(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 046 592**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **81106586.1**

(51) Int. Cl.³: **B 65 B 31/06**

(22) Date of filing: **25.08.81**

(30) Priority: **26.08.80 JP 117340/80**

(43) Date of publication of application:
03.03.82 Bulletin 82/9

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: **OSAKA KAGAKU GOKIN KABUSHIKI KAISHA**
41 Nishi-Daimotsu-cho
Amagasaki-shi 660(JP)

(72) Inventor: **Sato, Eiichi**
1740, Kikoba Hayama-machi
Miura-gun Kanagawa-ken, 240-01(JP)

(74) Representative: **Strohschänk, Heinz, Dipl.-Ing.**
Musäusstrasse 5
D-8000 München 60(DE)

(54) Deaerator for food-inserted one-end-bond tubes.

(57) In order to remove the air, which remains in a ham-wrapping tube, from an open end portion thereof thoroughly, a double deaeration nozzle, in which the inner nozzle can be projected out of and retracted into the outer nozzle, is provided.

When the tube-end in bound, the inner nozzle is retracted into the outer nozzle to allow the tube to be continuously deaerated via the outer nozzle even after the inner nozzle has been retracted thereinto.

FIG. 3

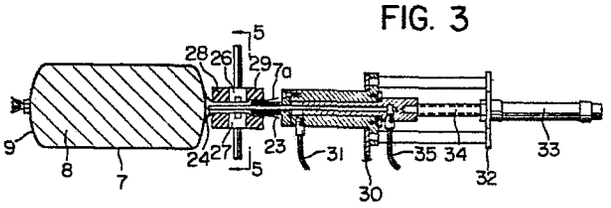
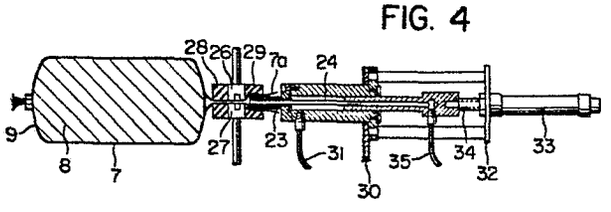


FIG. 4



EP 0 046 592 A2

Deaerator for food-inserted one-end-bond tubes

This invention relates to a deaerator for use in vacuum packaging a one-end-bond tubular film consisting of a thermally contractible synthetic resin and filled with food, for example, ham or a sausage, by removing the air, which remains in the tube, from an open end portion thereof thoroughly, and thereafter binding the open end portion of the same tube.

Removing the residual air thoroughly from a tube containing, especially, food is essential to the maintenance of the quality thereof. A 100% removal of the residual air from such a tube can be effectively carried out only when a deaerating operation for the tube has been shifted smoothly to a binding operation for an open end portion thereof.

In a conventional food-inserted tube binding operation, an open end portion of a tube is gathered or drawn to the center of a cross section thereof before the open end portion of the tube has been bound. A deaeration nozzle is then inserted into the gathered end portion of the tube to remove the residual air therefrom. In order to bind the end portion of the tube after the residual air has been removed therefrom, it is necessary that the deaeration nozzle be removed to the outside of the tube so as to allow a gathered end-binding operation to be conducted simultaneously. During an extremely short period of time between the completion of removal of the deaeration nozzle and that of the binding of the gathered end portion of the tube, the outside air would enter the tube to reside therein after the gathered end portion of the tube has been bound.

A gathered end-binding means which permits eliminating the

above-mentioned inconveniences has also been proposed. This binding means includes a greatly extended end portion of a food-inserted tube, which end portion is gathered at two axially spaced regions thereof. In order to bind the end portion of such a tube, a deaeration nozzle is inserted into the tube to remove the residual air therefrom, and the deaeration nozzle is thereafter removed from the inner gathered portion alone of the tube with the deaeration nozzle left inserted through the outer gathered portion thereof. The inner gathered portion of the tube is then bound as the deaeration of the tube is kept being carried out.

This improvement permits deaerating a food-inserted tube perfectly. However, when an excess end portion of the tube is cut off after the inner gathered portion thereof has been bound, a film tube of as long as not less than 10cm is left over as a chip. Accordingly, when the above improvement is applied to the mass production of such a vacuum-packaged food, tube chips are accumulated in the workshop. The wasting of material as mentioned above causes the cost of manufacturing tube-wrapped food to be increased.

