

March 30, 1965

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3,175,590

RETRACTABLE CAVITY NOZZLE FOR VACUUM PACKING AND LIFTING DEVICE

Filed April 22, 1960

5 Sheets-Sheet 1

Fig. 1.

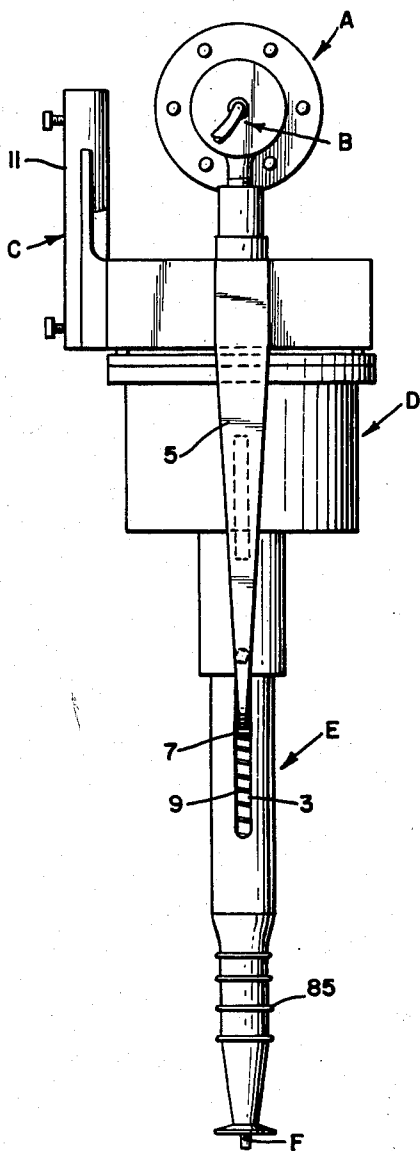
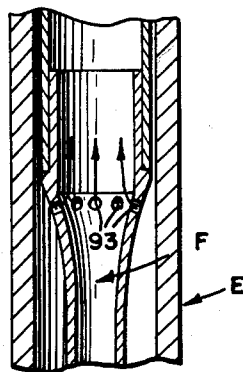


Fig. 6.



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Fig. 2.

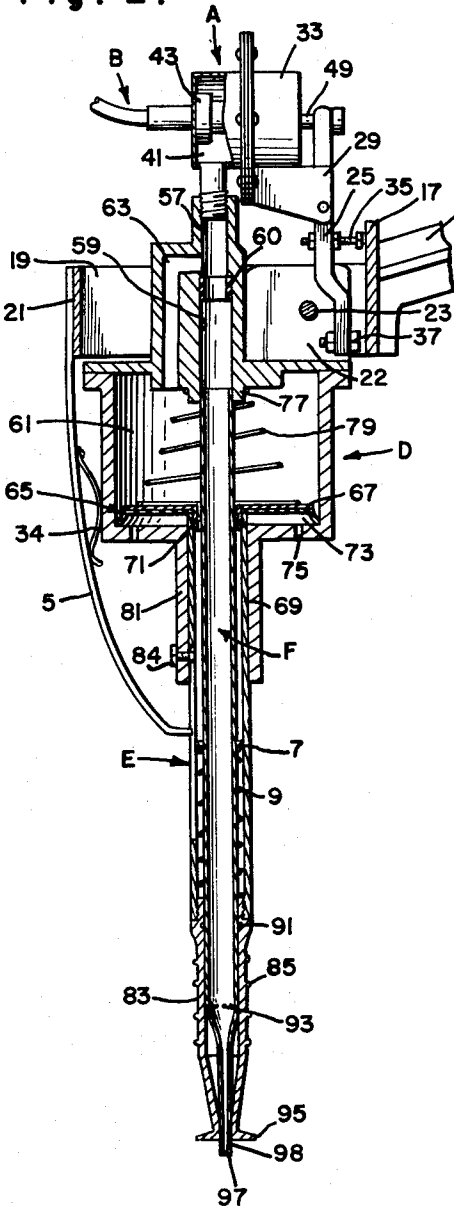
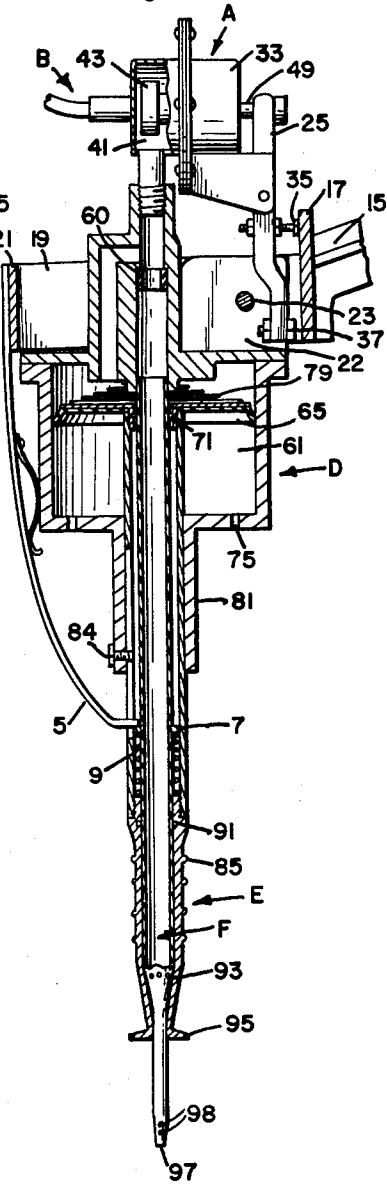


