Sept. 8, 1970 D. E. JAHNKE 3,527,018

VACUUM PACKAGING OF POULTRY

Filed Oct. 21, 1968 2 Sheets-Sheet 1

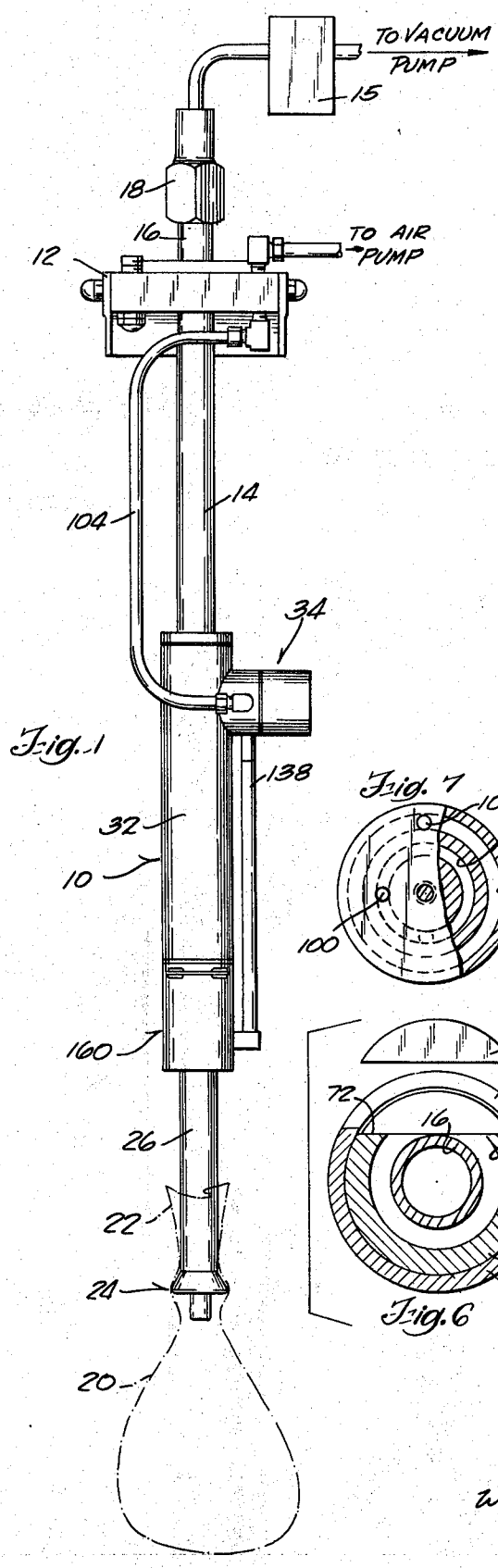


Fig. 1

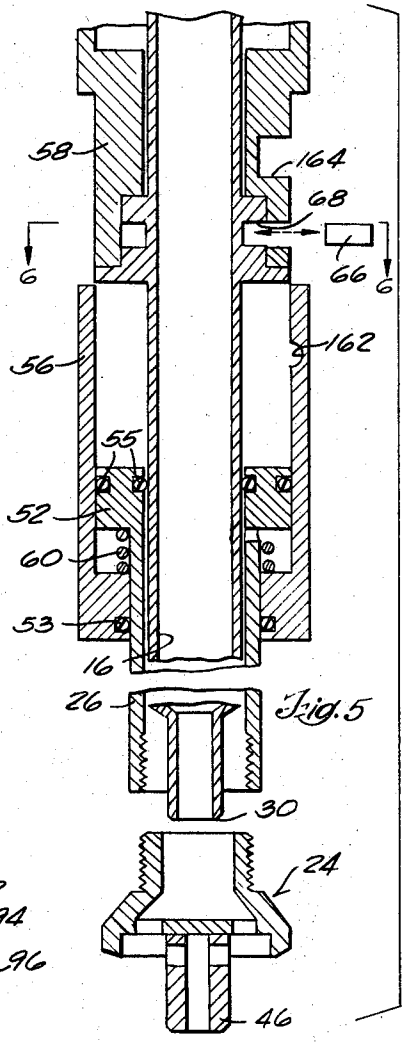


Fig. 5

Fig. 7

Fig. 6

