

[54] **DEVICE FOR THE EVACUATION, CLIPPING AND TRIMMING OF BAG-LIKE PACKAGES**

[75] Inventors: **L. George Andre**, Cincinnati, Ohio; **Wayne R. Barthalomew**; **Paul W. Worline**, both of Oak Ridge, Tenn.

[73] Assignees: **Acraloc Corporation**, Oak Ridge, Tenn.; **Rheem Manufacturing Company**, New York, N.Y. ; part interest to each.

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[51] Int. Cl. **B65b 31/06**

[58] Field of Search **53/112 B, 79**

[56] **References Cited**

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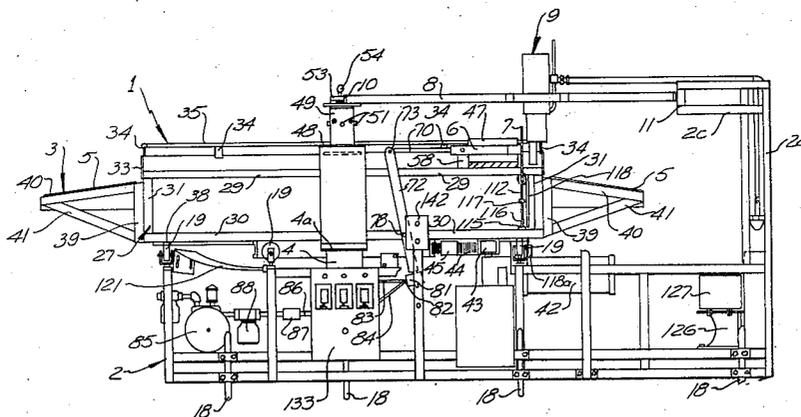
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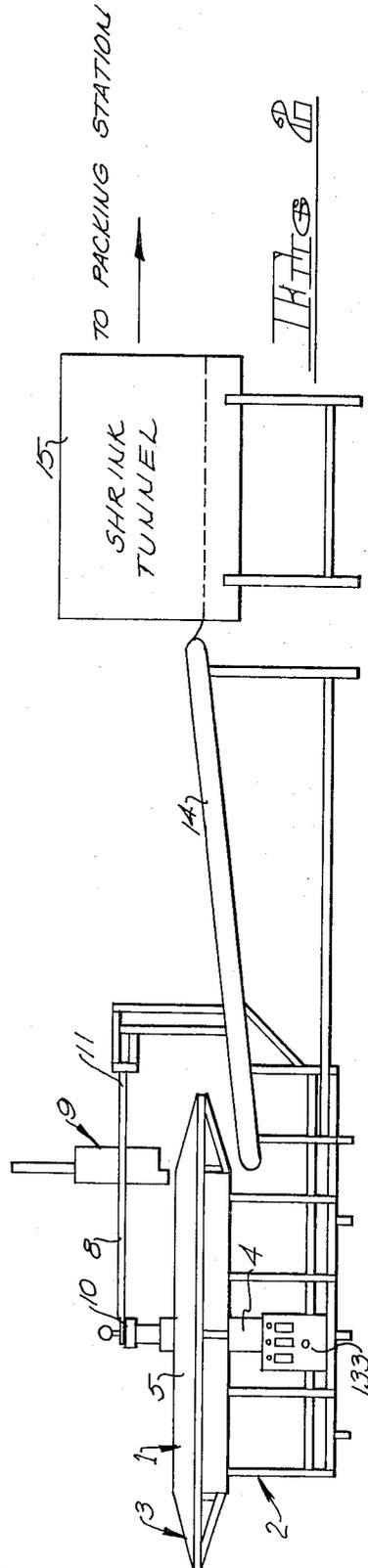
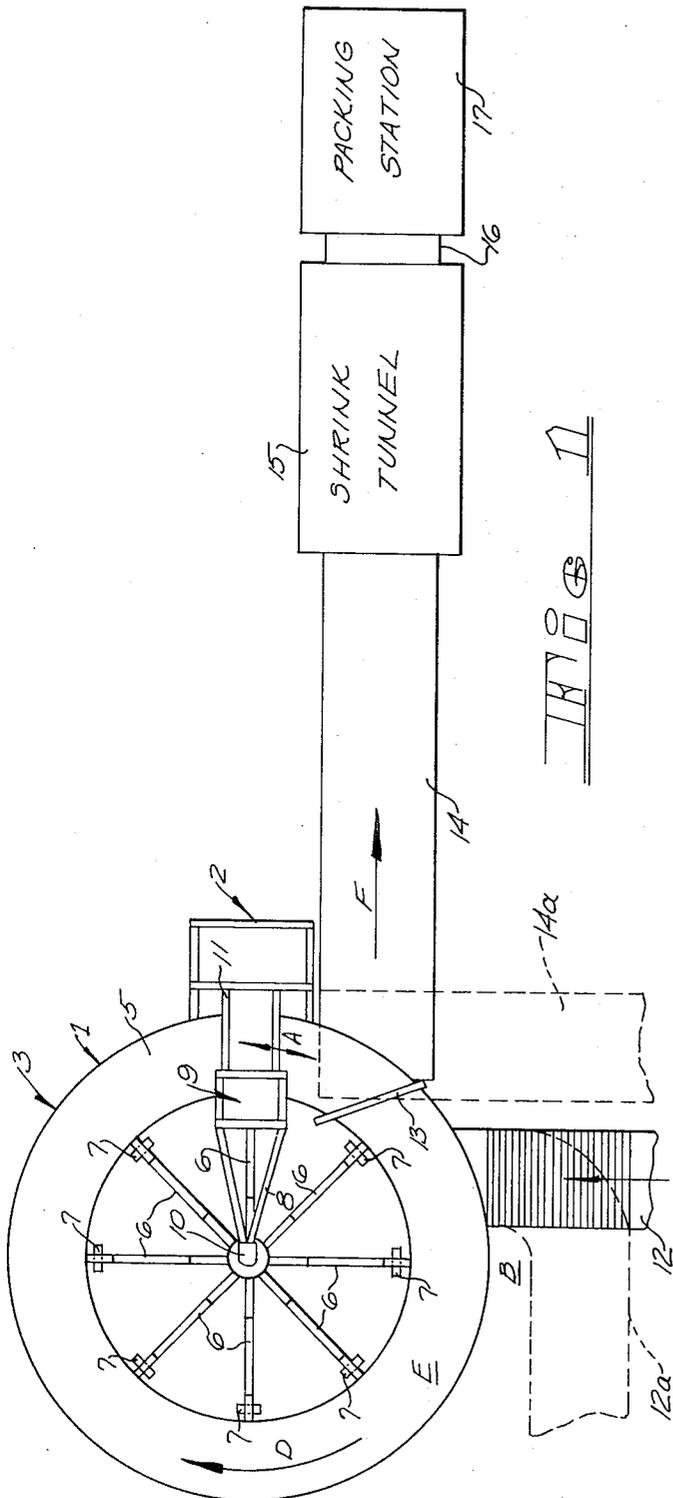
Primary Examiner—Travis S. McGehee
Attorney, Agent, or Firm—Melville, Strasser, Foster & Hoffman

