere flowing downstream in the film tube thereby segregating the evacuated atmosphere from the downstream flowing atmosphere to avoid flow interference.

14. In an apparatus for continuous packaging of units, a first means including a pair of shoes having opposed converging edges for receiving and forming a continuous length of film strip about the units, a longitudinal sealer co-operable with said first means for sealing opposed-longitudinal edges of the thus formed strip of film to form a closed tube of film having longitudinally spaced units therein, a transverse sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a hood mounted over said shoes and having outlets for flowing

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a controlled atmosphere into the longitudinally sealed tube in a downstream direction and about the spaced units as the units are moved downstream toward said transverse sealer, a second means including an exhaust pipe extended inside of the closed tube of film downstream of the longitudinal sealer and having a pipe inlet disposed at an area immediately adjacent to said transverse sealer for evacuating the controlled atmosphere flowing downstream in the film tube, and an analyzer unit operatively connected with said second means for analyzing the controlled atmosphere content of the tube of film at said area immediately adjacent to said transverse sealer.

15. In an apparatus for continuous packaging of units, a frame, a first means mounted on said frame for continuously folding a flat strip of film about the spaced units, means defining an enclosed area enclosing the strip and the units on the strip where the film is being folded about the strip, a longitudinal sealer supported by said frame adjacent said first means for sealing opposed-longitudinal edges of the thus folded strip to form a closed tube of film having longitudinally spaced units therein, a transverse sealer spaced from said longitudinal sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a second means for flowing a controlled atmosphere through the enclosed area in a downstream direction toward the transverse sealer so that a plurality of units are swept with the controlled atmosphere, a third means including an exhaust pipe extending into the tube from a point adjacent to said first means and with said tube having an inlet adjacent to said transverse sealer for pulling the controlled atmosphere from the tube and for assisting in the downstream flow of the controlled atmosphere over the units, and gas scrubber means operatively connected with said exhaust pipe and positioned for emitting the thus removed controlled atmosphere against an underside of units to be packaged.

16. In an apparatus for continuous packaging of units, a frame, a carriage mounted on said frame, a pair of shoes mounted on said carriage and having opposed converging guide edges and a pair of rollers mounted on said shoes for receiving a continuous length of film strip carrying longitudinally spaced units to be packaged with the guide edges guiding movement of the units and co-operable with the rollers in folding the strip about the units between the rollers and the shoes, a longitudinal sealer co-operable with said shoes and rollers for sealing opposed-longitudinal edges of the thus folded strip of film to form a closed tube of film having longitudinally spaced units therein, a transverse sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a hood having downstream opening outlets for flowing a controlled atmosphere into the longitudinally sealed tube in a downstream direction and about the spaced units as the units are moved downstream toward said transverse sealer, and means including an exhaust pipe extended inside of the closed tube of film and having a pipe inlet disposed at an area immediately adjacent to said transverse sealer for evacuating the controlled atmosphere flowing downstream in the film tube.

17. In an apparatus for continuous packaging of units in a controlled atmosphere, a frame, a carriage mounted on said frame, a pair of shoes mounted on said carriage and having opposed converging guide edges and a pair of rollers mounted on said shoes for receiving a continuous length of film strip carrying longitudinally spaced units to be packaged with the guide edges guiding movement of the units and co-operable with the rollers in folding the strip about the units between the rollers and the shoes, a longitudinal sealer co-operable with said shoes and rollers for sealing opposed-longitudinal edges of the thus folded strip of film to form a closed tube of film

having longitudinally spaced units therein, a transverse sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a hood having outlets for flowing a controlled atmosphere into the longitudinally sealed tube in a downstream direction and about the spaced units as the units are moved downstream toward said transverse sealer, means including an exhaust pipe extended inside of the closed tube of the film and having a pipe inlet disposed at an area immediately adjacent to said transverse sealer for evacuating the controlled atmosphere flowing downstream in the film tube, and means for moving the carriage vertically of a top surface of the frame to enable different sized units to be more readily packaged.

18. In an apparatus for continuous packaging of units in a controlled atmosphere, a frame, a conveyor spaced from the frame for conveying units onto a film strip on said frame, a first means mounted on said frame for continuously folding a flat strip of film about the spaced units, means defining an enclosed area enclosing the strip and the units on the strip where the film is being folded about the strip, a longitudinal sealer supported by said frame adjacent said first means for sealing opposed-longitudinal edges of the thus folded strip to form a closed tube of film having longitudinally spaced units therein, a transverse sealer spaced from said longitudinal sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a second means for flowing a controlled atmosphere through the enclosed area in a downstream direction toward the transverse sealer so that a plurality of units are swept with the atmosphere, a third means including an exhaust pipe extending into the tube from a point adjacent to said first means and with said pipe having an inlet adjacent to said transverse sealer for pulling the controlled atmosphere from the tube and for assisting in a downstream flow of the controlled atmosphere over the units, and scrubber means disposed in the space between said frame and said conveyor for emitting a controlled atmosphere against an underside of units to be packaged.

