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(54) Filing nozzle purging method and apparatus.

(57) A method and apparatus for employing air for purging excess product from a nozzle (26) employed for inserting product into a form, fill and seal package. The nozzle has a valve plug (32) engaging a valve seat, with the plug having a series of spaced grooves for directing the purging air. Purging air is provided to the nozzle from a remote air source, and after injection of product into the package, a burst of air is directed to the nozzle to clean any excess product from the nozzle. In addition, at all times during operation of the apparatus, a constant, low velocity flow of air is provided to the nozzle to help prevent accumulation of excess product.

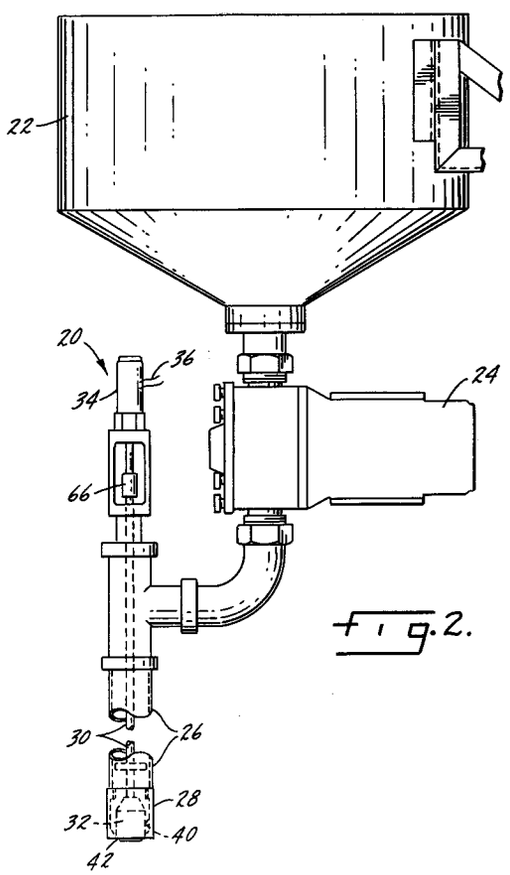

fig.2.

EP 0 550 966 A1

Background of the Invention

This invention relates to packaging methods and apparatus primarily for liquids, and more particularly to a form, fill and seal packaging method and apparatus where excess product is removed from a filling nozzle before product can interfere with sealing of the product in a package.

The process and apparatus of the present invention can be used with any type of packaging equipment, though it is preferred to be used with forming, filling and sealing apparatus and processes, and in particular with such apparatus and processes of Hayssen Manufacturing Company, assignee of the present application and assignee of many patents relating to such methods and apparatus. For example, U.S. Patent No. 4,288,965, the disclosure of which is incorporated herein by reference, relates to one type of forming, filling and sealing apparatus and process where a web of flexible plastic material is guided over a forming shoulder where the web is formed into a tube. The tube is then fed intermittently downward, longitudinally sealed, ultimately filled with a product and is then sealed and cut into individual packages each containing the packaged product.

When such a package is filled, a quantity of product is injected into the tube, the product flow is inhibited, and the tube is then sealed and severed above the contained product, and the process is repeated as the plastic tube progresses downwardly. If any product is inadvertently captured in the seal, the integrity of the package is compromised. Dry product within the package may spoil, while liquid product within a package may leak from the package. Thus, any contamination in the seal is extremely undesirable.

Liquids are injected into a package from a nozzle. Particularly when more viscous liquids are injected, excess accumulations can form on the nozzle and drip after a charge of liquid has been inserted in the package. If the drip happens to coincide with closing of the sealing jaws, contamination of the seal can occur. Also, more viscous liquids tend to "string" from the nozzle, and if any stringing occurs during closing of the sealing jaws, the seal will be inadequate. It is therefore important to assure that the injection of a charge of product into the tube be clean, without any dripping, stringing or accumulation of excess product.

Summary of the Invention

The present invention is directed to an apparatus and process for purging excess product from an injection nozzle in a packaging apparatus where an unsealed package is provided, product to be packaged is inserted through a nozzle into the unsealed package, and the unsealed package is then sealed to form a package for the product. The apparatus of the invention comprises means for providing a periodic, high velocity burst of air at the nozzle to purge excess product from the nozzle, and means for providing a constant, low velocity flow of air to the nozzle at all times.

In accordance with the preferred form of the invention, the means for providing a burst of air includes a conduit extending from a source of air to the nozzle, and a valve in the conduit for regulating air flow. A controller is provided for operating the valve to permit the periodic, high velocity burst of air.

The nozzle includes a nozzle head having a valve seat and a valve plug disposed within the nozzle, with the valve plug being shaped to engage the valve seat to halt the flow of product from the nozzle. The plug is provided with air flow direction means for both the constant flow of air and the periodic, high velocity burst of air. In accordance with the preferred form of the invention, the plug is circular and the air flow direction means comprises a series of spaced circumferential grooves in the plug adjacent the periphery thereof. In accordance with the illustrated form of the invention, the grooves are located in an insert which is installed in the plug. The insert is also provided with a concave bottom between the grooves to help prevent inadvertent accumulation of product at the nozzle.