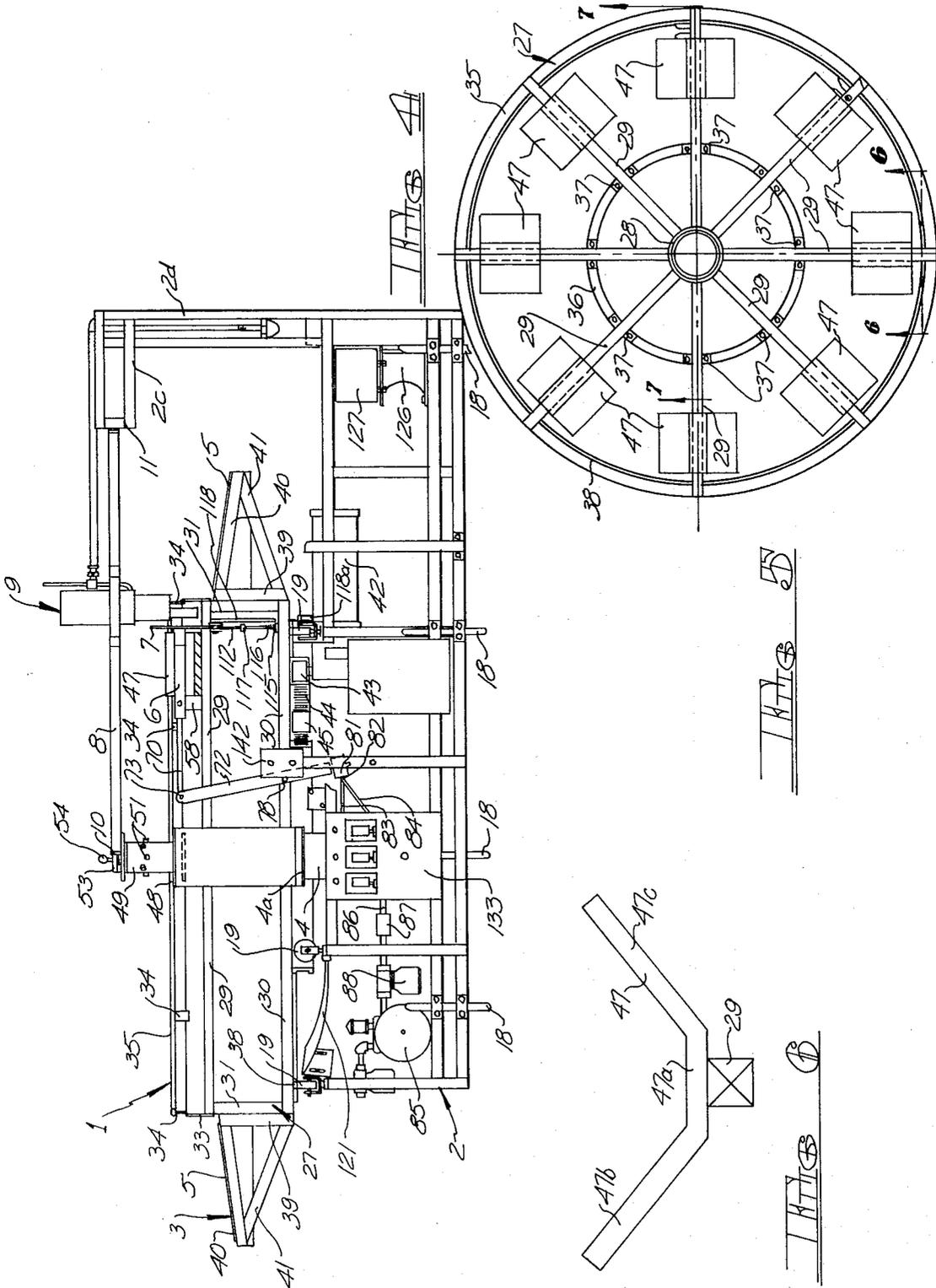
[57] **ABSTRACT**

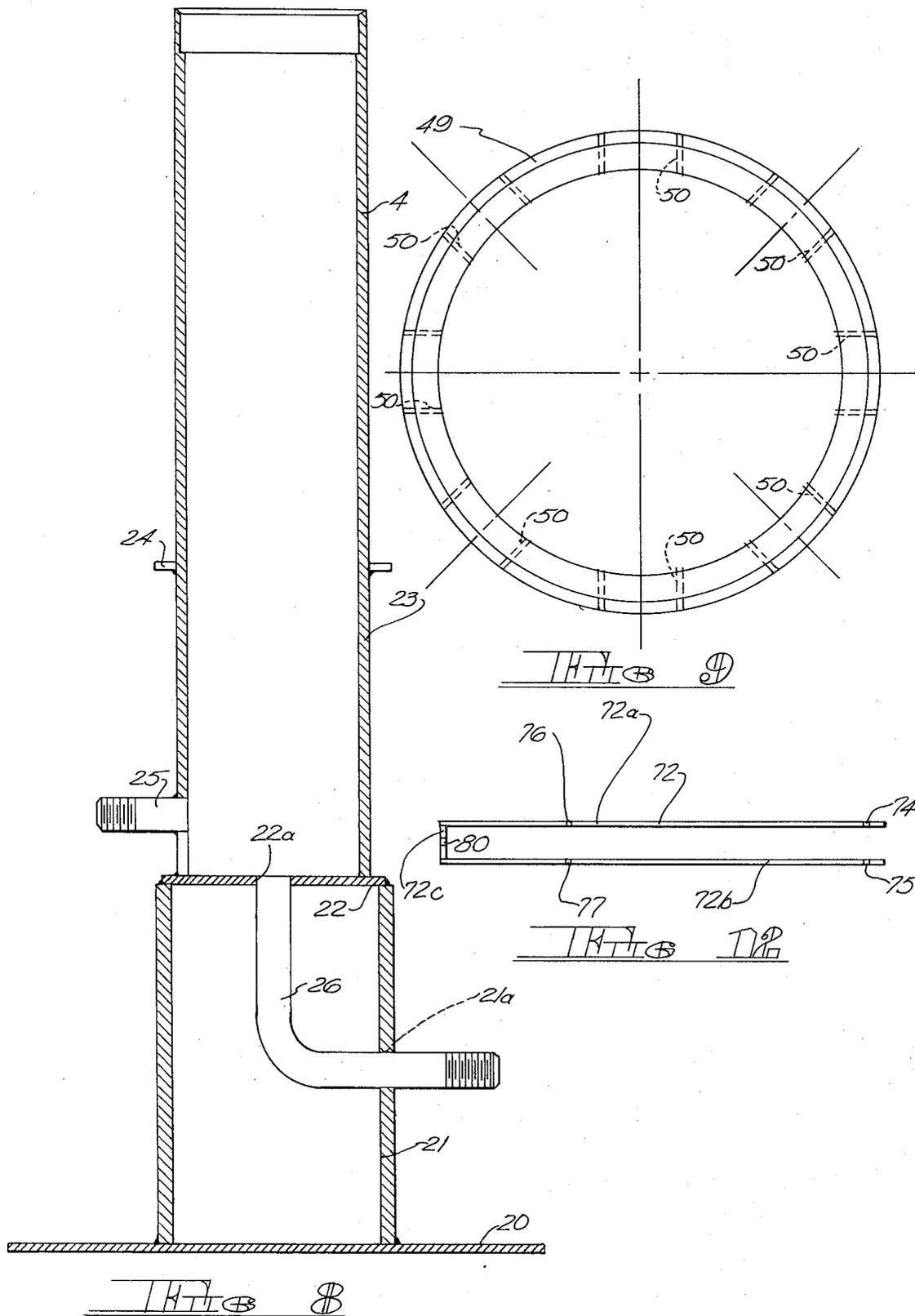
A device for the evacuation, clipping and trimming of product containing, bag-like packages comprising a rotatable assembly having a circular table portion, a plurality of radially oriented evacuation nozzles and clamping means for each nozzle for sealingly affixing a product containing bag-like package thereon. The device has circumferentially arranged about the rotating assembly a bag insertion position having clamp closing means, vacuum initiating means, vacuum terminating means, means to clip the bag-like package and to trim the excess end therefrom, clamp releasing means, means to divert the package from the table portion of the rotating assembly to further processing equipment and means to dispose of the excess bag end. Finally, means are provided to rotate the assembly and each of its nozzle and clamping means through the above noted positions.