19. In an apparatus for continuous packaging of units in a controlled atmosphere, a frame, a conveyor spaced from the frame for conveying units onto a film strip on said frame, a first means mounted on said frame for continuously folding a flat strip of film about the spaced units, means defining an enclosed area enclosing the strip and the units on the strip where the film is being folded about the strip, a longitudinal sealer supported by said frame adjacent said first means for sealing opposed-longitudinal edges of the thus folded strip to form a closed tube of film having longitudinally spaced units therein, a transverse sealer spaced from said longitudinal sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a second means for flowing a controlled atmosphere through the enclosed area in a downstream direction toward the transverse sealer so that a plurality of units are swept with the atmosphere, a third means including an exhaust pipe extending into the tube from a point adjacent to said first means and with said pipe having an inlet adjacent to said transverse sealer for pulling gas from the film tube and for assisting in the downstream flow of the controlled atmosphere over the units, and scrubber means disposed for emitting the controlled atmosphere against the units to be packaged, the scrubber means being operatively connected with said exhaust pipe and utilizing the controlled atmosphere removed from the closed film tube in the scrubbing of the units preparatory to packaging of such units.

20. In an apparatus for continuous packaging of units in a controlled atmosphere, a frame, a conveyor spaced from the frame for conveying units onto a film strip on

said frame, a first means mounted on said frame for continuously folding a flat strip of film about the spaced units, a longitudinal sealer supported by said frame adjacent said first means for sealing opposed-longitudinal edges of the thus folded strip to form a closed tube of film having longitudinally spaced units therein, a transverse sealer spaced downstream from said longitudinal sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a second means for circulating a controlled atmosphere through the tube of film, and scrubber means disposed in the space between said frame and said conveyor for emitting a controlled atmosphere against an underside of units preparatory to packaging the units to be packaged.

21. In an apparatus for continuous packaging of units in a controlled atmosphere, support means, a first means mounted on said support means for continuously folding a flat strip of film about the spaced units, a longitudinal sealer supported by said support means adjacent said first means for sealing opposed-longitudinal edges of the thus folded strip to form a closed tube of film having longitudinally spaced units therein, a transverse sealer spaced from said longitudinal sealer for transversely sealing the tube at longitudinally spaced intervals between the units for forming a series of packaged units, a second means for circulating a controlled atmosphere through the enclosed area about the units, a third means for withdrawing the controlled atmosphere from the film tube, and an analyzer for analyzing the controlled atmosphere and a recorder connected with said third means for maintaining a continuous analysis record of the controlled atmosphere withdrawn from the film tube.

22. In a method of packaging a plurality of spaced units in a forwardly moving elongated tube of gas impervious flexible material adapted to be progressively sealed about said units, the steps of flowing preservative gas in said tube, withdrawing gas from said tube as it is moving forward, and recirculating withdrawn gas over spaced units being moved forwardly into the tube.

23. In a method of packaging a plurality of spaced units in a forwardly moving elongated tube of gas impervious flexible material adapted to be progressively sealed about said units, the steps of flowing preservative gas in said tube, withdrawing gas from said tube as it is moving forward and recirculating withdrawn gas over spaced units being moved forwardly into the tube, and utilizing at least a portion of the withdrawn gas as it is being withdrawn from the tube for analyzing the atmosphere of each unit being packaged.

24. In a method of packaging a plurality of spaced units in a forwardly moving elongated tube of gas impervious flexible material adapted to be progressively sealed about said units, the steps of flowing preservative gas in said tube, withdrawing gas from said tube, and utilizing at least a portion of the withdrawn gas as it is being withdrawn from the tube for analyzing the atmosphere of each unit being packaged.

25. In a method of packaging a plurality of spaced units in a forwardly moving elongated tube of gas impervious flexible material adapted to be progressively sealed about said units, the steps of flowing preservative gas in said tube, withdrawing gas from said tube as it is moving forward, and recirculating withdrawn gas against undersides of spaced units being moved forwardly into the tube.

26. In a method of packaging a plurality of spaced units in a forwardly moving elongated tube of flexible film substantially impervious to air and the like and which film is adapted to be progressively sealed about said units, the steps of flowing a controlled atmosphere in said tube, withdrawing the controlled atmosphere from said tube as it is moving forward, and recirculating the withdrawn atmosphere over spaced units being moved forwardly into the tube.

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27. In a method of packaging a plurality of spaced units in a forwardly moving elongated tube of flexible film adapted to be progressively sealed about said units, the steps of flowing a controlled atmosphere in said tube, withdrawing atmosphere from said tube as it is moving forward and recirculating withdrawn atmosphere past spaced units being moved forwardly into the tube,

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and utilizing at least a portion of the withdrawn atmosphere as it is being withdrawn from the tube for analyzing the atmosphere of each unit being packaged.

No references cited.

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