

Aug. 18, 1953

G. TAUNTON
AIRTIGHT PACKAGE

2,649,234

Filed July 11, 1950

3 Sheets-Sheet 1

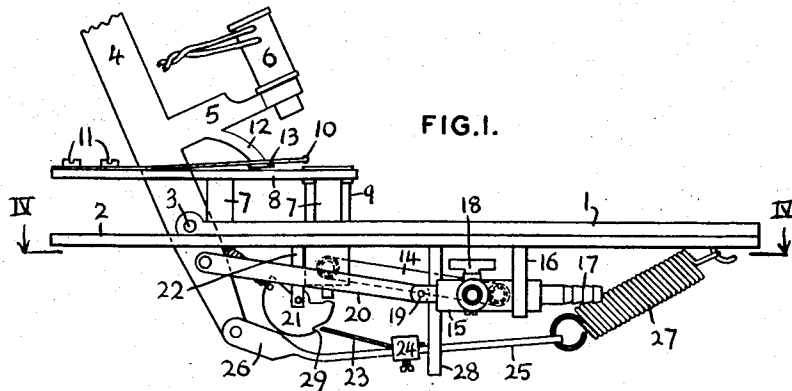


FIG. 1.

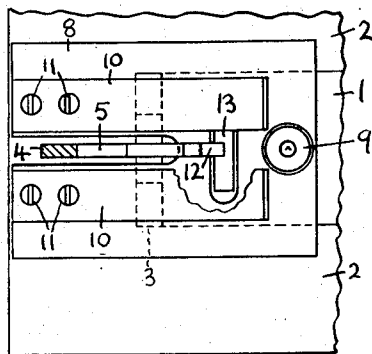


FIG. 2.

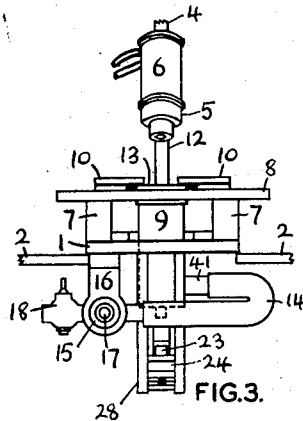


FIG. 3.

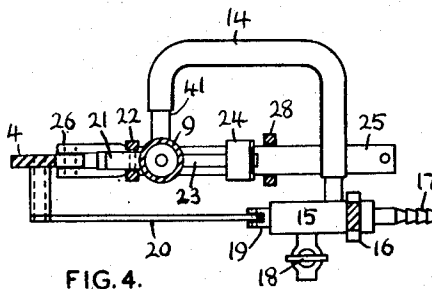


FIG. 4.