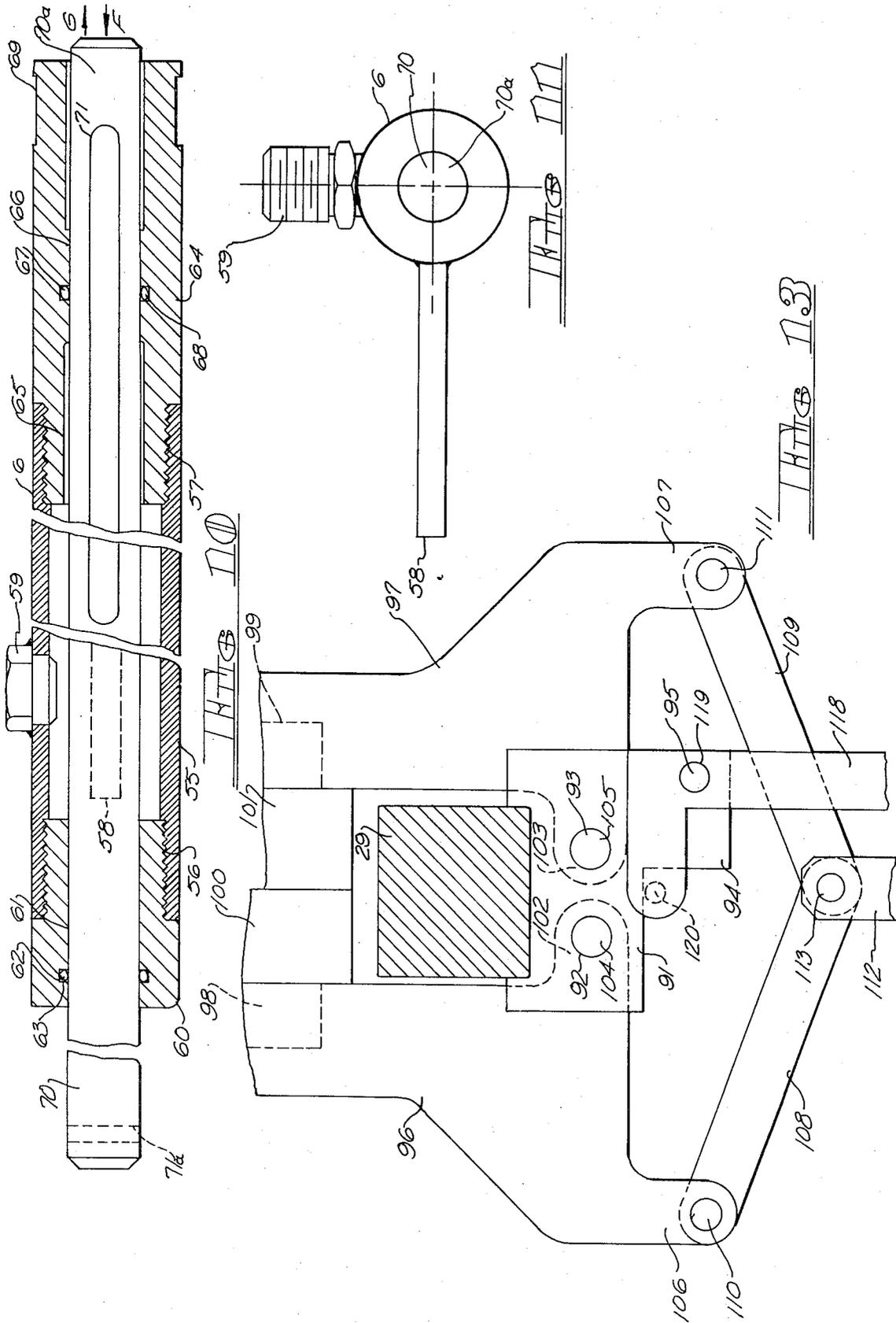
29 Claims, 16 Drawing Figures

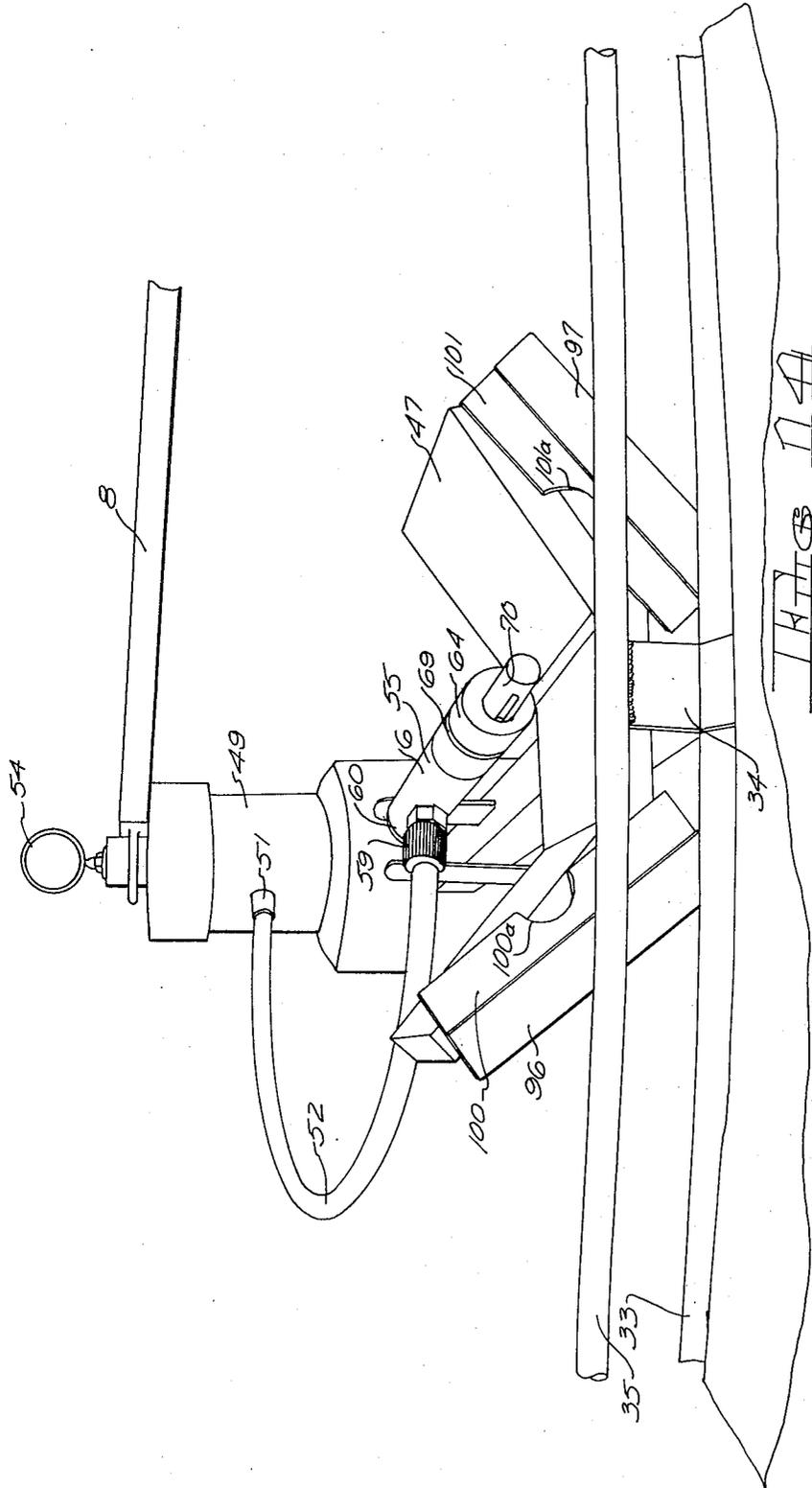


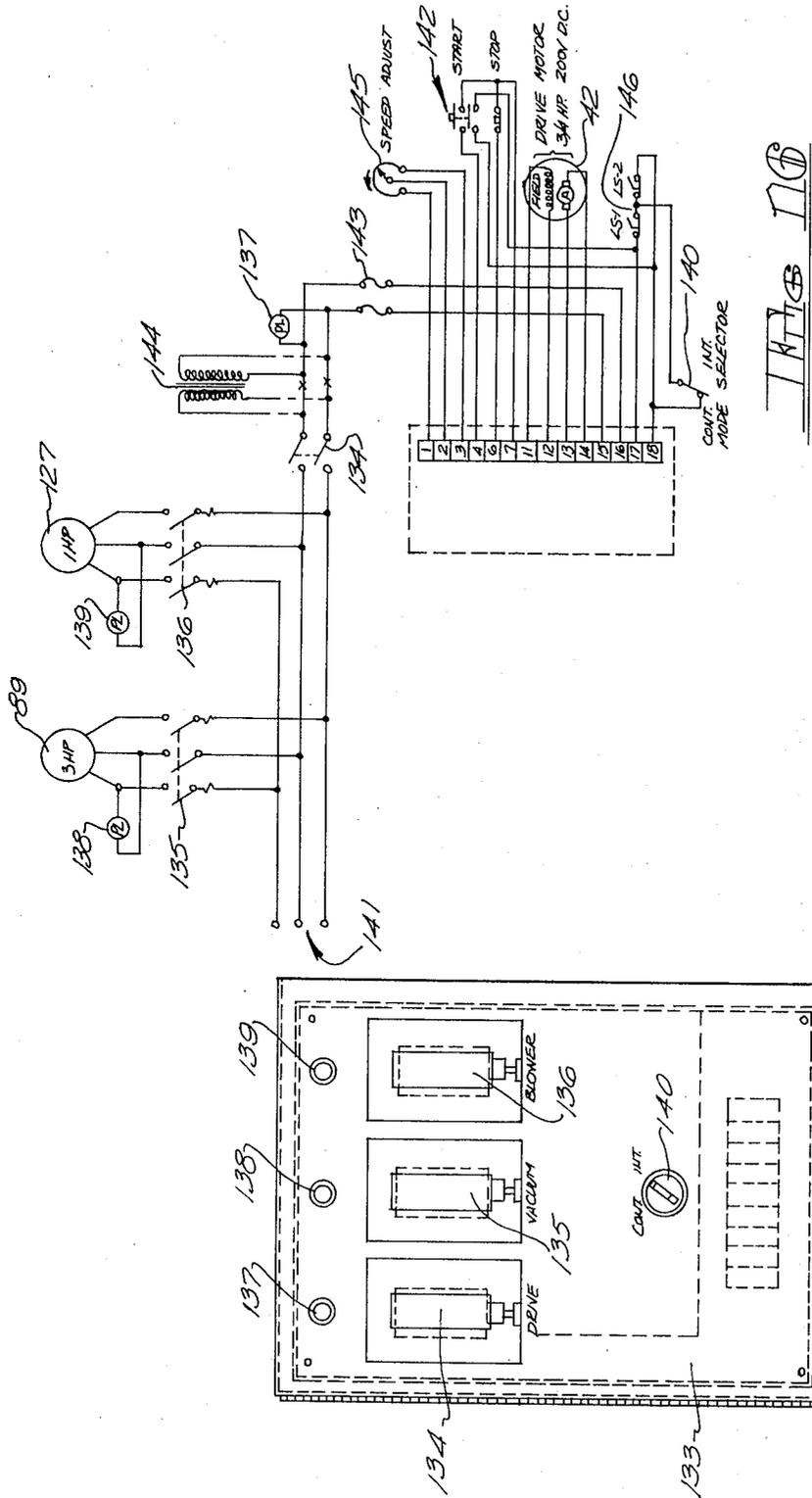












DEVICE FOR THE EVACUATION, CLIPPING AND TRIMMING OF BAG-LIKE PACKAGES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a package treating device and more particularly to a device for the evacuation, clipping and trimming of product containing bag-like packages.

2. Description of the Prior Art

With the development of strong, flexible, film-like plastic packaging material, it has become common practice to package many types of food products in bag-like packages of the plastic material. An exemplary list of the food products most frequently packaged in this manner includes red meats, poultry, hams and cheeses. In most instances, it is required that such packages be evacuated and sealed. This is true not only to prevent the growth and development of bacteria which would ultimately result in the discoloration or spoilage of the food product, but also to permit further processing of the package. Such further processing may include freezing, partial or complete cooking, and heat shrinking of the plastic package material (where a heat shrinkable material is used) in a shrink tunnel of the type taught, for example in the copending United States application in the name of Paul W. Worline, Ser. No. 154,412, filed June 18, 1971 and entitled SHRINK TUNNEL.