A constant flow of air is provided to the nozzle and emitted through the grooves, even when product is being injected from the nozzle into a tube. Means is provided for adjusting the intensity of the flow of that air, preferably in the form of a flow control valve. The constant air is provided via a bypass conduit which bypasses the apparatus for providing the high velocity burst of air so that the constant flow is provided at all times.

Brief Description of the Drawings

The invention is described in greater detail in the following description of an example embodying the best mode of the invention, taken in conjunction with the drawing figures, in which:

Figure 1 is a perspective view of a vertical form, fill and seal machine with which the apparatus and process of the invention may be used,

Figure 2 is an elevational view of a liquid filling system employing the nozzle and excess product purging apparatus according to the invention, and which may be used to fill the tube formed by the apparatus of Figure 1,

Figure 3 is an enlarged elevational view, partially in an exploded form, partially in cross section and partially broken away, illustrating a valve

plug and insert according to the invention,
Figure 4 is a further enlarged elevational view of an insert according to the invention,
Figure 5 is a top plan view thereof,
Figure 6 is a further enlarged cross-sectional view taken along lines 6-6 of Figure 5, and
Figure 7 is a schematic illustration of the air control apparatus of the invention.

Description of an Example Embodying the Best Mode of the Invention

Figure 1 illustrates a form, fill and seal apparatus, shown generally at 10, which can be used in conjunction with the apparatus and process according to the invention for forming sealed packages. The apparatus 10 is as illustrated in Patent No. 4,288,965. The apparatus 10 draws a plastic web W from a roll R thereof, forms the web into a tube T over a forming shoulder F, and the tube T is periodically heat sealed with a sealing apparatus S to form a sealed package or pouch P which is severed from the oncoming portion of the tube T as it progresses downwardly. The apparatus 10 forms no part of the invention, and is illustrated for environmental purposes only. Other similar apparatus could be used with the disclosed apparatus.

Figure 2 illustrates one form of a liquid filling system 20 which may be used to periodically inject a charge of product into the tube T during operation of the apparatus 10. The system 20 includes a supply 22 of liquid, and a regulator 24 for controlling flow of liquid from the supply 22 into a nozzle tube 26 which is capped by a nozzle 28. In a conventional fashion, the apparatus of Figures 1 and 2 are combined with the nozzle tube 26 extending within the tube T above the location of the sealing apparatus S for injection of product into the tube T in a known fashion.

An actuator shaft 30 extends between a valve plug 32 and an actuator 34 located atop the nozzle tube 26. The actuator 34 is electrically operated in a conventional fashion, and is connected by leads 36 to a controller 38 (Figure 7) which controls operation of the actuator 34.

The nozzle 28 has a hollow interior 40 in which the valve plug 32 is located. The dimensions of the hollow interior 40 are greater than the valve plug 32 so that liquid may pass through the nozzle tube 26, through the hollow interior 40 around the valve plug 32 and be ejected downwardly from the nozzle 28 when the valve plug 32 is withdrawn. The valve plug 32 has an annular valve seat 42 which is shaped to engage a similarly-formed interior portion of the hollow interior 40.

The actuator shaft 30 is appropriately secured to the valve plug 32 so that the valve plug 32 travels with reciprocal motion of the actuator shaft 30. The actuator shaft 30 has a hollow interior, forming an air conduit 44 through the length thereof which is connected in communication with a further conduit 46 bored within the valve plug 32. The conduit 46 extends to a larger bore 48 formed in the valve plug 32 as illustrated in Figure 3.

An air flow direction insert 50 is installed in the bore 48 by means of a pair of fasteners (not illustrated) extending through holes 52 in the insert 50 and engaging corresponding threaded holes 54 formed in the valve plug 32. Other means of fastening the insert 50 in place can be employed, if desired.

The insert 50 is used to direct and distribute air introduced into the valve plug 32 through the conduit 46. As illustrated, the insert 50 is tapered to permit air to flow about its periphery, and includes a lateral channel 56 to distribute air entering via the conduit 46. The insert 50 also has a skirt 58 having a series of spaced, circumferential V-shaped grooves 60 formed therein through which air flows. The outer diameter of the insert 50 at the skirt 58 closely matches the inner diameter of the bore 48 so that air flow from the plug 32 is through the series of grooves 60. Thus, air flow from the plug 32 is in a regular fashion directly adjacent the valve seat 42.

As best illustrated in Figures 3 and 4, the insert 50 has a concave bottom 62. The concavity of the bottom 62 further prevents any liquid controlled by the valve plug 32 from clinging to the insert 50.

A conduit 64 (Figure 7) is connected in communication with the conduit 44 through a junction 66 on the actuator shaft 30. The conduit 64 leads to an air burst valve 68, which is controlled by the controller 38 and which is provided with air from an air source 70. The air burst valve 68 is operated by the controller 38 to provide a burst of air at the grooves 60 in order to purge any excess product that has clung to the nozzle 28 after a charge of product has been inserted in a package P.