Fig. 3.



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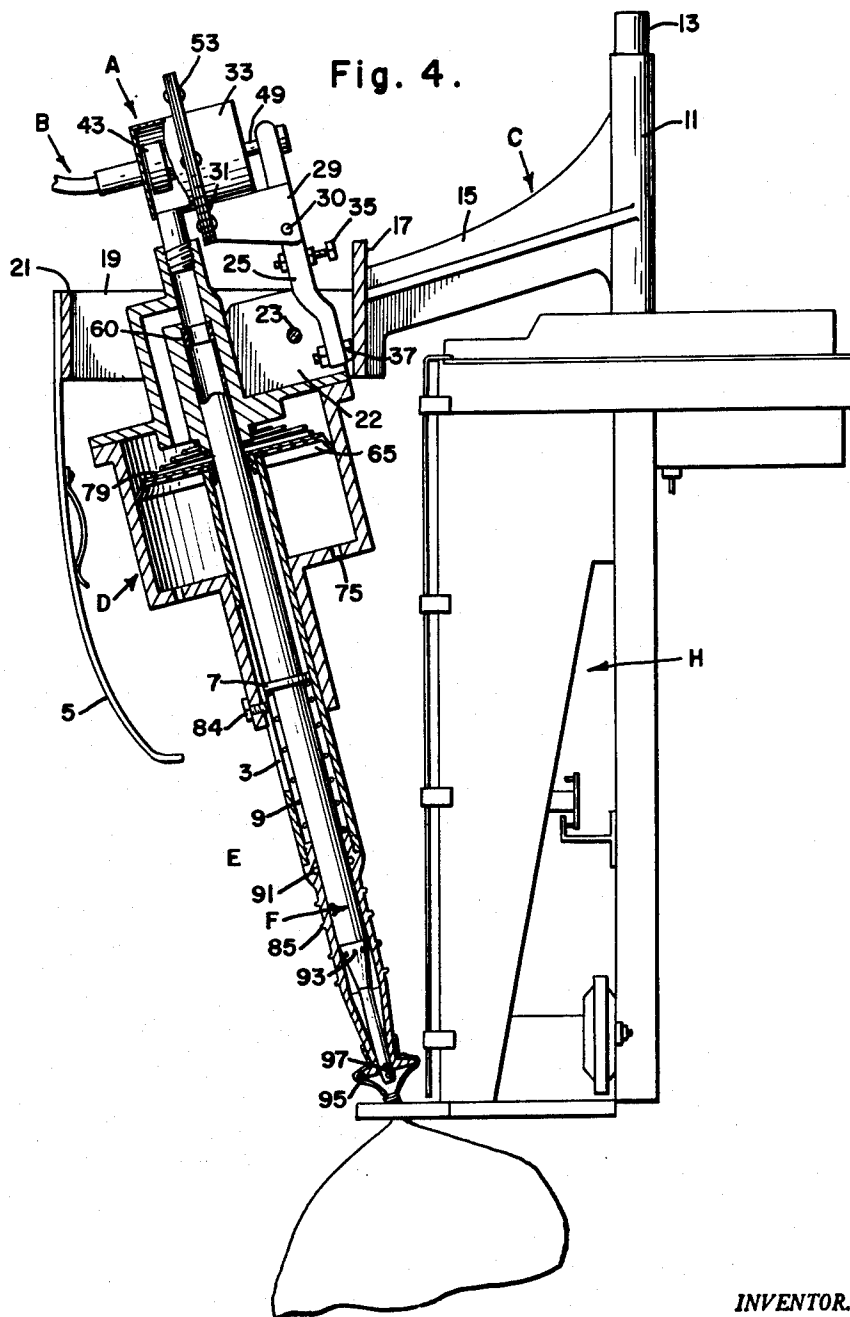
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