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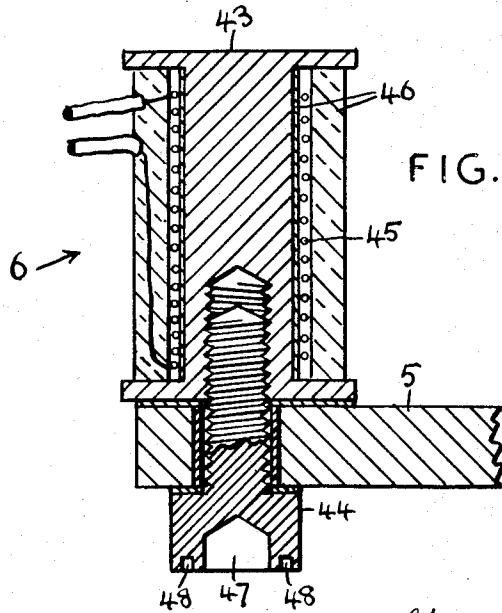
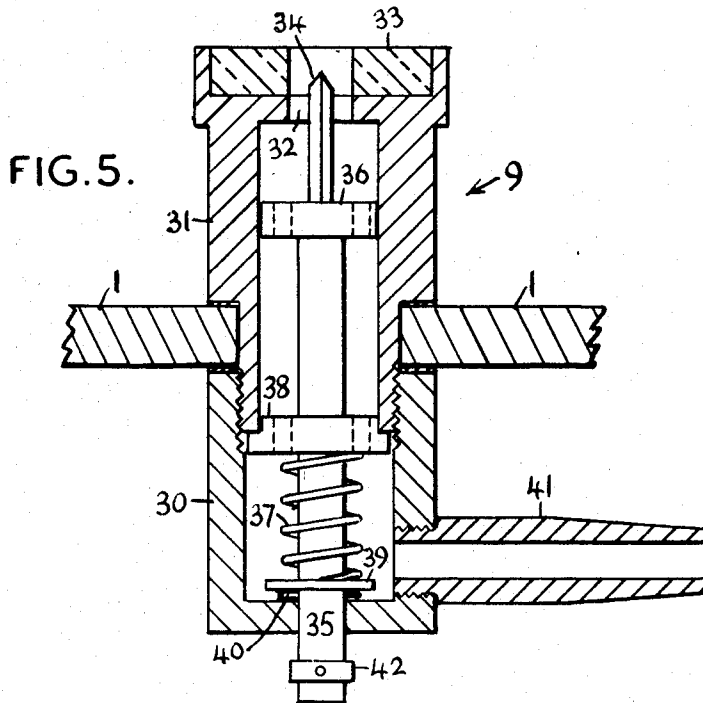
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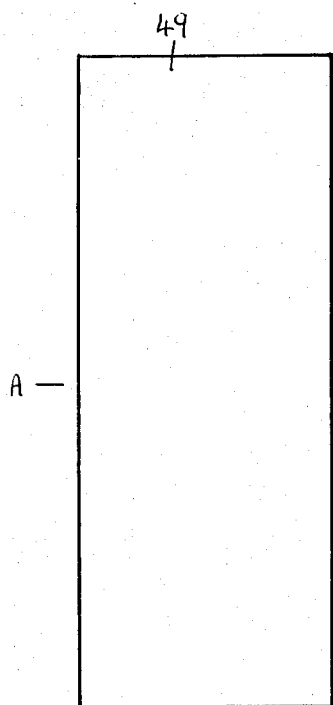


FIG. 8.

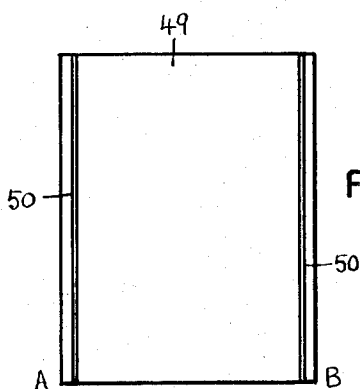


FIG. 9.

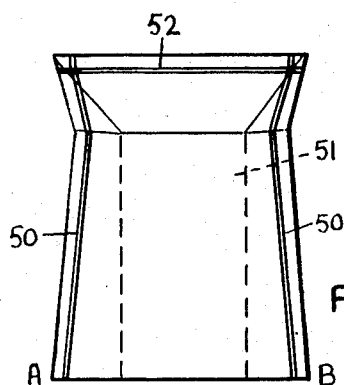


FIG. 10.

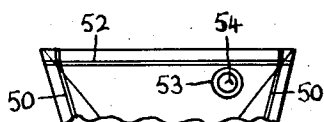


FIG. 11.

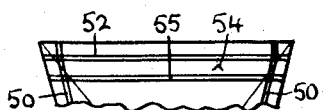


FIG. 12.

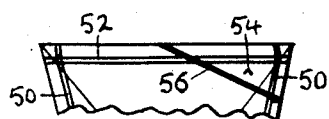


FIG. 13.

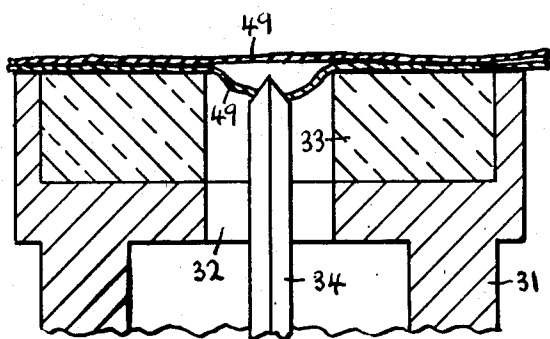


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UNITED STATES PATENT OFFICE

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AIRTIGHT PACKAGE

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19 Claims. (Cl. 226-56)

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This invention relates to airtight packages and in particular to the partial or complete evacuation of such packages.