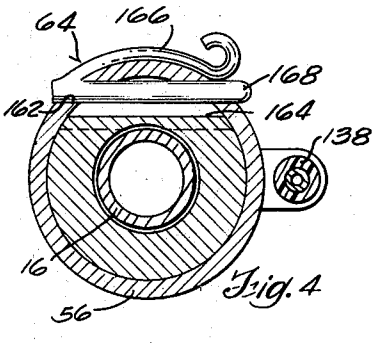


Fig. 4

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VACUUM PACKAGING OF POULTRY

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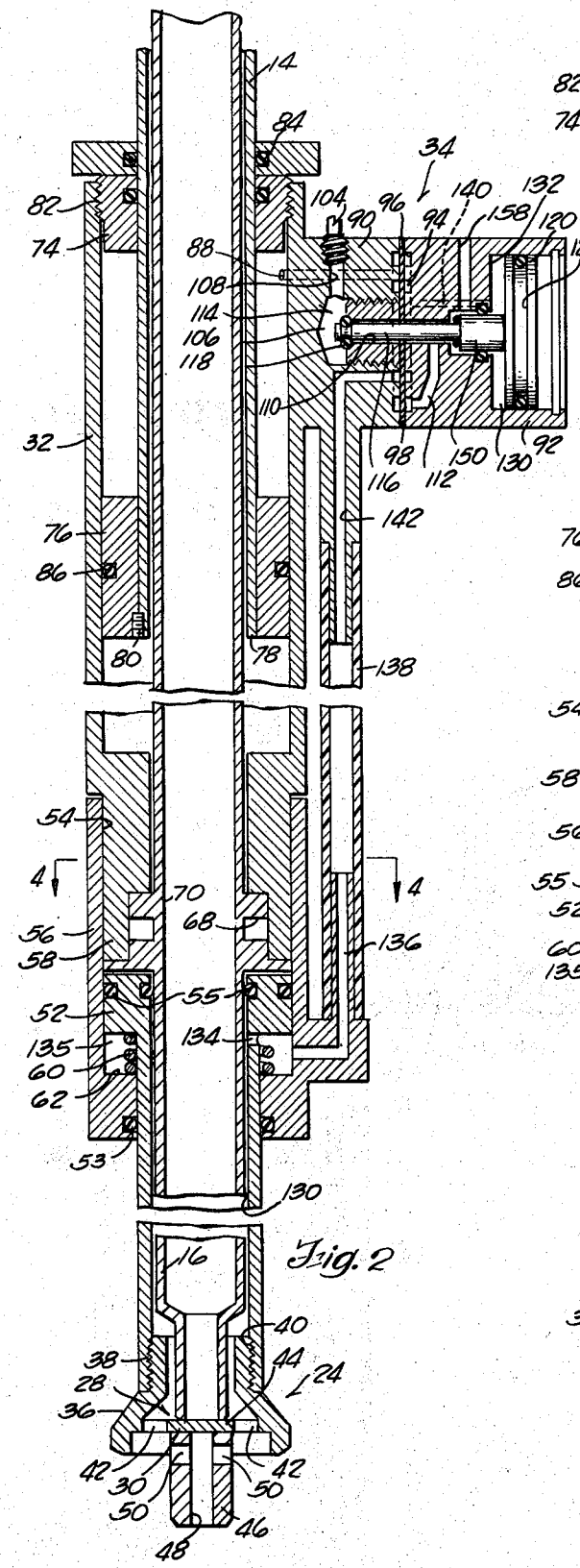