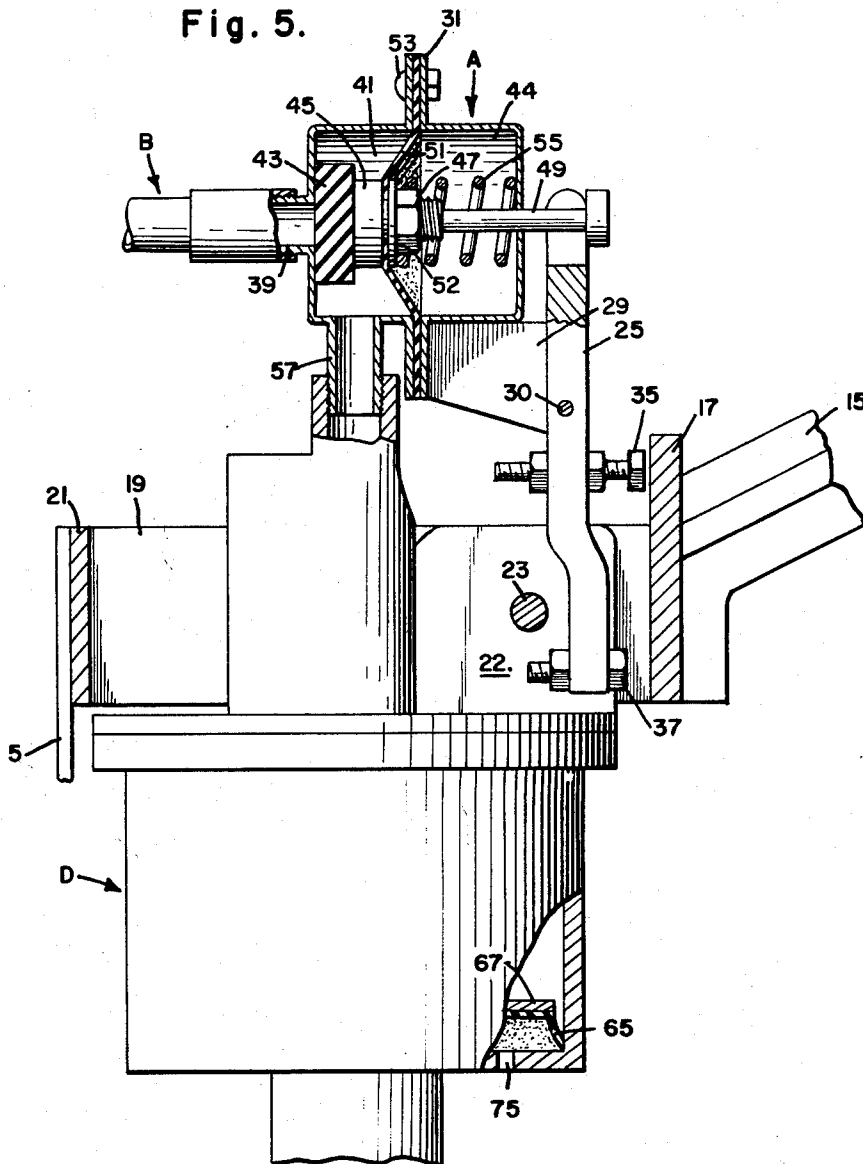
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Fig. 5.