The prior art workers have developed a number of ways of performing the evacuation and sealing of such packages. For example, hand-held evacuation nozzles of the type taught in the copending United States application in the name of Paul W. Worline, Ser. No. 96,940, filed Dec. 10, 1970 and entitled VACUUM NOZZLE have been used. Subsequent sealing of the package has been performed either by hand or through the use of various well known seal-forming machines including those which seal the package by applying a clip thereto. An exemplary clipping machine is taught in U.S. Pat. No. 3,266,138.

Machines have been devised which, when provided with a product containing bag, will perform the evacuation and sealing steps. Such a machine is taught, for example, in U.S. Pat. No. 3,304,687.

The problem with the approaches thus far described is that they require that one bag be completely evacuated and sealed before the next bag can be treated. Thus, while the performance is good, it is slow.

Additional packaging machines have been developed for the treatment of more than one product-containing bag at a time. Such packaging machines have been capable of handling a plurality of packages per minute, but they have been characterized by and limited to a straight line set up. Furthermore, such machines have been complex in nature, expensive to manufacture and difficult to clean. For example, it has not been uncommon for such machines to have a plurality of independent vacuum stations, each having its own vacuum system including its own vacuum pump.

The present invention is directed to an evacuating, clipping and trimming device for bag-like product containing packages which is compact, simple in construction and readily serviced and cleaned. The device is fast, and its speed may be varied depending upon the circumstances of its use. Its construction, together with

its unique circular configuration and rotating action, lend it a versatility hitherto unachievable. For example, it can be constructed with from eight to 16 evacuation nozzles, depending upon the product being packaged.

Furthermore, it can be installed with a "right angle" set up, a "reverse to-and from" set up or a "straight line" set up, depending upon the space available and the layout of the plant in which it is used. Furthermore, when a particular product requires a different clip, or a clip differing in size from that required by a product previously run on the device, the clipper may be pulled and a different clipper installed on the device within from about 2 to 3 minutes. The device of the present invention also lends itself well to stainless steel construction with nylon, teflon and similar fittings for easy cleaning so that it can meet the most stringent sanitation requirements.

SUMMARY OF THE INVENTION

The package evacuation, clipping and trimming device of the present invention comprises a framework and a center post upon which a rotatable assembly is mounted. The rotatable assembly, itself, comprises a circular table, a plurality of radially oriented evacuation nozzles and clamping means for each nozzle whereby a product-containing bag-like package may be sealingly held thereto.

The device has a position wherein a product containing bag is brought to the rotating assembly and placed about one of the evacuating nozzles. The device has another position wherein the bag is discharged from the rotating assembly for further processing. Between these positions, and appropriately arranged circumferentially about the rotating assembly, there are additional positions containing a clamp closing means, vacuum initiating means, vacuum terminating means, means to clip the bag-like package and trim the excess end therefrom, clamp releasing means, means to divert the package from the table portion of the rotating assembly and means to dispose of the trimmed excess bag end.

In the operation of the device, a single operator applies a bagged product to each of the vacuum nozzles as they pass the bag-receiving position. As each nozzle continues its travel, the clamps associated with it are closed sealingly affixing the package to it. The vacuum nozzle is then activated and evacuates the package during its travel to the clipping means. The vacuum is then terminated and the package is clipped and has its excess end cut off. The clamps are then opened and the sealed and trimmed package is diverted from the table portion of the rotating assembly for further processing. Finally, the excess trimmed end is disposed of.

All of the evacuating nozzles may be actuated by a single vacuum pump. The rotating assembly is driven by a variable speed motor so that the proper evacuation time may be allotted, depending upon the product being packaged. Furthermore, the variable speed motor permits the rotating assembly to be rotated at a varying speed or a constant speed, both continuously or intermittently.

The clipping and trimming means, which may be conventional, is mounted on a frame element above the rotating assembly and is capable of limited circumferential movement with the rotating assembly so that the packages may be clipped and trimmed without stopping the rotating assembly. The frame is such that vari-

ous clipping and trimming means may be used interchangeably.

The device may be so set up that products flowing to and from the device follow a substantially "straight line" path of travel, a substantially "right angle" path of travel or a substantially parallel "reverse to-and-from" path of travel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic plan view of the device of the present invention illustrating the various set ups it may have with respect to the path of travel of the packaged product.

FIG. 2 is a diagrammatic elevational view of the device of the present invention.

FIG. 3 is a fragmentary plan view of the device of the present invention.

FIG. 4 is an elevational view, partly in cross section, of the device of the present invention.

FIG. 5 is a plan view of the framework of the device of the present invention.

FIG. 6 is a cross sectional view taken along the section lines 6-6 of FIG. 5.

FIG. 7 is a cross sectional view taken along the section lines 7-7 of FIG. 5.

FIG. 8 is a cross sectional elevational view of the center post.

FIG. 9 is a plan view of the vacuum supply pipe.

FIG. 10 is a fragmentary elevational view, partly in cross section, of one of the vacuum nozzles.

FIG. 11 is an end elevational view of the vacuum nozzle of FIG. 10, as seen from the right in that FIGURE.

FIG. 12 is an elevational view of an actuating lever for one of the vacuum nozzles.

FIG. 13 is a fragmentary elevational view illustrating the clamping means of the present invention.

FIG. 14 is a fragmentary perspective view illustrating a portion of the rotating assembly and one of the vacuum nozzles and clamping means associated therewith.

FIG. 15 is an elevational view of the control panel of the device of the present invention.

FIG. 16 is a circuit diagram for the device of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning first to FIGS. 1 and 2, the device of the present invention is diagrammatically illustrated and generally indicated at 1. The device comprises a framework generally indicated at 2 supporting a rotatable assembly generally indicated at 3. The rotatable assembly is mounted on the framework 2 and a center post 4. The rotatable assembly 3 comprises a table portion 5, a plurality of radially oriented vacuum nozzles 6 and clamping means 7 in association with each vacuum nozzle. An additional frame 8 is mounted above the rotating assembly 3 and supports a clipping and trimming device generally indicated at 9. The rearward end of the frame 8 is rotatably supported at the center of the device, as at 10. The forward end of the frame 8 is shiftably supported on a portion of the frame 2, as at 11. Therefore, as will be described hereinafter, the frame 8 and the clipping and trimming device 9 are capable of limited movement indicated by arrow A so that the rotating assembly 3 need not be stopped during the clipping and trimming operations.

The device of the present invention is adapted to be attended by a single operator located at a position adjacent the device and indicated at B. Beside the operator there is located a conveyor 12 moving in the direction of arrow C. The conveyor 12 brings the product-containing bag-like packages to the device 1. The operator rests each package on the table portion 5 of the rotating assembly 3 and places its open end about the adjacent one of the nozzles 6. The rotating assembly 3 and its associated nozzles 6 and clamping means 7 are driven in the direction of arrow D. As each nozzle 6 and clamp 7 passes through the position E, means are provided to close the clamp 7 and activate the vacuum nozzle 6. As each nozzle and clamp means continues its path of travel in the direction of arrow D, the package fixed thereto is evacuated.

Just before the package reaches the clipper and trimmer 9, means are provided to shut off the vacuum nozzle. The bag is then clipped, its excess end is trimmed, and the sealed and trimmed package is directed by deflector 13 to conveyor 14, as the assembly 3 continues its rotation. Meanwhile, the clamping means are opened and the excess bag end is disposed of by means to be described hereinafter.

The conveyor 14 moves in the direction of arrow F and conducts the sealed and trimmed packages to additional processing means not constituting a part of the present invention. For purposes of an exemplary showing, however, the conveyor 14 may lead the sealed and trimmed packages to a shrink tunnel 15 of the type described in above noted copending U.S. application Ser. No. 154,412. From the shrink tunnel 15, an additional conveyor means 16 may conduct the packages to a packing station 17 where they are weighed, labeled, packed for shipment or otherwise processed.

With the conveyors 12 and 14 oriented as shown in FIG. 1, it will be noted that the packaged product follows a substantially "right angle" path of travel. By virtue of its construction and its unique circular configuration, the device 1 is extremely versatile with respect to the product flow layout. Thus, the conveyor 12 could be positioned as shown in dotted lines 12a. The conveyor 12a could even be shifted closer to the position E with the operator's position B being located between it and the conveyor 14. In either of these circumstances, it will be noted that the product will have a substantially "straight line" path of travel.

Alternatively, the conveyor 14 could be oriented as shown at 14a. Under these circumstances, the conveyor 12 and the conveyor 14a would give the product a "reverse to-and-from" path of travel. If the conveyor 14a, on the other hand, were combined with the conveyor 12a, another form of "right angle" path of travel would be achieved. Similarly, another form of "reverse to-and-from" path of travel could be achieved if the conveyor 12 were bent to the right in FIG. 1 to be parallel with the conveyor 14. It will be understood that the operator's position can readily be shifted to meet any of these product flow patterns.