An object of the present invention is to eliminate the above-mentioned drawbacks encountered in a conventional device of this kind.

Another object of the present invention is to provide a novel device which permits deaerating a food-inserted one-end-bound tube perfectly with a film tube of as short as only 1-2cm left over as a chip when an excess section of a gathered end portion, which has been bound, of the tube is cut off.

The gist of the idea of the present invention resides in the following. A double deaeration nozzle consisting of

concentrically arranged inner and outer members is provided in such a manner that the inner nozzle member can be projected out of and retracted into the outer nozzle member. When an open end portion of a food-inserted tube is bound, the inner nozzle member is retracted into the outer nozzle member to allow the tube to be continuously deaerated via the outer nozzle member even after the inner nozzle member has been retracted thereinto. In addition to the above, an auxiliary deaerating means for use in thermally contracting a bottom portion of a food-inserting tube to remove the residual air from the tube perfectly and thereby further improve the tube-end binding effect.

To these ends, the present invention provides a deaerator for food-inserted one-end-bound tubes, comprising a double deaeration nozzle which is provided in a position opposed to a gathered open end portion of a food-inserted one-end-bound tube and which consists of concentrically arranged inner and outer nozzle members; an actuator means for use in displacing the inner nozzle member between a position in which the inner nozzle member is projected from the front end of the outer nozzle member and a position in which the inner nozzle member is retracted in the outer nozzle member; a means for connecting the open end portion of the tube to the nozzle, which means is adapted to extend the open end portion of the tube onto the outer circumferential surface of the outer nozzle member and cover the latter with the former when the inner nozzle member is projected from the front end of the outer nozzle member; a tube-end gathering mechanism disposed so as to work on that section of the open end portion of the tube which is extended around the projected portion of the inner nozzle member; and a tube-end binding mechanism disposed so as to work on the gathered end portion of the tube after the inner nozzle member has been retracted into the outer nozzle member, the deaeration

of the tube continuing to be carried out via the outer nozzle member even after the inner nozzle member has been retracted thereinto.

The above and other objects as well as advantageous features of the invention will become apparent from the following description of the preferred embodiment taken in conjunction with the accompanying drawings.

The accompanying drawings show a mode of embodiment of the present invention, wherein:
Fig. 1 is a plan view;
Fig. 2 is a right side elevational view in section taken along the line 2-2 in Fig. 1;
Figs. 3 and 4 are front elevational view in section taken along the line 3-3 in Fig. 1, which illustrate the operation of the present invention in order;
Fig. 5 is a right side elevational view in section taken along the line 5-5 in Fig. 3; and
Fig 6 is an enlarged front elevational view of a principal part of what is shown in Fig. 3.

The construction and operation of the present invention will now be described in detail with reference to a mode of embodiment thereof shown in the accompanying drawings.

Fig. 1 is a plan view of the device as a whole according to the present invention. A single- or multilayer tube 7 which consists of a thermally contractible synthetic resin, such as saran film and which contains ham 8, has been transferred onto a working table 10 by a transfer means (not shown) with a tube bottom 9 having already been gathered and bound in another place. A vertically movable piston rod 11 is joined to the lower surface of the working table 10 as shown in Fig. 2. As soon as the removal of air from

and the binding of an open end of a food-inserted tube have been completed, an air cylinder (not shown) is actuated, and the rod 11 is moved upqardly along a guide 12 to lift the working table 10 up to the upper end of a wall 13, so that a product is rolled along an inclined wall 14 to be carried out of the apparatus.

In the meantime, a piston rod 15 for use in forwardly and backwardly moving the working table 10 is joined to the guide 12 for the rod 11, which piston rod 15 is extended in the direction of the length of the working table 10 and moved forwardly and backwardly by an operation of an air cylinder 16 shown in Fig. 1, with the assistance of a guide roller 17.

When the working table 10 is moved to an advanced position, an open end portion 7a of the ham-inserted tube 7 set on the working table 10 enters in a circularly opened state the central opening of a gathering, binding and cutting mechanism 18.

An example of a mechanism for gathering an open end portion of a ham-inserted tube and binding the gathered end portion of the tube with a clip is shown in Fig. 5. This mechanism is provided with machine frames 19, 20 disposed in an opposed relationship, and a pair of regulating elements 21, 22, which are extended parallel to each other and at right angles to the machine frames 19, 20 in such a manner that the regulating elements 21, 22 can be displaced along the machine frames 19, 20. The machine frames 19, 20 and regulating elements 21, 22 define a rectangular space. When the regulating elements 21, 22 are in their opened positions, the circularly opened end portion 7a is inserted into the rectangularly opened space mentioned above.