Fig. 2

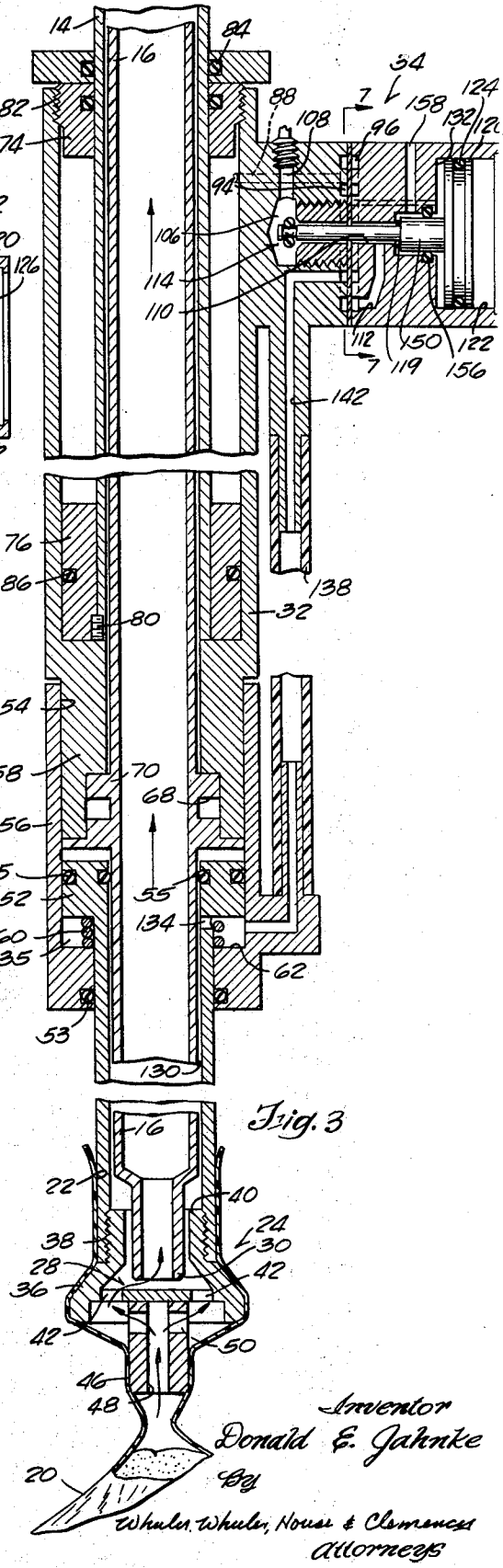


Fig. 3

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VACUUM PACKAGING OF POULTRY

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U.S. Cl. 53—112 15 Claims

ABSTRACT OF THE DISCLOSURE

Disclosed herein is an apparatus for vacuuming and lifting a package which includes a vertically disposed vacuum tube and a nozzle mounted for relative motion with respect to said vacuum tube to form a valve, a vacuum actuated air pressure control valve connected to supply high pressure air to a lift cylinder to raise the vacuum tube and a quick disassembly arrangement to allow for the removal of the vacuum tube and nozzle from the apparatus.

BACKGROUND OF THE INVENTION

Vacuum packaging of meats, such as poultry, has generally been done by vacuum lifters of the type shown in Pats. Nos. 3,046,713 and 2,866,975. The vacuum lifters are used to evacuate air from an air tight package or pouch and to raise or lift the package automatically from the supporting surface by using the vacuum used to evacuate the package. The vacuum nozzle used to evacuate the package in the vacuum type lifter has been subject to considerable objection due to the blockage of the nozzle by the opening in the portions of the wrapper that tend to be gathered around the nozzle when the package is evacuated. This results in an accumulation of moisture in the vacuum tube between the vacuum valve and the nozzle. The accumulated moisture then flows back through the nozzle after the package has been removed from the nozzle and drips into succeeding packages. An entire packaging line may be shut down for cleaning at any time by the packaging line inspector if the accumulation of moisture in the lifters is considered to be unsanitary. Disassembly of the vacuum lifters for cleaning requires a considerable amount of time causing a corresponding loss of time in the operation of the packaging line.

SUMMARY OF THE INVENTION

The vacuum packaging apparatus of this invention provides an improved operating cycle for evacuating air from a poultry package with substantially no flow back of moisture to the package. The operating cycle is improved by using a vacuum responsive valve assembly to automatically initiate a lifting motion when a vacuum is drawn in the package. Moisture accumulation is minimized by positioning the vacuum valve within the nozzle so that moisture accumulated in the vacuum tube is prevented from flowing back through the nozzle. This apparatus is also provided with a quick disassembly arrangement to remove the nozzle, handle and vacuum tube from the apparatus for cleaning. Packaging line shut down time has been reduced by using the quick disassembly arrangement, which only requires the removal of a snap lock pin in order to remove the parts to be cleaned. In its preferred form the apparatus of this invention includes the features of a vacuum valve located in close proximity to the nozzle, a vacuum actuated air pressure valve to automatically control the lifting and lowering of the apparatus and a quick disassembly arrangement to remove the parts of the apparatus that must be periodically cleaned.

Other objects and advantages of the present invention

will become more apparent from the following detailed description when read in connection with the accompanying drawings in which:

FIG. 1 is an elevation view of the vacuum packaging apparatus.