For a more detailed description of the apparatus, reference is made to FIGS. 3 and 4, wherein like parts have been given like index numerals.

The frame 2 may be of any suitable construction. For purposes of an exemplary showing, the frame is illustrated as a metallic openwork structure having a longitudinal portion 2a beneath the rotating assembly 3 and extending beyond the periphery of the rotating assem-

bly. The frame includes side portions 2b and 2c beneath the rotating assembly 3. That portion of the framework 2a which extends beyond the rotating assembly 3 has affixed thereto an upwardly directed portion 2d surmounted by a horizontal portion 2c.

At selected positions, the framework 2 may have adjustable legs, some of which are shown at 18 (see FIG. 4). The legs 18 permit the device to be appropriately leveled. Selected vertical members of that portion of frame 2 beneath the rotatable assembly 3 are provided with rollers 19. It will be understood that an additional pair of rollers 19 (not shown) will be associated with the frame portion 2c of FIG. 3. Centrally of that portion of the frame beneath the rotatable assembly 3 there is a vertically oriented center post 4 (see FIG. 4). While the center post 4 will be more fully described hereinafter, it is illustrated in FIG. 8 as comprising a horizontal bottom plate 20 by which it is affixed to the frame 2. The bottom cylindrical portion 21 of the center post is permanently affixed to the plate 20 as by welding or the like and has a closure member 22 permanently affixed to its upper end (again as by welding or the like). Permanently affixed to the closure member 22 there is an upper cylindrical portion 23. It will be noted that the upper portion 23 has an annular flange 24 affixed thereto. It also has a connection 25 for a conduit from a vacuum source, as will be described hereinafter. Finally, the closure member 22 has a central perforation 22a therein to which a drain conduit 26 is affixed, the conduit 26 passing laterally through a perforation 21a in the bottom portion 21 of the center post. The purpose of the drain 26 will again be described hereinafter.

The rotating assembly 3 comprises a central frame generally indicated at 27. As is most clearly shown in FIGS. 5 and 7, the central frame comprises a hollow, cylindrical hub 28 having a plurality of upper radially extending brace members 29 and a plurality of lower radially extending brace members 30. Each lower brace member 30 is located directly below a corresponding one of the upper brace members 29. There will be at least as many brace members 29 and 30 as there are nozzle assemblies, as will be evident hereinafter. At their outermost ends, each pair of brace members 29 and 30 are joined by a vertical brace member 31. At their outermost ends, the lower brace members 30 may be joined by a circular element 32. The outermost ends of the upper brace members 29 carry a circular rim 33. The rim 33 has affixed thereto a plurality of supports 34 upon which is mounted a circular rail 35 spaced slightly upwardly from the upper edge of the rim 33. The rim 33, supports 34 and rail 35 are most clearly shown in FIGS. 3, 7 and 14.

A belt pulley 36 is attached to some or all of the lower brace members 30 by appropriate bracket means 37. An additional circular rail 38 is also affixed to the bottom surfaces of some or all of the lower braces 30. Finally, as is shown in FIGS. 3 and 4, the annular downwardly and outwardly sloping table portion 5 of the rotating assembly is attached to the frame 27 by a plurality of brace members, some of which are shown at 39, 40 and 41 in FIG. 4.

As will be evident from FIGS. 3 and 4, the hub 28 of the rotating assembly 3 is rotatively mounted on the upper portion 23 of the center post 4 and rests upon a bushing 4a mounted on the annular center post flange 24 (FIG. 8). The circular rail 38 affixed to the bottom

of the rotatable assembly is adapted to rest upon the rollers 19 supported by the framework 2.

The rotatable assembly is driven by a variable speed motor 42. The variable speed motor 42 has a drive sprocket 43. A drive belt 44 passes about the drive sprocket 43, the pulley 36 on the rotatable assembly 3 and an idler wheel 45. The idler wheel 45 is mounted on an adjustable bracket 46 affixed to the frame 2. The idler wheel serves as a means for achieving the proper tension of the drive belt 44.

Returning to FIG. 5, it will be noted that each of the upper brace members 29 of the frame 27 have affixed to their upper surfaces a generally V-shaped tray-like member 47. As is shown in FIG. 6, each tray 47 has a substantially horizontal portion 47a affixed to its respective upper brace member 29 and upwardly and outwardly sloping side portions 47b and 47c. The trays 47 will contain the excess bag end to assure removal thereof following the trimming step as will be described hereinafter. In each of FIGS. 3 and 4, for purposes of clarity only one such tray member is shown. Again, for purposes of clarity, the tray members 47 have been eliminated from FIGS. 1, 2 and 7.

Returning to FIG. 4, the hub 28 of the rotatable assembly 3 is provided with an upper cap means 48, against which the end 23a of the upper cylindrical portion 23 of the center post sealingly abuts with the aid of the O-rings 23b. Mounted on the cap means 48, so as to be rotatable therewith, is a vacuum tube 49. The construction is such that there is communication between the inside of the upper portion 23 of the center post 4 and the vacuum tube 49. The vacuum tube 49 is shown in FIGS. 4 and 9 as comprising a cylindrical member having a plurality of evenly spaced perforations 50 therein. Each of the perforations 50 are threaded and are adapted to receive fittings by which a plurality of vacuum hoses or conduits may be connected to the vacuum tube 49. Such fittings are shown at 51 in FIGS. 3 and 4. It will be understood that the vacuum tube 49 will have fittings 51 equal in number to the number of vacuum nozzles 6. In FIG. 3, for purposes of clarity, only one vacuum nozzle 6 is shown. However, it is illustrated as being connected to its respective fittings 51 of the vacuum tube 49 by a vacuum hose 52. It will be understood that a similar hose 52 will be provided for each of the nozzles 6. The vacuum tube 49 is closed by a cap means 53. The cap means 53 may have mounted therethrough a vacuum gauge 54 so that the operator can monitor the vacuum system of the device of the present invention.

FIGS. 10 and 11 illustrate one of the vacuum nozzles 6. The vacuum nozzle 6 comprises a hollow cylindrical body 55, the rearward and forward ends of which are threaded as at 56 and 57, respectively. The body 55 of each vacuum nozzle is adapted to be affixed to the upper surface of one of the upper frame members 29 of the rotatable assembly 3. This is accomplished by providing the nozzle body 55 with a flange 58. While in FIGS. 10 and 11 the flange is illustrated as being horizontally oriented, when the nozzle body is affixed to its respective brace member 29 the flange 58 will be downwardly depending. This is shown in FIG. 4. A flange 58 is also fragmentarily shown in FIG. 7. The body 55 also has a laterally extending fitting 59 by which it can be connected to its respective one of the vacuum hoses 52 from the vacuum tube 49. This is shown in FIG. 3.

Engaged with the threads 56 in the rearward end of the nozzle body 55 there is shown an end closure means 60. The closure means has a central bore 61. An annular groove 62 is formed in the surface of the bore 61 for receipt of an O-ring 63.

Engaged with the threads 57 in the forward end of the nozzle body 55 is shown the nozzle 64, itself. The nozzle is of cylindrical configuration with a central bore 65 having a portion 66 of reduced diameter. An annular groove 67 is located in the portion 66 for receipt of an O-ring 68. About its periphery, near its forwardmost end, the nozzle 64 has an annular groove 69. This annular groove is adapted to cooperate with the clamping means 7, as will be described hereinafter.

The nozzle assembly 6 also includes an elongated probe 70. The probe 70 is of such diameter as to have a sliding fit within the bore 61 of end closure 60 and within the reduced diameter portion 66 of the nozzle bore 65. The probe has a diametrically opposed pair of elongated depressions, one of which is shown at 71.

It is the function of the probe 70 to activate and deactivate the nozzle assembly 6 by change of its axial position. At all times, the probe has a sealing fit with the end closure 60, by virtue of O-ring 63. It will be noted that the bore 65 of the nozzle 64 has a diameter greater than the probe 70, except for the reduced diameter portion 66.

Whenever the vacuum system of the device of the present invention (to be described hereinafter) is on, a vacuum is being pulled within the body 55. If the depressions 71 of the probe 70 lie within the reduced diameter portion 66 of the nozzle bore 65, a vacuum will be drawn by the nozzle assembly.

In FIG. 10, the nozzle is illustrated with the probe 70 moving forwardly in the direction of arrow G to its full open position. In its full open position, the rearward part of the depression 71 will span the reduced diameter portion 66 of the nozzle bore 65 thus interrupting the seal formed by O-ring 68. In its full open position, the forward end of the probe will extend beyond the forward nozzle end by several inches. Thus the forward end of the probe will enter the package to be evacuated so as to preclude the package from being sucked into the vacuum assembly and to assure a proper passage within the package to accomplish the evacuation. The probe 70 is illustrated in its extended position in FIG. 14.

When the evacuating action of the nozzle assembly 6 is to be terminated, the probe 70 will be moved rearwardly in the direction of arrow F until the forwardmost portion 70a of the probe (ahead of depression 71) lies within the reduced diameter portion 66 of the nozzle bore 65, enabling the O-ring 68 to make a full seal between the nozzle and the probe.