An inner nozzle member 24 of a double deaeration nozzle, a part of the deaerator according to the present invention, consisting of two concentrically arranged nozzle members 23, 24 is projected into the central portion of the above-mentioned rectangularly opened space, and in opposition to the open end portion 7a of the ham-inserted tube 7. When the circularly opened end portion 7a is forwardly moved, the nozzle 24 is enclosed therewith.

The forward movement of the open end portion 7a of the tube 7 is detected by a sensor (not shown). In accordance with a detection signal from the sensor, the regulating elements 21, 22 are actuated at once by operations of air cylinders (not shown). The regulating elements 21, 22 are moved toward each other from positions of two-dot chain line in Fig. 5 and stopped in positions of solid line in the same drawing, in which the regulating elements 21, 22 are close to each other with a gap 25 left therebetween. The gap 25 has a width equal to that of each of folds to be formed on the open end portion 7a when it is gathered. While the regulating elements 21, 22 are moved toward each other, the end portion 7a of the tube 7 is changed from a circularly opened state to an elongated half-opened state (refer to what is designated by "7a" and shown in solid line in Fig. 5). At this time, the inner nozzle member 24 is kept inserted in the central portion of the elongated half-opened end portion 7a of the tube 7.

When the movements of the regulating elements 21, 22 toward each other have been completed, a pair of gather-binding elements 26, 27, which are provided in an opposed relationship in bores in the central portions of the opposed machine frames 19, 20, respectively, are moved, by operations of air cylinders (not shown), toward each other along the gap 25 between the regulating elements 21,

22. As a result, the elongated half-opened end portion 7a of the tube 7 is gathered in the central portion of the gap 25, and pressed against the outer circumferential surface of the inner nozzle member 24 as the inner nozzle member 24 is enclosed with the end portion 7a. Each of the gather-binding elements 26, 27 has a recess in an end portion thereof. A clip (not shown) is bent by the pressing effect of these recesses provided in the gather-binding elements 26, 27, so that the end portion 7a is finally bound. Since this tube-end binding operation is out of the gist of the present invention, a description thereof will be omitted. A perfect deaeration of a ham-inserted tube, which constitutes a step to be carried out immediately before a tube end-binding operation, will be described in detail.

As shown in Figs. 3, 4 and 6, each of the gather-binding elements 26, 27 is provided on its right and left sides with elastic pads 28, 29, by which the end portion 7a of the tube 7 is pressed against the outer circumferential surfaces of the inner and outer nozzle members 24, 23. It is necessary that each of the elastic pads 29, out of the pads 28, 29, be used to press at the greater part of the lower surface thereof the end portion 7a of the tube 7 against the outer circumferential surface of the outer nozzle member 23. Thus, the connection of the outer end 7a of the tube 7 and the inner and outer nozzle members 24, 23 is completed.

The outer nozzle member 23, one of the concentrically arranged inner and outer nozzle members 24, 23 is fixed to a machine frame 30 at a rear end portion thereof, and connected to a vacuum pump (not shown) via an air discharge pipe 31. While a deaerating operation for a ham-inserted tube 7 is conducted, the inner nozzle member 24

is extended at a front end portion thereof out of the outer nozzle member 23 (refer to Figs. 3 and 6) as the nozzle member 24 maintains a narrow gap between the outer circumferential surface thereof and the inner circumferential surface of the outer nozzle member 23. While a tube-end binding operation is conducted, the inner nozzle member 24 is retracted into the outer nozzle member 23 (refer to Fig. 4). The inner nozzle member 24 is connected at a rear end portion thereof to a piston rod 34, which is adapted to be displaced forwardly and backwardly by an operation of an air cylinder 33 provided on a bracket 32 connected to the machine frame 30. The inner nozzle member 24 is communicated with a vacuum pump (not shown) via a discharge pipe 35.