FIG. 2 is a section view of the packaging apparatus in the inoperative position.

FIG. 3 is a section view of the packaging apparatus with the vacuum actuated air valve shown in the open position and the air lift cylinder pressurized.

FIG. 4 is a section view taken on line 4—4 of FIG. 2 showing the snap lock pin.

FIG. 5 is a section view showing the disassembly of the snap lock assembly from the air lift cylinder.

FIG. 6 is a section view taken on line 6—6 of FIG. 5 showing the key removed from the vacuum tube and air lift cylinder.

FIG. 7 is taken on line 7—7 of FIG. 3 showing the ports in the gasket for the Vac-Air valve assembly.

DESCRIPTION OF THE INVENTION

Although the disclosure hereon is detailed and exact to enable those skilled in the are to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claims appended hereto.

Referring more particularly to the drawings, the vacuum packaging apparatus **10** is shown supported by means of a mounting bracket **12** and a tubular shaft **14** with a vacuum tube **16** coaxially mounted within the shaft **14** and connected to a vacuum pump as indicated in the drawing by a quick disconnect coupling **18**. Meat or poultry which is to be packaged is placed in an impervious plastic bag **20** in a production line operation and is transported to a position beneath the packaging apparatus **10**. The opening **22** of the package **20** is gathered around a vertically disposed handle **26** co-axially mounted on the vacuum tube **16**. The vacuum tube **16** is closed by means of a valve **28** formed by the engagement of a nozzle **24** secured to the handle **26** and the lower end **30** of the vacuum tube **16**. The handle **26** is pulled downward relative to the vacuum tube **16** against the bias of a spring **60** to open the valve **28** formed between the nozzle **24** and the end **30** of the vacuum tube **16** to start the evacuation of air from the package **20**. As the air is evacuated from the package **20**, the package **20** is raised or lifted from the supporting surface by means of an air lift cylinder **32** which is automatically pressurized by a vacuum actuated air pressure control valve assembly **34**. The package should be raised to a position suspended beneath the handle **26** so that the package **20** can be twisted and a clamp applied to seal the opening **22** of the package **20**.

Means are provided in the nozzle **24** to prevent the blockage of the nozzle **24** by the plastic material forming the opening **22** of the package **20**. More specifically, the nozzle **24** has a frusto conical lower section **36** and an externally threaded section **38** which is screwed into an internal threaded section **40** in the handle **26**. These threaded sections could be reversed if desired with the internal threaded section provided in the nozzle and the external threaded section provided on the handle. Air evacuating from the package **20** is drawn through a number of openings **42** spaced outwardly from the vacuum tube **16** in a valve plate **44** located a spaced distance from the end of the lower section **36** of the nozzle **24**. The opening **22** of the package is prevented from being drawn against the valve plate **44** and blocking openings **42** by means of a depending tube **46** secured beneath the valve plate **44** within the circle of openings **42** and having an axial opening **48** connected to a cross bore **50** located in

close proximity to the valve plate **44**. As the opening **22** of the package **20** is drawn into engagement with the sides of the tube **46** as seen in FIG. 3, air will still be drawn through the opening **48** and cross bore **50** in the tube **46** and then through opening **42**.

Moisture is prevented from flowing back through the vacuum tube **16** and dripping from the nozzle **24** by locating the vacuum valve **28** within the nozzle **24**. The valve **28** is formed by means of the valve plate **44** which is positioned to operatively engage the lower end **30** of the vacuum tube **16**, producing a metal to metal vacuum line seal. Moisture drawn into the vacuum tube **16** is collected in a conventional moisture trap **15** in the vacuum line connected to the quick disconnect coupling **18**. Any moisture which accumulates in the vacuum tube **16** will flow by gravity toward the valve **28** but will be prevented from escaping from the vacuum tube **16** by the seal formed by the engagement of the valve plate **44** with the lower end **30** of the vacuum tube **16**. If the seal at the valve **28** should leak the moisture in the vacuum tube **16** cannot flow out of the vacuum tube **16** due to the continuous vacuum present in the vacuum tube **16** when the apparatus is operating. The small amount of moisture which may accumulate on the tube **46** is generally insignificant.