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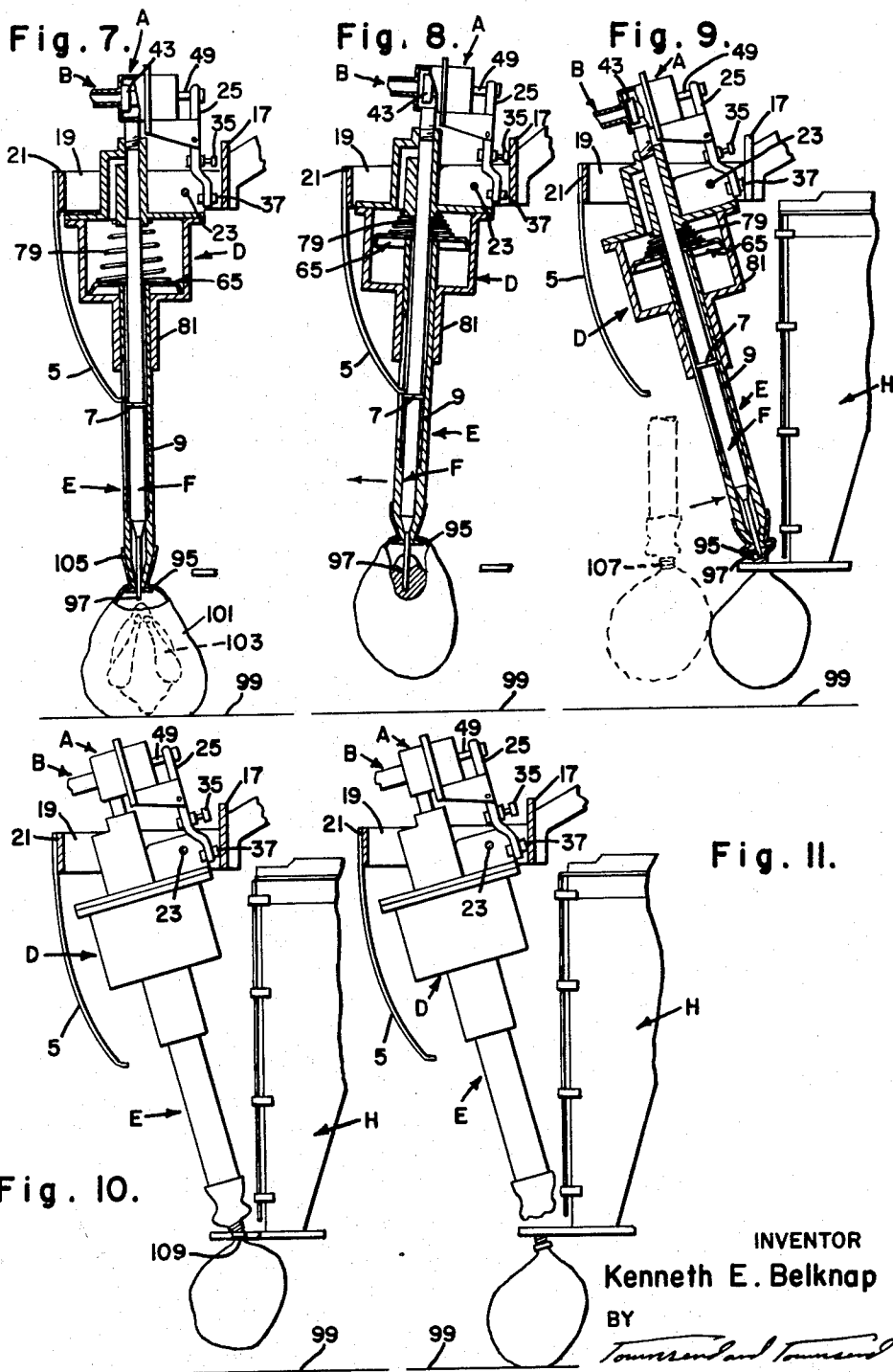
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RETRACTABLE CAVITY NOZZLE FOR VACUUM PACKING AND LIFTING DEVICE

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15 Claims. (Cl. 141—8)

This invention relates to improvements in vacuum packing devices and more particularly to devices especially adapted for use in vacuum packing eviscerated poultry or the like in collapsible air tight bags. In this regard, reference is made to U.S. Patent No. 2,681,757 for Vacuum Packing and Lifting Device, issued June 22, 1954.

It is an object of the within invention to provide a novel vacuum tube to withdraw air from two locations within a bag containing poultry. Such a tube is mounted within an outer tubular sleeve which has a nozzle normally proximate the end of the vacuum tube.

This outer sleeve, which mounts the bag and contents, and the inner tube are slidably axially movable relative to one another to cause the end of the inner tube to removably project into the body cavity of the eviscerated poultry, substantially below the nozzle of the outer sleeve.

Heretofore, it has been customary to vacuumize collapsible bags containing poultry by a vacuum nozzle tube insertable in the bag neck and which said tube is in communication with a vacuum source and raisable by a vacuum actuated motor to lift the bag and contents and remove air therefrom. One of the difficulties inherent in this apparatus and method was that the neck of the bag would collapse around the nozzle when subjected to vacuum, hindering flow of air from the bag through the tube. To overcome this problem, the operator was required to apply a constant downward hand pressure on the bag to stretch and keep open the neck portion. This procedure not only required skill on the part of the operator but slowed the vacuumizing operation, and oftentimes produced inconsistent packing results.