Referring to Fig. 1, an electric heater 37 is provided behind the working table 10, the electric heater 37 being directed to the tube bottom 9 which has already been bound. A blower 36 is provided behind the electric heater 37. An air current sent from the blower 36 to the tube bottom 9 is heated when it passes through the heater 37, so that hot air is applied to the tube bottom 9. The tube bottom 9 exposed to the hot air is thermally contracted to cause the residual air therein to be sent to the open end portion 7a of the tube 7. The residual air sent to the open end portion 7a is sucked by the inner and outer nozzle members 24, 23 to be discharged outside.

When the circularly opened end portion 7a is moved into the gather-binding mechanism 18 by a forward movement of the working table 10, the inner nozzle member 24 of the double nozzle is projected from the front end of the outer nozzle member 23 (refer to Figs. 3 and 6) by an operation of the air cylinder 33. As a result, the outer circumferential surface of the inner nozzle member 24 thus projected

from the outer nozzle member 23 and the outer circumferential surface of the outer nozzle member 23 are covered with the end portion 7a, so that the end portion 7a and the double nozzle are connected together. When the covering of the inner and outer nozzle members 24, 23 with the end portion 7a has been completed, an instruction by a signal representative of the completion of the above-memtioned covering of the nozzle members with the tube end is given to allow a vacuum pump (not shown) to be actuated. Consequently, the air in the ham-inserted tube starts being discharged through the inner and outer nozzle members 24, 23. The air in the tube is discharged substantially in an instant.

When the heater 37 and blower 36 are operated to apply hot air to the tube bottom 9 to thermally contract the same during or prior to the deaeration of the tube 7, the degree of vacuum in the tube 7 will be further increased.

The inner nozzle member 24 projected from the outer nozzle member 23 obstructs a tube-end binding operation, which is conducted after the deaeration of the tube 7 has been completed. Accordingly, the inner nozzle member 24 is retracted, before a tube-end binding operation has been conducted, into the outer nozzle member 23 by an operation of the air cylinder 33 via the piston rod 34. The gather-binding elements 26, 27 are then applied at their respective free end surfaces to the end portion 7a as shown in Fig. 4, to seal the tube 7 with a clip (not shown).

A very short period of time elapses between the starting of the retraction of the inner nozzle member 24 and the completion of a tube-end binding operation. The deaeration of a ham-inserted tube during such a short period of time as mentioned above is not satisfactorily carried out by a

conventional deaerator of this kind. In other words, the outside air enters the tube, which has once been deaerated sufficiently, during a short period of time referred to above. In fact, a tube-end binding operation with conventional deaerator and gather-binding elements is carried out under the above-mentioned condition.

According to the present invention, the outer nozzle member 23 is still in close contact with the end portion 7a of the tube 7 even after the inner nozzle member 24 has been retracted (refer to Fig. 4), so that the tube 7 is still subjected to deaeration. A tube-end binding operation is conducted under such condition, so that the outside air does not enter the tube during a tube-end binding operation. In other words, the tube is sealed in a perfectly deaerated state. Therefore, a decrease in the quality of a ham product due to the residual air in the tube in which the product is sealed can be completely eliminated. The above effect of the present invention has been achieved by the concentrically arranged deaeration nozzles 23, 24. Accordingly, an elongated end portion 7a is not required. In fact, the length of a tube left over as a chip after a ham-sealed tube with the end portions thereof bound has been subjected to a cutting operation for an excess portion thereof is as short as 1-2cm. This contributes to the nursing of resorces, and results in a decrease in the cost of manufacturing packaged ham products. Consequently, low-priced, high-quality packaged ham products can be supplied to the consumers.

The present invention is not, of course, limited to the above embodiment; it may be modified in various ways within the scope of the appended claims.

Claims:

1. A deaerator for food-inserted one-end-bound tubes, comprising a double deaeration nozzle which is provided in a position opposed to a gathered open end portion of a food-inserted one-end-bound tube and which consists of concentrically arranged inner and outer nozzle members; an actuator means for use in displacing said inner nozzle member between a position in which said inner nozzle member is projected from the front end of said outer nozzle member and a position in which said inner nozzle member is retracted in said outer nozzle member; a means for connecting said open end portion of the tube to said nozzle, which means is adapted to extend said open end portion of the tube onto the outer circumferential surface of said outer nozzle member and cover the latter with the former when said inner nozzle member is projected from the front end of said outer nozzle member; a tube-end gathering mechanism disposed so as to work on that section of said open end portion of the tube which is extended around the projected portion of said inner nozzle member; and a tube-end binding mechanism disposed so as to work on the gathered end portion of the tube after said inner nozzle member has been retracted into said outer nozzle member, the deaeration of the tube continuing to be carried out via said outer nozzle member even after said inner nozzle member has been retracted thereinto.