The valve **28** is opened to evacuate the package **20** and closed upon completion of the vacuuming operation by means of the handle **26** which is axially moveable on the vacuum tube **16**. The handle **26** is provided with a piston head **52** which is sealed within a cylindrical opening **54** in a cylindrical housing **56** by means of O-ring seals **55**. The housing **56** is secured to a reduced diameter section **58** on the lower end of the air lift cylinder **32** by means of the snap lock pin **64** and is sealed to the vacuum tube by O-ring seals **53**. The handle **26** is biased by means of the spring **60** positioned between the piston head **52** and the end wall **62** of opening **54** to hold the valve plate **44** in abutting engagement with the end **30** of the vacuum tube **16**. When the handle **26** is pulled downward against the bias of spring **60**, the vacuum valve **28** will open and on release of the handle the spring **60** will return the handle **26** to its original position, closing the valve **28**.

The package **20** is raised from the supporting surface by means of the air lift cylinder **32** mounted on the support shaft **14**. The air lift cylinder **32** is connected to the vacuum tube **16** by means of a key **66** positioned in an annular groove **68** in a flange **70** provided on vacuum tube **16** and a slot **72** in the lower section **58** of the cylinder. The flange **70** is inserted into a recess **71** in the lower end **58** of the cylinder and the key **66** is placed in the slot **72** and groove **68**. The cylinder **32** is coaxially mounted on the support shaft **14** and is retained thereon by means of the engagement of cap **74** in the open end of cylinder **32** with a piston head **76** secured to the lower end **78** of the shaft **14** by a set screw **80**. The cap **74** is secured to the cylinder **32** by means of a threaded section **82** and is sealed to the shaft **14** by means of O-ring seals **84**. The piston head **76** is sealed in the cylinder **32** by means of O-ring seals **86**. The cylinder **32** is moved upwardly on the shaft **14** to raise the vacuum tube **16** and handle **26** by admitting air under pressure into the cylinder **32** in the space between the piston **76** and the cap **74** through a port **88** provided in the side wall of the cylinder **32**.

In this last regard, the admission of high pressure air into the cylinder **32** is controlled by means of the vacuum air valve assembly **34** to raise the cylinder **32** on the shaft **14** when substantially all of the air has been evacuated from the package **20**. The vacuum air valve assembly **34** includes a valve body **90** provided on the side of cylinder **32** and a valve cap **92** secured to the valve body **90** by any appropriate means such as screws (not shown). The valve body **90** and valve cap **92** are each provided with a set of concentric grooves **94** and **96**. When the cap **92** is assembled on the body **90**, the grooves **94** and **96** form annular air flow paths which are sealed from each other and the atmosphere by means of a gasket **98** positioned between the cap **92** and valve body **90**. The gasket is provided with a first orifice **100** to connect the grooves **94** and a second orifice **102** to connect the grooves **96** (FIG. 3). The orifices **100** and **102** will always be aligned with their respective grooves **94** and **96** regardless of the rotary position of the gasket on the valve body.

High pressure air which is used to operate the air cylinder **32** is supplied from a source (not shown) to a flexible pressure line **104** connected to the mounting bracket **12** and to the valve body **90**. The high pressure air is admitted to a chamber **106** in the valve body **90** through a port **108** and passes from the chamber **106** through an orifice **110** to a passage **112** in the valve cap which is connected to the annular grooves **96**. The pressurized air passes through the orifice **102** in the gasket **98** and into the cylinder **32** through port **88**.

The flow of pressurized air through the vacuum air valve assembly **34** is controlled by means of a vacuum actuated valve **114** which is connected to respond to the evacuation of air from the package **20** to allow high pressure air to enter the air cylinder **32** and to vent the air in the air cylinder **32** to the atmosphere when the package is removed. The valve **114** includes a valve stem **116** positioned in orifice **110** and having an O-ring seal **118** positioned to sealingly engage and close one end of orifice **110** when the stem **116** is in a closed position and an O-ring seal **119** to sealingly engage and close the other end of orifice **110** when the stem **116** is in the open position. The valve stem **116** is moved axially in the orifice **110** by means of a piston head **120** secured to the stem **116** and positioned in a cylindrical opening **122** provided in the valve cap **92**. The piston head **120** is sealed by means of an O-ring **124** provided in a peripheral groove **126** in the piston head **120**.