It is a primary object of the within invention to eliminate the above mentioned difficulties by providing a vacuum tube mounted within an elongated tubular sleeve so that when the bag containing poultry is lifted by the outer sleeve, the inner tube will project from a position proximate the nozzle of the outer sleeve into the body cavity of the poultry substantially below the nozzle and maintain a constant channel through which air may be withdrawn from the bag and contents, even though the neck of the bag collapses around the nozzle itself.

It is another primary object of the within invention to provide an inner tube as above described which is raisable from the body cavity of the poultry to a position proximate the nozzle of the outer sleeve after air has been withdrawn from the bag and contents. This allows the operator to air-seal the neck of the collapsed bag below the nozzle. Such an object is accomplished by providing means to urge the inner tube slidably upward at the desired time.

It is another object of the within invention to provide means for returning the inner tube to normal position when communication between the vacuum source and the vacuum actuated motor is closed, thereby enabling the vacuum packing procedure to be repeated. Such object is accomplished by providing means on the outer sleeve to frictionally interlock the inner tube to cause the inner tube and the outer sleeve to move downward together.

A feature and advantage of the within invention resides in the fact that the device is pivotally mounted on a support means cooperable with means on the device to open and close communication between the motor and the

source. Thus, by simple pivotal movement of the outer tubular sleeve, the vacuum motor may be activated and deactivated.

Another object of the within invention is to provide a more thorough and efficient method of vacuum packaging a non-collapsible hollow article having an open end, such as eviscerated poultry, in a collapsible air-tight bag. Such a method comprises the steps of withdrawing air from at least two locations in the bag containing the article. More specifically, said method comprises the steps of placing the article in a collapsible bag with the open end of the article adjacent the neck of the bag, withdrawing air from the bag at a first location proximate the neck of said bag and withdrawing air from a second location within the hollow of the article during and after withdrawal of air at said first location. In other words, the vacuum at the first location causes the bag to collapse against the article, and during the collapse of the bag and after its collapse air is withdrawn from within the article. Thus, the method of the present invention uses the hollow packaged article to prevent the bag from collapsing around the vacuum tube which enables one to obtain substantially unrestricted air flow from the bag at all times and to attain substantially complete evacuation of air from the bag.

Other objects and advantages of the invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a front elevational view of a satisfactory embodiment of the within invention;

FIG. 2 is a side elevational view, in section, of the embodiment of FIG. 1, showing the motor and associated outer sleeve and inner tube in normal position;

FIG. 3 is a side elevational view, in section, of the embodiment of FIG. 1, showing the motor vacuum actuated and the inner tube extending beyond the lower end of the outer sleeve;

FIG. 4 is a side elevational view, in section, of the embodiment of FIG. 1, showing the device pivotally mounted on a post also supporting an automatic bag clipping and cutting device and showing the outer sleeve and inner tube in raised position;

FIG. 5 is an enlarged elevational view, in section, of the vacuum valve mechanism of the embodiment of FIG. 1;

FIG. 6 is an enlarged sectional view of a portion of the outer sleeve and inner tube showing apertures communicating the outer sleeve with the inner tube; and

FIGS. 7-11, inclusive, are vertical, sectional views of the within invention showing the component parts thereof in different positions of operation.

Referring now more particularly to the drawings, an embodiment of the invention is shown in FIG. 1 as generally comprising a vacuum valve mechanism A having a vacuum source B communicating therewith, a support bracket C pivotally mounting the device, a vacuum actuated tube lifting mechanism D communicating with valve mechanism A, an associated outer retractable bag lifting sleeve E and slidable inner vacuum tube F.

Outer tube E has a slotted portion 3 through which a retaining arm 5 extends to engage stop ring 7 abutting compression spring 9, all of which will hereinafter be explained more fully.

As best seen in FIG. 4, support bracket C includes a tubular member 11 mounted for slidable vertical movement on a stationary post 13. Indicated schematically at H is an automatic clip feeding and fastening device according to that described in Patent No. 2,907,494. This

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device is shown for purposes of illustration as also mounted on post 13, and the combination of such device with the apparatus of the within invention is more particularly described in my copending application Serial No. 24,170, now Patent No. 3,046,713, filed on an even date herewith and entitled: Combination Vacuum Lifter and Bag Clipping Assembly.

Arm 15 of support bracket C terminates in abutment plate 17 to which are attached side frame members 19 and end frame 21. A mount block 22 connected to the device is interposed between side frames 19 and pivotally mounted thereto by means of pivot bolt 23.