2. A deaerator for food-inserted one-end-bound tubes, comprising a food-inserted one-end-bound tube consisting of theremally contractible film; a double deaeration nozzle which is provided in a position opposed to a gathered open end portion of a food-inserted one-end bound tube and which consists of concentrically arranged inner and outer nozzle members; an actuator means for use in displacing said inner nozzle member between a position in which said inner nozzle

member is projected from the front end of said outer nozzle member and a position in which said inner nozzle member is retracted in said outer nozzle member; a means for connecting said open end portion of the tube to said nozzle, which means is adapted to extend said open end portion of the tube onto the outer circumferential surface of said outer nozzle member and cover the latter with the former when said inner nozzle member is projected from the front end of said outer nozzle member; a tube-end gathering mechanism disposed so as to work on that section of said open end portion of the tube which is extended around the projected portion of said inner nozzle member; a tube-end binding mechanism disposed so as to work on the gathered end portion of the tube after said inner nozzle member has been retracted into said outer nozzle member; and an auxiliary deaerating means for applying hot air to a bottom portion of the tube to thermally contract the same portion of the tube, the deaeration of the tube continuing to be carried out via said outer nozzle member even after said inner nozzle member has been retracted thereinto.

3. A deaerator according to Claim 2, wherein the thermal contraction of said bottom portion of the tube with hot air is carried out prior to the deaeration of the tube via said open end portion thereof.

4. A deaerator according to Claim 2, wherein the thermal contraction of said bottom portion of the tube with hot air is carried out simultaneously with the deaeration of the tube via said open end portion thereof.