It has already been proposed to wrap foodstuffs and other articles in flexible airtight materials, such as waxed sheet material or suitable coated cellulose acetate film, and to seal the edges of the wrapping by heat or otherwise so as to produce an airtight package.

The object of the present invention is to provide a flexible oxygen-proof container in which the amount of oxygen retained within the container is reduced to any desired quantity after sealing.

In this way, especially in the case of foodstuffs, such as cheese, the development of moulds, yeasts, bacteria and the like is inhibited, loss of weight by evaporation of the contents is substantially eliminated and the contents are protected from external contamination.

According to this invention a method of reducing the oxygen content of a flexible airtight sealed package, for example a bag or pouch, comprises the steps of bringing the material of the package, at a part thereof where the inner faces of the material can be brought together without obstruction, into contact with a suction member having an orifice therein, applying suction to said orifice, piercing an exhausting slit in the material by means of a piercing tool passed through said orifice so that air is withdrawn from the interior of the package by said suction member, bringing the inner faces of the packaging material into contact with each other in the neighbourhood of said orifice and sealing said faces together so that an airtight seal is effected between the interior of the package and said exhausting slit.

The material from which the package is made may be any suitable oxygen-proof waxed sheet material, or a suitably coated cellulose acetate film, or a suitably coated regenerated cellulose film. A further suitable material is that known under the registered trade-mark "Pliofilm." It is also possible, and in many cases preferable, to use a laminated packaging material. Thus for example a material formed from laminations of "Pliofilm" and cellulose acetate, or of polyethylene and cellulose acetate or of "Pliofilm" and metal foil, may be used.

It is preferred to use a material which can be sealed together by the application of heat and pressure in the known manner. Alternatively, however, other oxygen-proof materials may be used the faces of which to be joined together are

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provided with a coating of pressure-sensitive adhesive.

The invention also includes apparatus for reducing the oxygen content of a flexible airtight sealed package which comprises a suction member having an orifice therein against which the packaging material may be located, means for applying suction to said orifice, a piercing tool either fixed or reciprocable within said orifice to pierce an exhausting slit in said packaging material, and sealing means for providing an airtight seal in said packaging material between said exhausting slit and the interior of the package. Said sealing means may be a heated tool adapted to press the two thicknesses of the packaging material together against said suction member around the orifice therein.

The shape of the face of the heated tool may be varied; thus it may be circular, triangular or polygonal. Where it is of relatively large area it is preferable, when using waxed packaging material, to provide grooves in the face thereof to prevent the wax from being driven away from the heated surface; for example the face of the heating tool may consist of a number of concentric ridges.

The invention will now be described with reference to the accompanying drawings, given by way of example, in which:

Figure 1 is a side elevation of apparatus according to the invention for reducing the oxygen content of a flexible airtight sealed package,

Figure 2 is a partial plan view of the apparatus of Figure 1 with parts broken away,

Figure 3 is a front view of the apparatus of Figure 1 with certain parts omitted,

Figure 4 is a plan view of the apparatus taken on the line IV-IV of Figure 1 with certain parts omitted,

Figure 5 is a vertical section, on a larger scale, of the suction member of Figure 1,

Figure 6 is a vertical section, on a larger scale, of the sealing member of Figure 1,

Figure 7 is a vertical section, on a still larger scale, of the upper part of the suction member of Figure 5, and

Figures 8 to 13 illustrate steps in the formation of a sealed package.

Referring first to Figures 1 to 4, a bedplate 1 is mounted on suitable support plates 2 and is shaped at its rear end for the reception of a pin 3 by means of which a lever 4 is pivoted to the bedplate 1. The lever 4 is provided, above the pivot 3, with an arm 5 which carries a sealing member 6 (to be described later), the sealing

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member 6 and part of the arm 5 being omitted from Figure 2 for the sake of clarity.

Supported on the bedplate 1 by means of four pillars 7 is a table 8 which is slotted to allow movement of the lever 4 and is also provided with an aperture through which protrudes the upper end of a suction member 9 (to be described later). Two resilient fingers 10 are secured to the table 8 by screws 11 and normally press against the table 8 for a purpose to be described later.

The arm 5 is provided with a curved extension 12 carrying at its lower end a plate 13, movement of which is permitted by the provision of a slot in the table 8. By slight counterclockwise movement of lever 4, the plate 13 is moved upwardly to raise the fingers 10 out of engagement with the table 8.