At the end of valve mechanism A is a valve actuating lever 25 attached to valve rod 49. The lever 25 is mounted for pivotal movement to frame 29 as at 30, and frame 29 is anchored to connecting plates 31 of the vacuum valve housing 33. This lever 25 includes stop 35 and stop 37 which project outwardly therefrom to selectively abut plate 17 upon pivotal movement of the machine. The stops are adjustable to allow for wear due to friction against plate 17.

Referring now to FIG. 5, a detailed sectional view of vacuum valve mechanism A, the vacuum source B is shown attached to an outwardly projecting conduit member 39 which opens into valve chamber 41. In this view a valve head 43, preferably formed of resilient material such as rubber, appears in seated position abutting the wall around the opening of conduit 39 forming a tight seal between chamber 41 and the conduit. The head 43 may be mounted on a base 45 threadedly connected to nut 47 and rod 49. The valve chamber 41 is preferably sealed from the rod chamber 44 of valve housing 33, and a flexible diaphragm 51 is provided for this purpose. The diaphragm is snugly fitted about the valve head base 45 backed by collar 52 and extends outwardly of housing 33 between connecting plates 31 where it is secured by bolts 53. Disposed behind the diaphragm is a compression spring 55 for actuating the valve to closed position. The spring 55 is seated at one end on nut 47, and its opposite end abuts the rear wall of chamber 44.

In operation of the valve, when the device is pivoted in frame 19 causing either stop 35 or stop 37 to abut plate 17, the valve actuating lever 25 will pivot at 30 biasing valve rod 49 rearwardly to unseat valve head 43 and cause the creation of a vacuum in valve chamber 41. The diaphragm 51 will flex with the movement of rod 49.

When the device is in normal vertical position, and stop 35 is slightly spaced apart from abutment plate 17, pressure from source B plus pressure from spring 55 causes return of valve head 43 to seating position closing communication between the source and chamber 41.

Referring now to FIGS. 2, 3 and 4 of the drawings, showing detailed sectional views of the device, the major phases of operation may be seen. These views respectively show the machine in (1) neutral or at rest position with communication closed between source B and tube lifting mechanism or motor D; (2) vacuumizing position with source B actuating the motor D and retaining arm 5 engaging slidable inner tube F which projects into the body cavity of the poultry; and (3) bag fastening and trimming position in which retaining arm 5 is out of engagement with inner tube F and both the vacuum tube F and outer sleeve E are raised.

As is seen in the drawings, a main conduit 57 extends from valve chamber 41 to communicate with vacuum tube F (through channel 59) and lift chamber 61 (through channel 63). The upper portion of tube F passes through the center of chamber 61 and in operation will ride into and out of channel 59. The upward movement of tube F is limited by stop 60. Also in chamber 61 are pistons generally indicated at 65. These pistons 65 include head plates 67 which are affixed to outer sleeve E and resilient cups 73 shown snugly engaging the inner walls of chamber 61. An O-ring 71 is mounted on the vertically extending portions of plates 67, and ring and cups seal

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the chamber against atmospheric pressure induced by vacuum relief ports 75.

At the upper end of the vacuum lift chamber is a downwardly extending portion 77 to which a compression spring 79 is anchored. The spring has an opposite end abutting the heads of pistons 65. As is obvious, when vacuum raises pistons 65 in the chamber, spring 79 compresses, and, when vacuum is removed from the chamber, will decompress to urge the pistons, and affixed outer sleeve E downward to normal position.

The housing of motor D extends downwardly, telescoping the upper portion of outer sleeve E and forms a guide 81 for the vertical movement of the sleeve. A retaining screw is indicated at 84. This screw prevents the turning of sleeve E relative to the housing of motor D. Thus, the slotted portion 3 of sleeve E is maintained in proper alignment to receive arm 5. At the lower portion of outer sleeve E a hand grip 83 is provided. This grip is defined by annular raised portions 85 and terminates in a flared nozzle 95. In the nozzle, vacuum is created by means of apertures 93 in the inner tube F formed adjacent the narrowed end portion of the tube. The bottom 97 of tube F is closed and apertures are formed about the neck of the tube as at 98. By this means a plurality of air intake openings are made available, which are located so as not to become plugged and inhibit air flow if the end of the air tube contacts against the fleshy part of the bird's cavity or the like. Nozzle 95 is air sealed above apertures 93 by an O-ring 91 which together with O-ring 69 also performs the function of frictionally engaging the inner tube F. Thus, when vacuum pressure is absent from chamber 61, causing movement of the outer sleeve downward to neutral, the inner tube also returns to neutral.