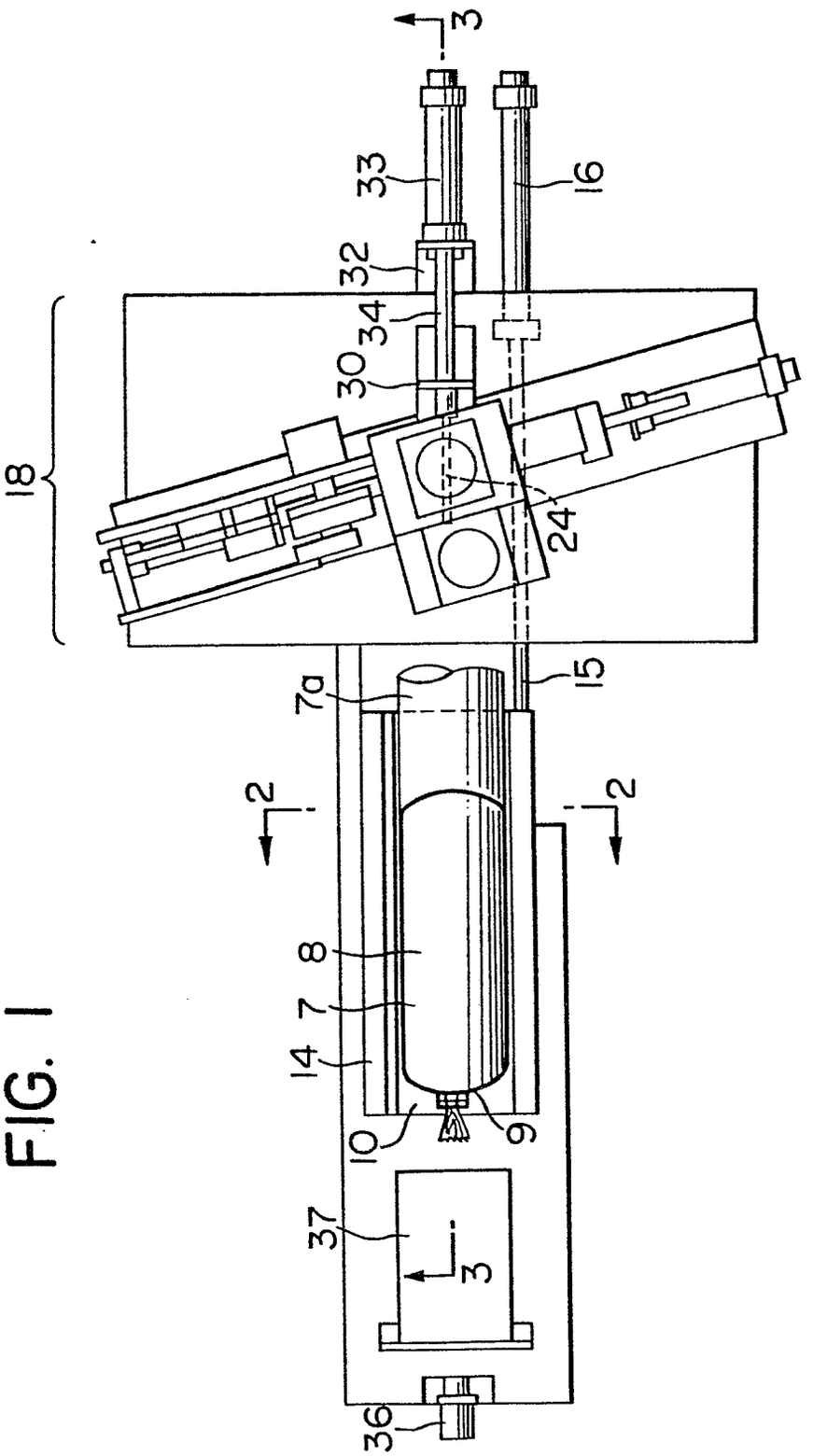


FIG. 1

FIG. 2

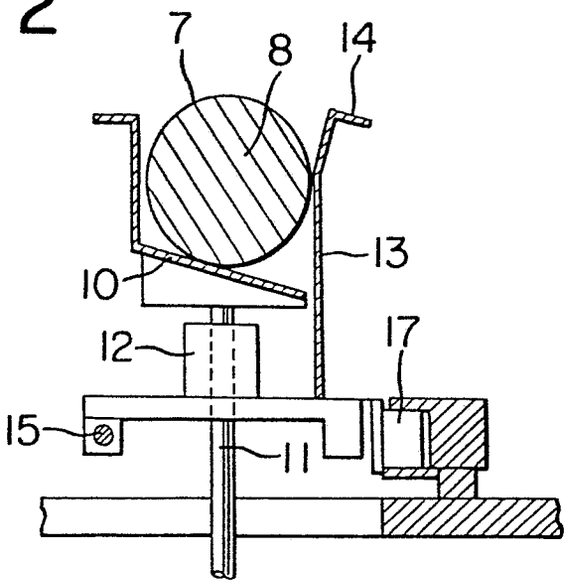


FIG. 5

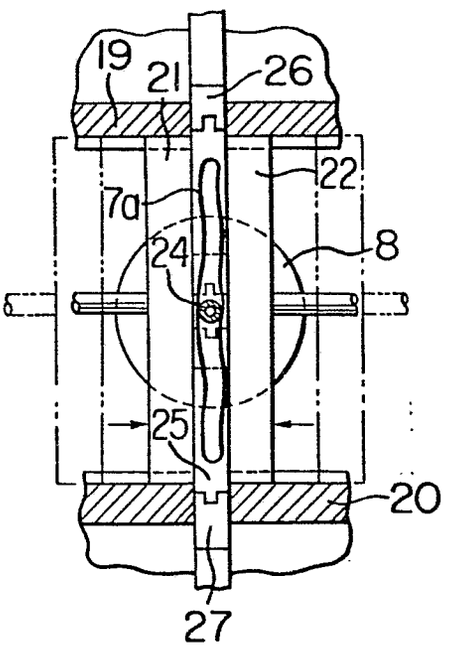


FIG. 6

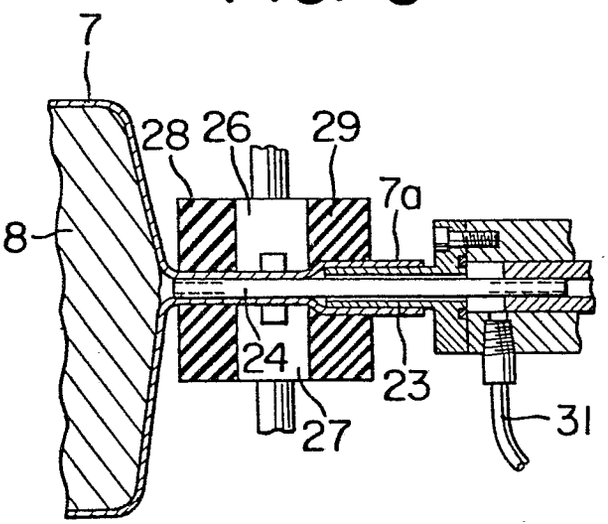