The suction member 9 is connected by a pipe 14 to a vacuum valve 15, supported from the bedplate 1 by a bracket 16. The valve 15 is provided with a nipple 17 for connection to a vacuum pump (not shown) and is also provided with a release cock 18. The valve 15 also comprises a plunger 19, movement of which can be effected by means of a link 20 pivoted at one end to the plunger 19 and at the other end to the lever 4. Progressive clockwise movement of the lever 4 moves the plunger 19 to establish communication first between the nipple 17 and the pipe 14 and then also between these and the release cock 18.

The hammer 21, in the form of a spring-loaded substantially semicircular plate, is pivoted to a bracket 22 mounted on the underside of the bedplate 1 and is adapted to be actuated by a leaf spring 23 adjustably mounted by means of a clamp 24 on a bar 25 one end of which is formed as a stirrup 26 pivoted to the lever 4 and the other end of which is connected to a spring 27 (shown only in Figure 1) attached to the bedplate 1.

The bar 25 is guided between the arms of a bracket 28 mounted on the underside of the bedplate 1. The hammer 21 is provided with a notch 29 in which the end of the leaf spring 23 engages upon initial clockwise movement of the lever 4; upon further clockwise movement of the lever 4, the hammer turns in a clockwise direction until the end of the leaf spring 23 is forced out of the notch 29, whereupon the hammer 21 moves sharply in a counterclockwise direction under the action of its spring (shown only in Figure 1).

Referring now more particularly to Figures 5 and 7, the suction member 9 comprises a lower casing 30 and an upper casing 31, the internal diameter of the latter being smaller than that of the former. The two casings are provided with complementary screw-threads so that they may be screwed together and thereby mounted on the bedplate 1 as indicated. The upper casing 31 is provided with an orifice 32 and the upper face of the casing 31 is recessed for the reception of an annular resilient facing 33, for example of rubber.

A piercing tool 34, which in the example shown is of V-shaped cross-section, is mounted in the end of a rod 35 slidable within the suction member 9. The rod 35 passes through an aperture in the lower end of the casing 30 and is provided at its upper end with a flange 36 which slides within the casing 31. The rod 35 is urged downwardly by a spring 37 located between the loose collar 38 (mounted on the rod 35 and abutting against the lower end of the casing 31) and a

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washer 39 which is held in position on the rod 35 by a cotter pin 40. The casing 30 is provided with a nipple 41 for the attachment of the pipe 14 (Figures 1, 3 and 4). The flange 36 and the loose collar 38 are provided with perforations (indicated by dotted lines). The stroke of the rod 35 may, if desired, be limited by an adjustable stop 42.

Referring to Figure 6, the sealing member 6 comprises a metallic bobbin 43 into which is screwed a cylindrical metallic sealing tool 44 whereby the sealing member 6 is held in position on the arm 5. An electrical heating element 45 is wound on the bobbin 43, suitable insulation 46 being provided between the element and the bobbin and also externally around the element. The front face of the sealing tool 44 has a circular recess 47 and an annular groove 48.

The invention will now be described as applied to the airtight packaging of cheese, but it will be understood that other materials or articles may be packaged in a similar manner.

Referring first to Figures 8 to 10, a rectangular sheet 49 (Figure 8) of a suitable flexible packaging material, is folded about the centre line A—B and the two side edges sealed together at 50 by means of a heated tool, such as heated rollers, in known manner (Figure 9). In this way a bag is formed, the end A—B of which is closed while the opposite end remains open. A wedge-shaped piece of cheese is then inserted through the open end of the bag until the thin end of the wedge contacts the fold A—B (Figure 10); the position occupied by the cheese is indicated by dotted lines at 51.

The two layers of film at the open end are sealed together at 52 by means of a heated tool, such as heated rollers, in known manner. The cheese is then contained in an airtight package which also contains air.

The package is then laid on the bedplate 1 (Figures 1 to 3) with the sealed end 52 lying on the table 8, the fingers 10 being raised slightly by a small counterclockwise movement of the lever 4 and then allowed to return to hold the sealed end 52 firmly on the table in a position in which a part of the package between the seal 52 and the cheese 51 overlies the orifice in the suction member 9.