The means for imparting axial movement to the probe 70 is most clearly seen in FIGS. 4, 10 and 12. First of all, it will be noted that the rearward end of the probe has a transverse perforation 71a therein. This is to permit the probe to be pivotally affixed to the upper end of an actuating lever 72 (FIGS. 4 and 12) by means of a pivot pin 73.

In FIG. 12 it will be evident that the lever 72 comprises two elongated and substantially identical elements 72a and 72b joined at the bottom by a transverse element 72c.

As will be noted from FIG. 4, the lever elements 72a and 72b are adapted to lie on either side of that radial

frame element 29 of the rotating assembly 3 which supports its vacuum assembly 6. The lever elements 72a and 72b also straddle or lie on either side of the corresponding radial frame element 30.

The uppermost ends of the lever elements 72a and 72b (FIG. 12) have coaxial perforations 74 and 75 adapted to receive the pivot pin 73 passing through the perforation 71a in the end of probe 70. The lever elements 72a and 72b have an additional pair of coaxial perforations 76 and 77 adapted to receive a pivot pin 78 (FIG. 4) passing through a perforation 79 in the lower frame element 30 (FIG. 7).

From the above description and with reference to FIG. 4 it will be evident that as the lever 72 pivots in a counterclockwise direction about the pivot pin 78 the probe 70 will be pulled rearwardly to its vacuum-off position. Similarly, as the lever 72 pivots about the pin 78 in a clockwise direction, the probe 70 will be moved forwardly to its vacuum-on position.

The transverse lever element 72c (FIG. 12) has a central perforation 80. As will be evident from FIG. 4, a roller 81 is pivotally affixed to the bottom end of the lever by a pin passing through the perforation 80. The roller 81 is adapted to contact a cam track 82 supported on the frame 2 by appropriate frame members 83 and 84. While the cam track 82 is only fragmentarily illustrated in FIG. 4, it will be understood that it surrounds the center post 4 and is so configured as to cause the lever 72 to move the probe to its vacuum-on position once the clamps have been actuated at position E (FIG. 1) and to keep the probe in its vacuum-on position until the probe reaches a position immediately ahead of the point where it passes beneath the clipping and trimming device 9, at which point the cam is so configured as to move the lever 72 and probe 70 to the vacuum-off position, as shown in FIG. 4. Again the cam track 82 is designed to maintain the probe in its vacuum-off position until the probe again passes through the clamping position E.

In the particular embodiment described, the framework of the rotatable assembly 3 has eight pairs of radial framed elements 29 and 30. It will be understood that each of the radial frame elements 29 will carry a nozzle assembly 6 (see FIG. 1). Each of the nozzle assemblies 6 will have its own respective lever 72 actuated by the cam track 82. Furthermore, each of the nozzle assemblies will have its fitting 59 connected to a fitting 51 of the vacuum tube 49 by a hose element 52, as indicated in FIG. 3. Thus the vacuum tube 49 will have a number of fittings 51 equal to the number of nozzle assemblies 6.

As indicated above, the interior of the vacuum tube 49 communicates with the interior of the upper portion 23 of the center post. The connection 25 of the center post (FIG. 8) is connected to a vacuum pump 85 through a vacuum line 86 containing a valve 87 and a filter 88. The vacuum pump 85 is driven by a motor 89. Thus, through the line 86, upper center post portion 23, vacuum tube 49 and vacuum hoses 52, all of the vacuum nozzle assemblies 6 are activated by a single vacuum pump 85 and motor 89.

As stated above, each nozzle assembly 6 has in association therewith a clamping means 7. Since all of the clamping means are identical, only one need be described and reference is made to FIGS. 4, 7 and 13. Referring first to FIG. 7, it will be noted that on the underside of the upper radial frame member 29, at a position

below the position which would be occupied by the forward end of the nozzle assembly affixed to the frame member 29, there is mounted a pair of brackets 90 and 91. In FIG. 13, the bracket 91 is shown affixed to the frame member 29. The bracket 91 is substantially rectangular in configuration having a pair of perforations 92 and 93 therein. The bracket also includes a downwardly depending lug portion 94 having a forwardly extending pin 95 affixed thereto. It will be understood that the bracket 90, in parallel spaced relationship behind the bracket 91, is identical to the bracket 91 with the exception that it does not include the downwardly depending lug portion 94 and pin 95. The bracket 90 will have a pair of perforations (not shown) coaxial with the perforations 92 and 93 in the bracket 91. The clamp itself comprises a pair of elongated mirror image jaws 96 and 97. The facing edges of the jaws have recesses 98 and 99, respectively, therein to receive the lug portions of resilient jaw inserts 100 and 101. The upper ends of the jaws 96 and 97 and the jaw inserts 100 and 101 are clearly shown in FIG. 14. These elements are shown in open position in FIG. 14 and in closed position in FIG. 13. The jaw inserts 100 and 101 each have semi-circular depressions 100a and 101a. The depressions are adapted to fit snugly about and within the annular groove 69 in the nozzle portion 64 of the nozzle assembly. Thus, when the open end of a bag-like package is placed about the nozzle 64, and when the jaws 96 and 97 close, the jaw inserts 100 and 101 will sealingly engage the package to the nozzle 64. Since the jaw inserts 100 and 101 are made of resilient material, such as silicon rubber or the like, this sealing can be accomplished without damage to the bag material.

Returning to FIG. 13, the bottom end of the jaws 96 and 97 have lugs 102 and 103 extending toward each other and lying between the brackets 90 and 91. Pivot pins 104 and 105 pass through the perforations 92 and 93 in the bracket 91, coaxial perforations in the jaw lugs 102 and 103 and the above mentioned coaxial perforations in the bracket 90. Thus, the jaws are pivotally affixed between the brackets 90 and 91.

At their lowermost ends, the jaws 96 and 97 also have downwardly depending lug portions 106 and 107. Link members 108 and 109 are pivotally affixed at their ends to the jaw lug portions 106 and 107, respectively, by suitable pivot means 110 and 111. The other ends of links 108 and 109 are pivotally joined together and to a downwardly depending actuating rod 112, as at 113.

As will be seen in FIG. 7, the lower radial frame member 30 has a vertical perforation 114 extending therethrough. As is shown in FIG. 4, the perforation 114 is provided with a bushing 115 and the lower end of the actuating rod 112 passes through the bushing and perforation. A coil spring 116 surrounds the actuating rod 112 with its lower end resting against bushing 115. The actuating rod 112 is also provided with a stop collar 117. The purpose for the spring and stop collar will be evident hereinafter.

It will be noted from FIG. 13 that if the actuating rod 112 is moved downwardly, the links 108 and 109 will cause the jaws 96 and 97 to achieve an open position as shown in FIG. 14. The lowermost position of the actuating rod 112 (and therefore the open position of jaws 96 and 97) will be determined by abutment of the actuating rod stop collar 117 against the upper end of spring 116.

Returning to FIG. 13 a trip lever 118 is shown as having an inverted L-shaped configuration. Near its upper end, the trip lever 118 has a perforation 119 through which the pin 95 on the lug portion 94 of bracket 91 extends, thereby pivotally mounting the trip lever 118. The trip lever also has a rearwardly extending pin 120. As will be noted in FIG. 13, when the trip lever 118 is in its at rest position, the pin 120 will abut against an edge of the bracket 91.

It will also be evident from FIG. 13 that an upward movement of the actuating rod 112 will cause the jaws 96 and 97 to close. In this figure, the jaws and their associated elements are shown in their respective positions at the moment the jaw inserts 100 and 101 begin to contact each other and the nozzle of the vacuum nozzle assembly. By virtue of the resiliency and compressibility of jaw inserts 100 and 101, the actuating rod 112 can continue its upward movement past a dead center position and into abutting relationship with the trip lever pin 120. When the actuating rod attains this position, the jaws 96 and 97 will be locked into position by virtue of the actuating rod having past its dead center position. At the same time, the resilient jaw inserts 100 and 101 will be slightly compressed insuring that they will sealingly engage the package end against the nozzle portion of the nozzle assembly.

It will be understood that once the jaws are in their closed and locked position with the upper end of the actuating rod 112 in abutting relationship with the trip lever pin 120, should the trip lever be pivoted about pin 95 in a counterclockwise direction, its pin 120 will force the actuating rod 112 downwardly through its dead center position, whereupon the jaws are free to open to the position determined by the adjustable stop collar 117 on the actuating rod.

Referring to FIGS. 3 and 4 it will be noted that an arcuate, upwardly sloping cam surface 121 is fixed to the frame 2. As viewed in these figures, the righthandmost end of the cam surface 121 is immovably affixed to the frame, while the left hand end of the cam is adjustably affixed to the frame. It will further be noted that the cam 121 is located at the position E with respect to the rotating assembly 3. The cam surface 121 coacts with the bottom end of the actuating rod 112 to move the rod upwardly, causing the jaws to achieve their closed and locked condition at the position E. Proper operation of these elements can be assured by virtue of the adjustability of the cam 121 and the stop collar 117 on the actuating rod 112. As viewed in FIG. 4, a cam means, such as the tab 118a, will be affixed to the frame 2 so as to trip the lever 118 and release the jaws at about the time they are passing deflector 13. The jaws will then release from the nozzle portion of the nozzle assembly 6, the bag end having been trimmed by the clipping and trimming means 9. The bag end is then free to be picked up by the nozzle 122 of a suction conduit 123. The suction conduit 123 is connected to the upper end of a waste container 124. Suction is created within the conduit 123 and container 124 by virtue of the fact that at its bottom end the container is connected by a conduit 125 to a blower 126 (FIG. 4) and motor 127 affixed to the frame 2.