FIG. 3

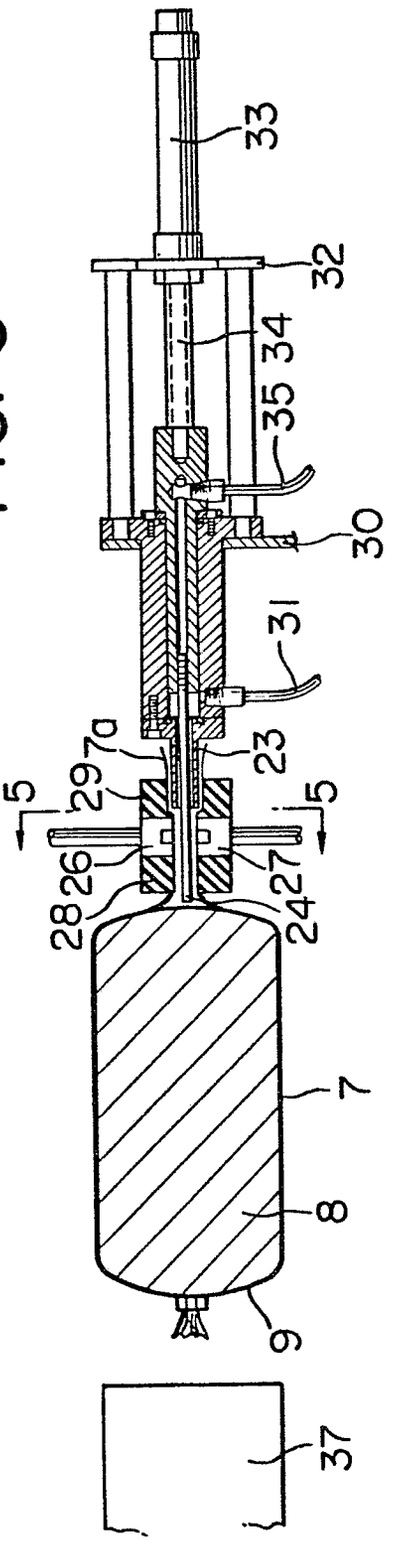
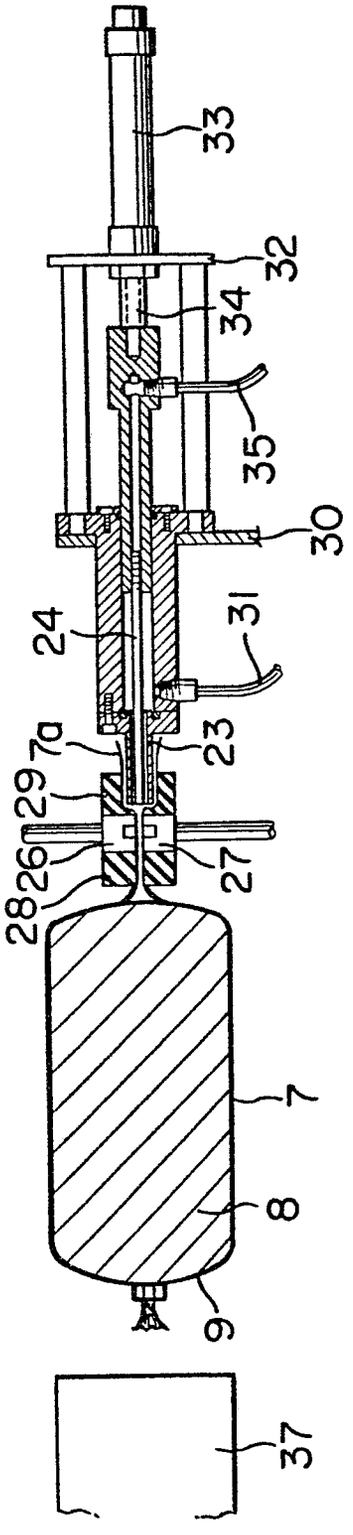

33
32
34
35
34
30
31
7a
23
5
29
5
26
27
28
24
7
8
9
37

FIG. 4


33
32
34
35
30
24
31
7a
23
29
26
27
28
7
8
9
37