The lever 4 is then moved in a clockwise direction, and during this movement the following sequence of operations takes place:

(1) Air is withdrawn by suction from the suction member 9 so that the lower layer 49 of the film overlying the orifice 32 of the suction member 9 is drawn down slightly into the orifice as shown in Figure 7, while the upper layer remains substantially flat.

(2) The hammer 21 is cocked and released to strike the lower end of the rod 35 whereby the piercing tool 34 is driven upwards to pierce an exhausting slit in the said lower layer of the film without the upper layer being pierced, so that air is withdrawn from the package. It is possible to regulate the stroke of the piercing tool 34 to achieve this purpose by suitable selection of the spring loading of the hammer 21 and the rod 35 and by adjustment of the position of the clamp 24 holding the leaf spring 23. Alternatively, and more simply, a stop 42 may be provided on the lower end of the rod 35 as already described. The V-shaped piercing tool 34 forms a triangular tab which is drawn open by the suction to facilitate the evacuation of the package.

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(3) The release cock 18 is brought into communication with the pipe 14 so that any desired degree of final evacuation of the package may be obtained depending on the extent to which the release cock is opened. If desired a vacuum gauge may be connected to the pipe 14 to give an indication of the degree of evacuation.

(4) The heated sealing tool 44 presses on the film 49 within the area bounded by the resilient facing 33 and effects a sealing together of the two layers 49 of film around the exhausting slit. The recess 47 and the groove 48 in the sealing tool 44 prevent wax (when a waxed material is used for the packaging material) being driven away from the heated surface and thereby endangering the efficacy of the seal. Figure 11 indicates the circular seal 53 around the exhausting hole 54, whereby the latter is sealed off from the interior of the package.

It will be readily understood that, as an alternative to the circular seal 53, it is possible to provide a seal across the end of the package from one side to the opposite side as indicated at 55 in Figure 12 or from one side to an adjacent side as indicated at 56 in Figure 13.

Other modifications are possible in the various details hereinbefore described within the scope of the following claims.

I claim:

1. Apparatus for reducing the oxygen content of a flexible airtight sealed package comprising a suction member having an orifice therein against which the packaging material of the sealed package may be located, resilient fingers adapted to press on said packaging material to hold it in position, means for applying suction to said orifice, a piercing tool reciprocable within said orifice to pierce an exhausting slit in said packaging material, sealing means for providing an airtight seal in said packaging material between said exhausting slit and the interior of the package, and an actuating lever which upon movement in one direction lifts said fingers to permit insertion of the packaging material and upon movement in the opposite direction allows said fingers to return to grip the packaging material and actuates in turn the suction means, the piercing tool and the sealing means.

2. Apparatus for reducing the oxygen content of a flexible airtight sealed package comprising a suction member having an orifice therein against which the packaging material of the sealed package may be located, a source of suction, a valve interposed between said suction member and said source of suction and including a plunger, an actuating lever, a link pivoted at one end to said lever and at the other end to said plunger, a piercing tool reciprocable within said suction member to pierce the packaging material in said orifice, a hammer, a spring loaded bar pivoted to said lever, an adjustable clamp on said bar, a leaf spring clamped within said clamp, an arm on said lever and sealing means carried by said arm so that upon movement of said lever said plunger is moved to establish communication between said source of suction and said suction member, said leaf spring actuates said hammer to strike said piercing tool to pierce an exhausting slit in said packaging material and said sealing means is pressed onto said packaging material to effect an airtight seal between said exhausting slit and the interior of the package.

3. Apparatus as claimed in claim 2 comprising an adjustable release cock on said valve for reg-

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ulating the degree of evacuation of said package prior to sealing.

4. A method of reducing the air content of a flexible air-tight sealed package consisting of a sheet material, comprising the steps of applying suction to a portion of the sheet material forming the package for separating said portion from the opposite wall of the package; piercing said portion only so that the suction applied thereto effects an evacuation of said sealed package; and sealing an area around said portion so as to prevent entering of air through said pierced portion.