The operation of the mechanism will now be described by having particular reference to FIGS. 7-11 inclusive.

FIG. 7 shows the position of the various parts comprising the device when the machine is at rest or in neutral position. The operator first raises or lowers the machine on its primary support 13 so that the end 97 of tube F and the end of nozzle 95 are disposed above the packing table 99 a distance determined by the size of the bird to be packed. The bird, indicated by the dotted lines at 103, is then manually placed into a collapsible bag 101 formed of air-tight material, such as pliofilm or polyethylene.

The bird is placed in the bag with the tail end up in direct alignment with the neck 105 of the bag. Consequently, the cut, in the abdomen of the bird through which the viscera are removed, is also aligned with the bag neck. After the fowl has been placed in the bag, the bag neck 105 is placed over the annular raised portions 85 of outer sleeve E and held by the operator in this position.

The machine is then pivoted slightly, as shown in FIG. 8, to actuate the vacuum lifting mechanism D. Arm 5 becomes engaged with stop ring 7 and motor D has lifted outer sleeve E relative to vacuum tube F thereby causing the end of tube F to project into the body cavity of the bird. In this position air is withdrawn from the bag through the end of nozzle 95, and from the interior of the fowl, through the apertures 98 in the end 97 of inner tube F. This tube forms a constant channel for withdrawal of air even though the bag may collapse around the end of nozzle 95 impeding withdrawal of air therethrough.

Once the bag and contents are thoroughly vacuumized, the operator pivots the machine slightly in the opposite direction. This movement disengages arm 5 and inner tube F rises under pressure of spring 9 to an upper position proximate the end of nozzle 95. As the lower end of tube F has withdrawn from the interior of the fowl, the operator is permitted to spin or twist the bag to form a rope-like seal in the neck of the bag as is indicated at 107. The machine is then further pivoted to the posi-

tion illustrated in FIG. 9. At this position stop 37 abuts plate 17 which causes valve head 43 to barely "crack" open. This causes re-establishment of sufficient vacuum communication with source B to maintain the bag in lifted position so that the neck of the bag will align with the jaws of the bag fastening and cutting machine H.

FIG. 10 illustrates the position of the machine immediately after impact of the bag neck against the jaws of the fastening machine has caused a clip or metal band to be applied to the bag neck, and FIG. 11 shows the trimmed bag after it has dropped to the packing table and the packaging job has been completed.

When the machine is returned to normal or neutral position, the valve is caused to close and piston spring 79 will force outer sleeve E and inner tube F (associated with sleeve E by virtue of O-rings 71 and 91) to return to the position shown in FIG. 7 in which position the machine is in readiness for another operating cycle.

The entire vacuumizing, fastening and trimming operation requires only a few seconds of time and may be performed with one hand leaving the other hand free for assembly purposes.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention as limited only by the scope of the appended claims.

What is claimed is:

1. In a bag vacuumizing and lifting device in combination with a vacuum source: a vacuum actuated motor in communication with said source; an outer vertically movable elongated tubular sleeve drivably connected to said motor and having a nozzle at the end thereof; an elongated vacuum tube mounted within said outer sleeve communicating with said source, and switch means on said device to open and close communication between said source, said motor, said sleeve and said vacuum tube; said tube mounted for slidable axial movement relative to said sleeve upon actuation of said switch means selectively to a first normal position in which said sleeve nozzle is proximate the end of said tube, a second position in which said sleeve nozzle is raised substantially above the end of said tube, and a third position in which the end of said tube is proximate the end of the raised said sleeve nozzle.

2. A combination according to claim 1 wherein said device is pivotally mounted on a stationary support member and wherein said switch means to open and close communication is operable by pivoting said device on said support.

3. A combination according to claim 1 wherein said device is pivotally mounted to a secondary support for pivotal movement from normal position in one direction to actuate said motor and raise said outer sleeve relative to said inner tube, and for pivotal movement in another direction to raise the end of said inner tube proximate the nozzle of the raised said outer sleeve and re-actuate said motor.