The piston head **120** is moved to open the valve **114** by drawing a vacuum in the space **130** between the piston head **120** and the end wall **132** in cylinder **122**. The space **130** is connected to the valve **28** through the space between the vacuum tube **16** and the handle **26**, port **134** provided in the handle **26**, space **135** in the cylindrical housing **56**, passage **136**, flexible plastic tube **138**, passage **142** in the valve body **90** which is connected to annular grooves **94**, orifice **100** in the gasket **98** and port **140** in the valve cap **92**. When a vacuum is drawn in the space **130**, the piston **120** will move to the left to the position shown in FIG. 3 to open valve **114** and allow air under pressure to enter the cylinder **32**. The O-ring seal **119** will close the orifice **110**. The upward motion of the cylinder **32** on the shaft **14** will raise the package **20** until it is suspended beneath the nozzle **24**.

The packaging apparatus **10** is automatically returned to its initial position when the handle **26** is released by the response of the valve assembly **34** to the closing of the vacuum valve **28**. Atmospheric pressure is returned to the space **130** in the valve cap **92** by the connection of the space between the handle **26** and tube **16** to the atmosphere through openings **42** in the nozzle **24**. The force of the high pressure air in orifice **110** will act against the O-ring seal **119** and a small piston **150** sealed in opening **152** in the valve cap **92** by O-ring seals **156**. The force of high pressure air in the orifice **110** will move the piston **150** and the piston **120** to the right closing the valve **114**. The motion of the piston **150** will open a port **158** in the valve cap **92** venting the high pressure air in the cylinder **32** to the atmosphere through passage **88**, annular groove **96**, orifice **102** in the gasket **98**, passage **112** and out through port **158**.

The nozzle **24**, handle **26** and vacuum tube **16** must be cleaned periodically and if considered unsanitary, an entire packaging line may be required to be stopped until these parts are cleaned. The nozzle **24**, handle **26** and vacuum tube **16** can be quickly disassembled from the cylinder **32** by means of the snap lock release assembly

160 secured to the lower end of cylinder 32. This assembly includes the housing 56 secured to the cylinder 32 by means of the snap lock pin 64 which is inserted through an aperture 162 in the housing 56 and through a slot 164 in the side of the cylinder 32. The snap lock pin 64 is retained on the housing 56 by means of a resilient arcuate section 166 that has a curvature substantially similar to the curve of the outer surface of the housing 52 and a straight pin 168. The section has sufficient flexibility to snap into a locked position on the side of the housing 56 and allows for easy release from the housing 56 by merely pulling the pin 168 out of aperture 162. When the snap lock pin is pulled out of the orifice 162, the housing 56 will be free to move downward on the lower end 58 of the cylinder 32 exposing the locking key 66 positioned in the annular groove 68 in the flange 70 of the vacuum tube 16. By removing the key 66, the vacuum tube 16 will be free to fall out of the lower end 58 of the cylinder 32. The quick disconnect coupling 18 is removed from the upper end of the vacuum tube 16 to allow the handle 26, nozzle 24 and vacuum tube 16 to be removed for cleaning. Reassembly of this equipment on the cylinder 32 can be accomplished by merely reversing the disassmbly procedure. It should be apparent that the disassembly and assembly of the handle, nozzle and vacuum tube takes only a minute or two.

What is claimed is:

1. An apparatus for vacuuming and lifting a package having an opening, said apparatus comprising:
- a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted in the opening of the package,
- means for supporting said tube,
- means for forming a valve at the other end of said vacuum tube, said valve forming means comprising a nozzle which includes a valve plate having a number of openings and a tubular section depending from said valve plate and having an axial opening and a cross bore intersecting said axial opening and located in close proximity to said valve plate,
- means for moving said vacuum tube relative to said supporting means and means for actuating said moving means in response to the removal of substantially all of the air from the package.

2. A package vacuuming and lifting apparatus according to claim 1 including means releasably connecting said vacuum tube and valve means to said moving means.

3. An apparatus for vacuuming and lifting a package having an opening, said apparatus comprising:
- a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted in the opening of the package,
- means for supporting said tube,
- means for forming a valve at the other end of said vacuum tube,
- means for moving said vacuum tube relative to said supporting means,
- means for actuating said moving means in response to the removal of substantially all of the air from the package; and
- means for releasably connecting said vacuum tube and valve means to said moving means, said connecting means including a housing mounted on said moving means and a snap lock pin to secure said housing to said moving means.