5. A method for reducing the air content of a flexible air tight sealed package comprising the steps of bringing suction member having an orifice into contact with the outer face of a wall portion of the package at a part of said package where the inner faces of said wall portion and of an opposite wall can be directly superimposed; applying suction to said orifice so as to separate at said orifice only said inner face of said wall portion from said opposite wall; piercing a slit through said wall portion only by means of a piercing tool passing through said orifice so that air is withdrawn from the interior of the package through said orifice; bringing said inner faces of said wall portion and of said opposite wall into contact with each other in the region of said orifice; and sealing said inner faces together so that an air tight seal is produced between the interior of the package and said slit.

6. A method as claimed in claim 5 wherein said inner faces of said wall portion and of said opposite wall are provided with a coating of a pressure-sensitive adhesive, and wherein said sealing is carried out by applying pressure.

7. A method as claimed in claim 5 wherein the walls of the package which are to be sealed consist of a material which can be sealed by the application of heat, and wherein heat is applied for sealing said inner faces.

8. Apparatus for reducing the air content of a flexible air tight sealed package comprising, in combination, suction member having an orifice adapted to engage a wall portion of the package; means for applying suction to said orifice so as to separate said wall portion from the opposite wall of the package and to hold said wall portion to said orifice; a piercing tool arranged within said orifice movable therein from a retracted position to a piercing position and adapted to pierce in said piercing position said wall portion held by suction to said orifice only, but not said opposite wall; and sealing means for providing an air tight seal between said slit and the interior of the package.

9. An apparatus as claimed in claim 8 and including operating means operatively connected to said means for applying suction, to said piercing tool, and to said sealing means for consecutively actuating the same.

10. An apparatus as claimed in claim 8 and including resilient holding means for holding said package against said suction member.

11. An apparatus as claimed in claim 8 wherein said piercing tool has a point of V-shaped cross section so as to form a triangular tab in said wall portion.

12. Apparatus for reducing the air content of a flexible air tight sealed package comprising, in combination, suction member having an orifice adapted to engage a wall portion of the package; means for applying suction to said orifice so as to separate said wall portion from the opposite wall of the package and to hold said wall

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portion to said orifice; a piercing tool arranged within said orifice reciprocable therein from a retracted position to a piercing position and adapted to pierce in said piercing position said wall portion held by suction to said orifice only, but not said opposite wall; means for reciprocating said piercing tool; and sealing means for providing an air tight seal between said slit and the interior of the package.

13. An apparatus as claimed in claim 12 and including stop means for limiting the reciprocating movement of said piercing tool.

14. Apparatus for reducing the air content of a flexible air tight sealed package comprising, in combination, suction member having an orifice adapted to engage a wall portion of the package; means for applying suction to said orifice so as to separate said wall portion from the opposite wall of the package and to hold said wall portion to said orifice; a piercing tool arranged within said orifice movable therein from a retracted position to a piercing position and adapted to pierce in said piercing position said wall portion held by suction to said orifice only, but not said opposite wall; and heated tool means arranged oppositely said orifice of said suction member, and adapted to press said opposite wall and said wall portion together and against said suction member for providing an air tight seal between said slit and the interior of the package.

15. An apparatus as claimed in claim 14 wherein said heated tool means is provided with an annular sealing face formed with at least one annular groove.

16. Apparatus for reducing the air content of a flexible air tight sealed package comprising, in combination, suction member having an orifice adapted to engage a wall portion of the package; means for applying suction to said orifice so as to separate said wall portion from the opposite

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wall of the package and to hold said wall portion to said orifice; a piercing tool arranged within said orifice movable therein from a retracted position to a piercing position and adapted to pierce in said piercing position said wall portion held by suction to said orifice only, but not said opposite wall; a vacuum valve means interposed between said suction member and said means for applying suction; a hammer means movable between an inoperative position and a striking position striking said piercing tool for moving the same from said retracted position to said piercing position; sealing means for providing an air tight seal between said slit and the interior of said package; and an operating lever connected to said vacuum valve means, to said hammer means, and to said sealing means for consecutively actuating the same.

17. An apparatus as claimed in claim 16 wherein said vacuum valve means includes an adjustable release cock for regulating the degree of evacuation of the package.

18. An apparatus as claimed in claim 16 wherein said vacuum valve means includes a plunger; and including a link pivoted at one end to said plunger and at the other end thereof to said operating lever.

19. An apparatus as claimed in claim 16 including a bar pivoted to said operating lever; and a leaf spring adjustably mounted on said bar and connected to said hammer means for actuating the same.

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