4. In a bag vacuumizing and lifting device in combination with a vacuum source: a vacuum actuated motor, said motor in communication with said source; an outer vertically movable elongated tubular sleeve connected to said motor and movable upon vacuum actuation of said motor from a normal lowered position to a raised position; said sleeve having a vacuum nozzle at the bottom end thereof in communication with said source and to receive thereon the neck of a bag, an elongated vacuum tube mounted within said outer sleeve and communicating with said source, means on said device to open and close communication between said source, said motor, said sleeve and said vacuum tube; said vacuum tube and sleeve slidably axially movable relative to one another, the lower end of said tube occupying a position proximate

the nozzle on said sleeve when the latter is in normal lowered position; disengageable stop means on said device to maintain said vacuum tube stationary and to cause same to project into the bag interior below said nozzle when the outer sleeve carrying said bag is in raised position; means operable when said stop means is disengaged and said sleeve is in raised position to vertically raise said vacuum tube within said sleeve to a position whereat the end thereof is proximate with the nozzle of said sleeve; means to return said sleeve and vacuum tube to normal lowered position.

5. A combination according to claim 4 in which said vacuum tube includes a narrowed portion apertured about the periphery thereof to create a vacuum in the lower portion of said sleeve.

6. The process of vacuum packaging a hollow non-collapsible article having an open end in a collapsible air-tight bag, comprising the steps of: withdrawing air from the bag at one location in said bag and withdrawing air at another location in said bag during and after withdrawal of air at said first location.

7. The process of vacuum packaging a hollow non-collapsible article having an open end in a collapsible air-tight bag, comprising the steps of: withdrawing air from said bag at a first location in the bag adjacent the neck of the bag and withdrawing air from the bag at a second location spaced a substantial distance interiorly from the bag neck during and after withdrawal of air at said first location.

8. The process of vacuum packaging a hollow non-collapsible article having an open end in a collapsible air-tight bag, comprising the steps of: collapsing the bag against the article and withdrawing air at a location within the hollow of the article during and after collapse of said bag.

9. The process of vacuum packaging eviscerated poultry in a collapsible air-tight bag, comprising the steps of: withdrawing air from said bag at a first location in the bag adjacent the neck of the bag and withdrawing air from the bag at a second location spaced a substantial distance interiorly from the bag neck during and after withdrawal of air at said first location.

10. The process of claim 9 and wherein the second location from whence air is withdrawn is within the eviscerated cavity of the poultry within the bag.

11. The process of vacuum packing a hollow non-collapsible article having an open end in a collapsible air-tight bag comprising the steps of: withdrawing air from said bag at a first location in the bag adjacent the neck of the bag, and also withdrawing air from said bag at a second location within the hollow of said article and through said open end thereof.

12. In a combination with a vacuum source, a bag vacuumizing and lifting device comprising an elongate sleeve having a nozzle end for entry into the bag, means for supporting said sleeve in a depending pivotal position with the nozzle end disposed downwardly, said supporting means being adapted to afford axial movement to said sleeve between an upper and a lower position, means for selectively axially driving said sleeve from the lower position to the upper position, an elongate tube slidably disposed in said sleeve and having an air inlet end movable relative said nozzle between a retracted position and a projecting position, means for yieldably biasing said tube toward the retracted position, means for releasably locking said tube in a lower position when said sleeve is in the lower position so that on movement of the sleeve to the upper position said tube will be in the projecting position, and means communicating said vacuum source to said tube and to said sleeve.

13. The invention of claim 12 wherein said axially driving means comprises a cylinder, a piston slidably movable within said cylinder, means for securing said sleeve to said piston and means for controllably communicating said vacuum source to said cylinder.

14. The invention of claim 13 wherein said controllable vacuum communicating means comprises a valve having a control arm for moving the valve between an opened and closed position and an abutment plate secured to said sleeve supporting means proximate said arm; said arm being adapted to engage said abutment plate to move the valve to an open position in response to pivotal movement of said sleeve.

15. The invention of claim 12 wherein said releasable tube locking means comprises a stop ring secured to said tube and a substantially rigid arm depending from said sleeve supporting means, said arm terminating at its lower end in an abutment for engaging said sleeve, whereby pivotal movement of said sleeve and tube relative said supporting means disengages said stop ring from said abutment.

References Cited in the file of this patent

UNITED STATES PATENTS

247,855	Smalley	Oct. 4, 1881
594,449	Weber	Nov. 30, 1897
816,169	Macy	Mar. 27, 1906
2,335,738	Casey	Nov. 30, 1943
2,376,583	De Poix	May 22, 1945
2,402,121	Brewster et al.	June 18, 1946
2,581,914	Darrow	Jan. 4, 1952
2,681,757	Kellerman	June 22, 1954
2,695,741	Haley	Nov. 30, 1954
2,887,849	Lytle	May 26, 1959
2,905,506	Kristensen	Sept. 22, 1959
2,955,941	Huldrans et al.	Oct. 11, 1960
2,991,600	Lancaster	July 11, 1961
3,062,590	Turner et al.	Nov. 6, 1962