The clipping and trimming device 9 does not constitute a part of the present invention. A number of suitable devices are well known in the art and are exemplified by U.S. Pats. Nos. 3,583,056, 3,570,088 and 3,266,138.

As will be evident from FIGS. 3 and 4, the clipping and trimming device 9 is removably affixed to the elongated framework 8. As indicated above, one end of the framework 8 is pivotally affixed to the vacuum tube cap 53 as at 10. The other end of the frame 8 is provided with rollers 128 and 129 (see FIG. 3) adapted to ride on a cross member of the frame portion 2c. A tension spring 130 is affixed at one end to the frame portion 2c and at the other end to the roller bearing end of frame 8. The spring 130 serves to urge the frame 8 to its normal position illustrated in FIGS. 3 and 4. However, the pivotal mounting of the frame 8 will permit the clipping and trimming device 9 to move with the product-containing bag during the clipping and trimming operations. This assures that the rotating assembly 3 can move continuously, even during the clipping and trimming operations. Once these operations have been completed, the device 9 will be returned to its normal position by spring 130.

Once a package has been clipped and trimmed by the device 9, it will be removed from the table 5 to the conveyor 14 by deflector 13 (see FIG. 1). It will be understood that the deflector 13 is not connected to the rotating assembly 3, but rather to the frame 2 by suitable brace members (not shown).

The frame 8 for the clipping and trimming device 9 may also support an elongated brace 131 extending in the direction of position E. The forwardmost end of brace 131 depends downwardly and supports a short rail segment 132. The rail segment 132 is spaced above the rail 35 of the rotating assembly 3 and is configured to cooperate therewith to appropriately gather the bag-like package end to assure proper sealing thereof to the nozzle assembly by the clamping means.

FIGS. 15 and 16 illustrate the electrical controls for the device of the present invention. FIG. 15 illustrates a panel box 133. The panel box is located beneath the device, near the operator's position, as shown in FIGS. 2 and 3. The panel box 133 has on its face switches 134, 135 and 136 with associated pilot lights 137, 138 and 139, respectively. It has a further switch 140. These switches and pilot lights are given like index numerals in FIG. 16. The panel box 133 and its associated switches are preferably waterproof, as are the other elements of the device of the present invention, to permit thorough washdown of the device after use, as will be described hereinafter.

In the circuit diagram of FIG. 16, a source of three phase current is generally indicated at 141. The vacuum pump motor 89 (see also FIG. 3) is shown connected to the current through switch 135. Pilot light 138 is associated with the vacuum pump motor 89. The blower motor 127 (see FIG. 4) is illustrated as connected to the power source through switch 136. Pilot light 139 is connected with the blower motor as indicated. A start and stop switch 142 is connected to the current source through switch 134. This connection is made through appropriate fuse means 143. Where required, such as, for example, where the incoming voltage of 440 volts is stepped down to 220 volts, the start-stop switch may also be connected through a transformer 144, the connections of which are shown in dotted lines. Pilot light 138 is also so connected as to be

The start-switch 142 is located at the position B of the operator and is shown in FIG. 4. The start-stop

switch 142 controls the main drive motor 42 (see FIGS. 3 and 4).

The switch 140 (shown both in FIGS. 15 and 16) permits the operator to select the desired mode of operation of the device, i.e. a continuous operation or an intermittent operation. FIG. 16 also shows a speed adjusting means 145 by which the operator can adjust the speed of the main drive motor 42. The speed adjustment 145 is located with the panel box 133. Finally, limit switch means 146 may be provided in association with the clipping and trimming device 9 to shut down the main drive motor 42 should the device 9 exceed its normal length of travel during the clipping and trimming operations.

The operation of the device of the present invention may be described as follows. The operator actuates switches 134, 135 and 136 (one at a time) to their on positions. This will energize the start-stop switch 142, the vacuum pump motor 89 and the blower motor 127. Thereafter, the operator will energize the start switch 142 initiating rotation of the assembly 3 and actuation of the various nozzle assemblies and their associated clamping means.

One at a time, the operator will place the open end of a product-containing, bag-like package about that one of the nozzles passing through the operator's position. As each of the packages reaches position E, it will be appropriately gathered by the cooperation of rail 35 and rail segment 132 and the clamping means 7 will be closed by the cam 121, sealingly affixing the package to the nozzle assembly 6. Immediately thereafter, the nozzle assembly will be energized by its cam rail 82 and a vacuum will be drawn within the package. The vacuum will continue as the package rotates with the assembly 3 to a position immediately ahead of the clipping and trimming device 9, whereupon the cam rail 82 will de-energize the nozzle assembly 6. The package will then be clipped and trimmed by the device 9 and directed onto the conveyor 14 by deflector 13. From this point on, the package will be subjected to further treatments, exemplary ones of which are discussed above.

Once past the clipping and trimming device 9, the clamping means 7 will be opened as described above releasing the trimmed bag end for pick up by the disposal nozzle 122. The nozzle and clamping assemblies are then in proper condition to receive another package.

After use, the device can be readily cleaned by the operator alone. For cleaning purposes all of the electrical components are turned off and foreign material is drained from the center post. Referring to FIGS. 8 and 3, it will be noted that the drain 26 of the center post is connected by a conduit 147 to a valve means 148. Opening of the valve 148 will permit draining of the center post. The filter 88 is removed from the vacuum pump line 86; the vacuum tube cap 53 is removed; and the nozzle assembly probes 70 are removed from their respective nozzle assemblies by extracting probe pins 73. Finally, the nozzle portions 64 of the nozzle assemblies are removed from their bodies 55 and the valve 87 in the line to the vacuum pump is closed. Having performed these steps, the device is ready for complete washdown both internally and externally. The internal washdown is accomplished by connecting a source of water into the drain line 147, resulting in a reverse flushing action. Each nozzle assembly is then cleaned,

including flushing through the nozzle bodies 55 into the vacuum tube 49 and upper center post portion 23.

The remaining elements of the device are then washed down individually, including for example the nozzle portions 64, probes 70 and the like. The device is thereafter reassembled and is ready for use.

Modifications may be made in the invention without departing from the spirit of it. For example, while the device of the present invention is illustrated as having eight nozzle assemblies and associated clamping means, it can be built with up to 16 nozzle assemblies. The number of nozzle assemblies and associated clamping means is a function of the time required to evacuate the packages and the size of the product. As exemplary but non-limiting examples, it would be normal to provide the device with eight nozzle assemblies if used to package red meats or cheese. With hams up to 12 nozzle assemblies and with poultry from 12 to 16 nozzle assemblies may be used.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A device for the evacuation, clipping and trimming of bag-like product-containing packages, said device comprising a framework having a hollow center post, a circular assembly comprising a central hub rotatively mounted on said center post, a plurality of pairs of upper and lower frame members extending radially from said hub, the upper and lower frame members of each pair lying in the same vertical plane, and annularly downwardly and outwardly sloping table structure comprising the peripheral portion of said circular assembly, and means at the ends of said upper and lower radial frame members to support said annular table structure, a plurality of radially oriented nozzle assemblies mounted on said circular assembly, a vacuum source, said central hub being surmounted by a hollow vacuum tube rotatable with said hub, the interior of said vacuum tube being connected by a fluid tight seal to the interior of said center post, means to close the upper end of said vacuum tube with a fluid tight seal, said vacuum tube having a plurality of ports equal in number to the number of said vacuum nozzle assemblies, hose means connecting each of said vacuum nozzle assemblies to one of said vacuum tube ports, means for connecting the interior of said center posts to said vacuum source, a plurality of openable and closable clamping means mounted on said circular assembly each in association with one of said nozzle assemblies for sealingly engaging the open end of one of said packages to the adjacent nozzle assembly, means for rotating said circular assembly, said device having a first circumferential position with respect to said circular assembly wherein said packages are sequentially placed on said table each with its open end about that nozzle assembly passing by said first position at the time of placement of said package, said device having a second circumferential position wherein said packages are removed from said table, means to seal said package end, means on said frame to mount said sealing means adjacent said second position and in the path of travel of said packages from said first position to said second position, means to close each of said clamping means after it has passed through said first position, means to open each of said clamping means after it has passed said second position but before it again passes said first position, and means to open each vacuum nozzle im-

mediately after the closing of its respective clamping means and to close each nozzle immediately prior to its passage by said sealing means.

2. The structure claimed in claim 1 including first conveying means to bring said packages to said first position and a second conveying means to conduct said packages away from said second position.

3. The structure claimed in claim 1 including deflecting means mounted on said framework to remove said packages from said circular assembly at said second position.

4. The structure claimed in claim 1 wherein said means to rotate said circular assembly comprises a variable speed motor operatively connected to said circular assembly.

5. The structure claimed in claim 1 wherein said sealing means comprises means to apply a clip about said package end whereby said evacuated package is sealed.

6. The structure claimed in claim 1 wherein said means on said frame to mount said sealing means is such as to permit limited travel of said sealing means in the direction of a package being sealed whereby said circular assembly may rotate during the sealing operation.