4. An apparatus for vacuuming and lifting a package having an opening, said apparatus comprising:
- a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted in the opening of the package,
- means for supporting said tube,
- means for forming a valve at the other end of said vacuum tube,
- means for moving said vacuum tube relative to said supporting means,

- means for actuating said moving means in response to the removal of substantially all of the air from the package, and
- means releasably connecting said vacuum tube and valve means to said moving means, said connecting means including a removable key connecting said vacuum tube to said moving means.

5. An apparatus for vacuuming and lifting a package having an opening, said apparatus comprising:
- a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted in the opening of the package,
- means for supporting said vacuum tube, said supporting means including a mounting bracket and a hollow support shaft, said vacuum tube being mounted for axial movement within said shaft,
- means for forming a valve at the other end of the vacuum tube,
- means for moving said vacuum tube relative to said supporting means, said valve means being mounted on said moving means for movement into engagement with said vacuum tube, and
- means for actuating said moving means in response to the removal of substantially all of the air from the package.

6. A package vacuuming and lifting apparatus according to claim 5 wherein said moving means includes an air lift cylinder supported on said support shaft.

7. A package vacuuming and lifting apparatus according to claim 5 including means to releasably connect said vacuum tube and said valve means to said cylinder.

8. An apparatus according to claim 7 wherein said valve means includes a nozzle and said releasable means includes a spring to bias said nozzle into engagement with said vacuum tube.

9. An apparatus for vacuuming and lifting a package having an opening, said apparatus comprising:
- a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted into the opening of the package,
- means for supporting said tube,
- means for forming a valve at the other end of said vacuum tube,
- means for moving said vacuum tube relative to said supporting means,
- and means for actuating said moving means in response to the removal of substantially all of the air from the package, said actuating means including a vacuum air responsive valve assembly having a high pressure air passage connected to said moving means and to a source of high pressure air,
- a vacuum air passage connected to said valve means and means for controlling the flow of air through said high pressure air passage in response to the presence of a vacuum in said vacuum air passage.

10. An apparatus according to claim 9 wherein said control means includes a stem mounted for axial movement in said air passage and having an O-ring seal to close said high pressure air passage and a piston on said stem operatively positioned to respond to the presence of a vacuum in said vacuum air passage.

11. An apparatus for vacuuming and lifting a package having an opening, said apparatus comprising
- a mounting bracket,
- a vertically disposed tubular shaft supported by said mounting bracket,
- a vacuum tube mounted for axial movement in said shaft,
- a nozzle moveable into engagement with said vacuum tube to form a valve and adapted to be inserted in the opening in the package,
- an air lift cylinder mounted on said shaft,
- means for releasably connecting said nozzle and vacuum tube to said air lift cylinder, and
- means responsive to the presence of a vacuum in said

package for pressurizing said air cylinder to move said vacuum tube and nozzle relative to said shaft.

12. An apparatus according to claim **11** wherein said responsive means includes a valve body having a pair of concentric grooves,

a valve cap mounted on said valve body and having a pair of concentric grooves corresponding to said grooves in said valve body, and

means for sealing said cap to said valve body and for connecting the corresponding grooves in said cap with said grooves in said valve body.

13. An apparatus according to claim **12** wherein one of said grooves is connected to said air lift cylinder and to a source of high pressure air and

the other of said grooves is connected to the vacuum tube and

including means to control the flow of high pressure air to said cylinder in response to the presence of a vacuum in said other groove.

14. An apparatus for vacuuming a package having an opening, said apparatus comprising a bracket,

a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted in the opening of the package,

means for supporting said tube on said bracket, and

means mounted on said supporting means forming a valve at said other end of said vacuum tube, said valve means including a nozzle having a valve plate

positioned to sealingly engage said other end of said vacuum tube and having a plurality of holes around the outer periphery of said plate and a tubular section depending from said valve plate and having an axial opening and a cross bore intersecting said opening.

15. An apparatus for vacuuming a package having an opening, said apparatus comprising a bracket,

a vacuum tube having one end operatively connected to a vacuum source and the other end adapted to be inserted in the opening of the package,

means for supporting said tube on said bracket and including a removable key to secure said vacuum tube to said supporting means and a snap lock pin to secure said valve means to said supporting means, and

means mounted on said supporting means for forming a valve at said other end of said vacuum tube.

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