7. The structure claimed in claim 1 including in association with said sealing means a means to trim the excess package end extending beyond the seal made by said sealing means.

8. The structure claimed in claim 1 wherein said vacuum source comprises a single vacuum pump.

9. The structure claimed in claim 1 wherein each of said nozzle assemblies comprises an elongated hollow body with a port connected to said vacuum source, the rearward end of said body having a closure means with a bore therethrough having a sealing means therein, a nozzle element affixed to the forward end of said body, said nozzle element having a bore with a sealing means therein, an elongated probe of circular cross section slidably mounted in said bore of said closure means and said nozzle element and their respective sealing means, said probe having rearward and forward ends and a pair of longitudinally extending diametrically opposed depressions spaced inwardly of its forward end, said probe being slidable axially between a retracted nozzle-closed position wherein said sealing means of said closure means and said nozzle element make a fluid-tight seal with said probe and an extended nozzle-open position wherein said sealing means of said closure means makes a fluid tight seal with said probe, said probe depressions spanning said sealing means in said nozzle element bore whereby the seal between said last mentioned sealing means and said probe is interrupted and a vacuum is drawn by said nozzle assembly, said means to open and close said nozzle assemblies comprising means to move said nozzle assembly probes between their nozzle open and closed position.

10. The structure claimed in claim 1 wherein each of said clamping means comprises a pair of jaws movable between an open position and a closed position.

11. The structure claimed in claim 2 wherein said first and second conveyors are oriented at right angles with respect to each other.

12. The structure claimed in claim 2 wherein the axes of said first and second conveyors are parallel, the direction of travel of said packages on said first and second conveyors being the same.

13. The structure claimed in claim 2 wherein the axes of said first and second conveyors are parallel, the direction of travel of said packages on said first and second conveyors being opposite.

14. The structure claimed in claim 5 including in association with said clipping means a means to trim the excess package end extending beyond said clip.

15. The structure claimed in claim 7 including disposal means for removing said trimmed package end from its respective nozzle assembly after release thereof by the opening of the adjacent one of said clamping means.

16. The structure claimed in claim 7 wherein said vacuum source comprises a single vacuum pump.

17. The structure claimed in claim 9 wherein said means to open and close said nozzle assemblies comprises a lever for each nozzle assembly, each of said levers having an upper and a lower end, each of said levers being pivotally affixed to said circular assembly at a point between said upper and lower ends, the upper end of said lever being pivotally connected to said rearward end of its respective probe whereby movement of the lower end of said lever in one direction will cause movement of said probe in the opposite direction, a continuous cam, cam follower means on the lower end of each of said levers, said cam follower means of all of said levers being in continuous contact with said cam, said cam being so configured as to result in the opening and closing of said nozzle assemblies at the proper times.

18. The structure claimed in claim 9 wherein each of said nozzle elements has an external peripheral groove, each of said clamping means being configured to engage its respective nozzle element in said groove with said package end therebetween when said clamping means is closed.

19. The structure claimed in claim 9 wherein the nozzle element of each of said nozzle assemblies is detachable from said elongated body.

20. The structure claimed in claim 10 wherein each of said nozzle assemblies has an external peripheral groove, each of said clamping means being configured to engage its respective nozzle assembly in said groove with said package end therebetween when said jaws are in said closed position.

21. The structure claimed in claim 10 wherein the clamping surfaces of said jaws are made of resilient material.

22. The structure claimed in claim 10 wherein said jaws are joined by linkage elements, said linkage elements being configured to pass through a dead center position when said jaws move between said open and closed positions by said clamping means opening and closing means.

23. The structure claimed in claim 14 including vacuum disposal means for removing said trimmed package end from its respective nozzle assembly after the release thereof by the opening of the adjacent one of said clamping means.

24. The structure claimed in claim 1 wherein one of said nozzle assemblies is affixed to each one of said upper radial frame members by bracket means, each of said nozzle assemblies being located above and in parallel spaced relationship to its respective upper frame member, each one of said nozzle assemblies comprising an elongated hollow body with a port connected by one of said vacuum hoses to one of said vacuum tube ports,

the rearward end of said body facing said vacuum tube having a closure means with a bore therethrough having a sealing means therein, a nozzle element affixed to the forward end of said body, said nozzle element having a bore with a sealing means therein, an elongated probe of circular cross section slidably mounted in said closure means and nozzle element bores and their respective sealing means, said probe having rearward and forward ends and a pair of longitudinally extending diametrically opposed depressions spaced inwardly of its forward end, said probe being slidable between a retracted nozzle closed position wherein said sealing means of said closure means and said nozzle element make a fluid-tight seal with said probe and an extended nozzle-open position wherein said closure means sealing means makes a fluid-tight seal with said probe, said probe depressions spanning said sealing means in said nozzle element bore whereby the seal between said last mentioned sealing means and said probe is interrupted and a vacuum is drawn by said nozzle assembly.

25. The structure claimed in claim 24 wherein said means to open and close said nozzle assemblies comprises an elongated U-shaped lever for each of said nozzle assemblies, each of said U-shaped levers comprising a pair of elongated leg portions in parallel spaced relationship joined at their bottom ends by a transverse portion, the upper ends of the leg portions of each lever having the probe of their respective nozzle assembly extending therebetween and pivotally connected thereto, said leg portions lying on either side of the pair of upper and lower frame members with which their respective nozzle assembly is associated, said leg portions being pivotally affixed to said lower frame member whereby movement of the lower end of each lever in one direction will cause movement of its respective probe in the opposite direction, a continuous cam extending about said center post, a roller affixed to said transverse portion of each of said levers, said rollers of all of said levers being in continuous contact with said cam, said cam being so configured as to result in the opening and closing of said nozzle assemblies at the proper times.

26. The structure claimed in claim 25 wherein each of said clamping means comprises a pair of jaws supported by and pivotally affixed to bracket means on one of said upper frame members, said jaws being swingable between open and closed positions, the nozzle element of each of said nozzle assemblies having an external peripheral groove, the clamping surfaces of said jaws being made of resilient material and being configured to engage the adjacent nozzle assembly in said nozzle element groove with said package end therebetween when said jaws are in said closed position.

27. The structure claimed in claim 26 including a pair of links, one end of each link being pivotally affixed to one of said jaws, the other end of each link being pivotally affixed to each other and to the upper end of an elongated actuating rod, the upper end of said actuating rod moving toward said jaws through a dead center position when said jaws swing to said closed position, said means to close said clamping means comprising a cam surface appropriately located on said framework to move said actuating rod upwardly with its upper end passing through said dead center position, a trip lever pivotally affixed to said bracket means supporting said jaws, said trip lever being pivotable be-

tween a neutral position and a tripped position, a portion of said trip lever contacting said upper end of said actuating rod when said jaws are in said closed position and said trip lever is in said neutral position, said portion of said trip lever being so configured as to force said actuating rod downwardly through said dead center position opening said jaws when said trip lever is shifted to said tripped position, said means to open said clamping means comprising means appropriately located on said framework to shift said trip lever to said tripped position.

28. The structure claimed in claim 27 including V-shaped tray means affixed to each of said upper frame members below the nozzle element of the adjacent nozzle assembly.

29. A device for the evacuation, clipping and trimming of bag-like packages, said device comprising a framework, a circular assembly rotatively mounted on said framework, a plurality of radially oriented nozzle assemblies mounted on said circular assembly, a vacuum source, means to connect said nozzle assemblies to said vacuum source, a plurality of openable and closable clamping means mounted on said circular assembly each in association with one of said nozzle assemblies for sealing engaging the open end of one of said packages to the adjacent nozzle assembly, means for rotating said circular assembly, said device having a first circumferential position with respect to said circular assembly wherein said packages are sequentially placed on said circular assembly each with its open end about that nozzle assembly passing by said first position at the time of placement of said package, said device having a second circumferential position wherein said packages are removed from said circular assembly, means to seal said package end, means on said frame to mount said sealing means adjacent said second position.

tion and in the path of travel of said packages from said first position to said second position, means to close each of said clamping means after it has passed through said first position, means to open each of said clamping means after it has passed said second position but before it again passes said first position, and means to open each vacuum nozzle immediately after the closing of its respective clamping means and to close each nozzle immediately prior to its passage by said sealing means, each of said nozzle assemblies comprising an elongated hollow body with a port connected to said vacuum source, the rearward end of said body having a closure means with a bore therethrough having a sealing means therein, a nozzle element affixed to the forward end of said body, said nozzle element having a bore with a sealing means therein, an elongated probe of circular cross section slidably mounted in said bore of said closure means and said nozzle element and their respective sealing means, said probe having rearward and forward ends and a pair of longitudinally extending diametrically opposed depressions spaced inwardly of its forward end, said probe being slidable axially between a retracted nozzle-closed position wherein said sealing means of said closure means and said nozzle element make a fluidtight seal with said probe and an extended nozzle-open position wherein said sealing means of said closure means makes a fluid tight seal with said probe, said probe depressions spanning said sealing means in said nozzle element bore whereby the seal between said last mentioned sealing means and said probe is interrupted and a vacuum is drawn by said nozzle assembly, said means to open and close said nozzle assemblies comprising means to move said nozzle assembly probes between their nozzle open and closed position.

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