The air source 70 is also connected directly to the conduit 64 through a bypass conduit 72 which joins the conduit 64 at a T junction 74. The quantity of air flowing through the bypass conduit 72 is controlled by an adjustable flow control valve 76. Thus, a constant flow of air is provided at the grooves 60 at all times, controlled in intensity by the flow control valve 76. The air burst valve 68 is bypassed by a relatively low velocity flow of air, helping to assure that the nozzle 28 remains free of any excess product clinging thereto.

In operation, the form, fill and seal apparatus 10 and liquid filling system 20 are operated in a well known fashion. The web W from the roll R is drawn over the forming shoulder F and formed into the tube T, where the sealing apparatus S periodically seals the tube T to form the packages P.

Between each cycle of the sealing apparatus S, the liquid filling system 20 fills the next package P with a charge of product from the supply 22. The valve plug 32 controls the amount of liquid metered into each package P. The actuator 34 is used to raise and lower the valve plug 32 for metering purposes.

As explained above, air from the air source 70 is constantly available at the nozzle 28 due to use of the bypass conduit 72. The constant flow of air tends to form a protective bubble inside liquid passing by the valve plug 32 when the valve plug 32 has been raised by the actuator 34. That helps assure that no liquid clings to the valve plug 32 and the nozzle 28 when the valve plug 32 has been closed. Also, when the valve plug 32 is closed, the controller 38 actuates the air burst valve 68, providing a periodic, high velocity burst of air at the nozzle 28 to purge excess product from the nozzle each time that the nozzle is closed. The high velocity burst of air, in combination with the constant, low velocity flow of air, maintains the nozzle 28 in a drip free condition, preventing an inadvertent drips or stringing from falling between the jaws of the sealing apparatus S as it is closed. Therefore, the integrity of the seal provided by the sealing apparatus S is not compromised or contaminated in any manner by the product contained within the package P.

The invention has been described above in relation to a vertical form, fill and seal packaging method and apparatus. The same nozzle purging method and apparatus could be also used in other types of packaging lines, and the to-be-sealed package need not be plastic. The invention can be used where it is important that extraneous product not contaminate the sealing of the package.

Various changes can be made to the invention without departing from the spirit thereof, or scope of the following claims.

Claims

1. In an apparatus for forming, filling and sealing packages where a web of plastic material is formed into a tube, product to be packaged is inserted in the tube and the tube is sealed to form a package for the product, a method for aiding the purging of excess product form a nozzle employed for inserting product in the tube, comprising
   a. controlling a flow of gas to the nozzle for periodically purging of excess product from the nozzle, and
   b. providing a bypass flow of gas past the controlled flow to provide a constant flow of gas to the nozzle.

2. The method according to claim 1 in which method step b includes adjusting the constant flow of air dependent on the product being packaged.

3. In an apparatus for filling and sealing packages where an unsealed package is provided, product to be packaged is inserted in the unsealed package and the unsealed package is then sealed to form a package for the product, a method for aiding the purging of excess product form a nozzle employed for inserting product in the unsealed package, comprising
   a. providing a periodic, high velocity burst of gas at the nozzle after product is inserted in the unsealed package to purge excess product from the nozzle, and
   b. providing constant, low velocity flow of gas to the nozzle.

4. The method according to claim 3 in which method step b includes adjusting the constant flow of gas dependent on the product being packaged.

5. In an apparatus for forming, filling and sealing packages where an unsealed package is provided, product to be packaged is inserted through a nozzle into the unsealed package and the unsealed package is then sealed to form a package for the product, the improvement comprising
   a. means for providing a periodic, high velocity burst of gas at the nozzle to purge excess product from the nozzle, and
   b. means for providing a constant, low velocity flow of gas to the nozzle.

6. An apparatus according to claim 5 in which said means for providing a burst of gas includes a conduit extending from a source of gas to said nozzle, and a valve in said conduit for regulating gas flow.

7. An apparatus according to claim 6 including a controller for operating said valve.

8. An apparatus according to claim 5 in which said nozzle includes a nozzle head having a valve seat and a valve plug disposed within said nozzle head, said valve plug being shaped to engage said valve seat and being operable to halt flow of product from said nozzle, and including gas flow direction means in said valve plug.

9. An apparatus according to claim 8 in which said plug is circular where engaging said valve

seat, and said direction means comprises a series of spaced circumferential grooves in said plug.

10. An apparatus according to claim 9 in which said grooves are located in an insert located in said plug.

11. An apparatus according to claim 10 in which said insert has a concave bottom between said grooves.

12. An apparatus according to claim 5 in which said means for providing a constant flow of gas includes a conduit communicating a source of gas to said nozzle.

13. An apparatus according to claim 12 including means in said conduit for adjusting the constant flow of gas.

14. An apparatus according to claim 13 in which said means for adjusting comprises an adjustable flow control valve.

15. An apparatus according to claim 12 in which said conduit bypasses said means for providing a high velocity burst of gas.

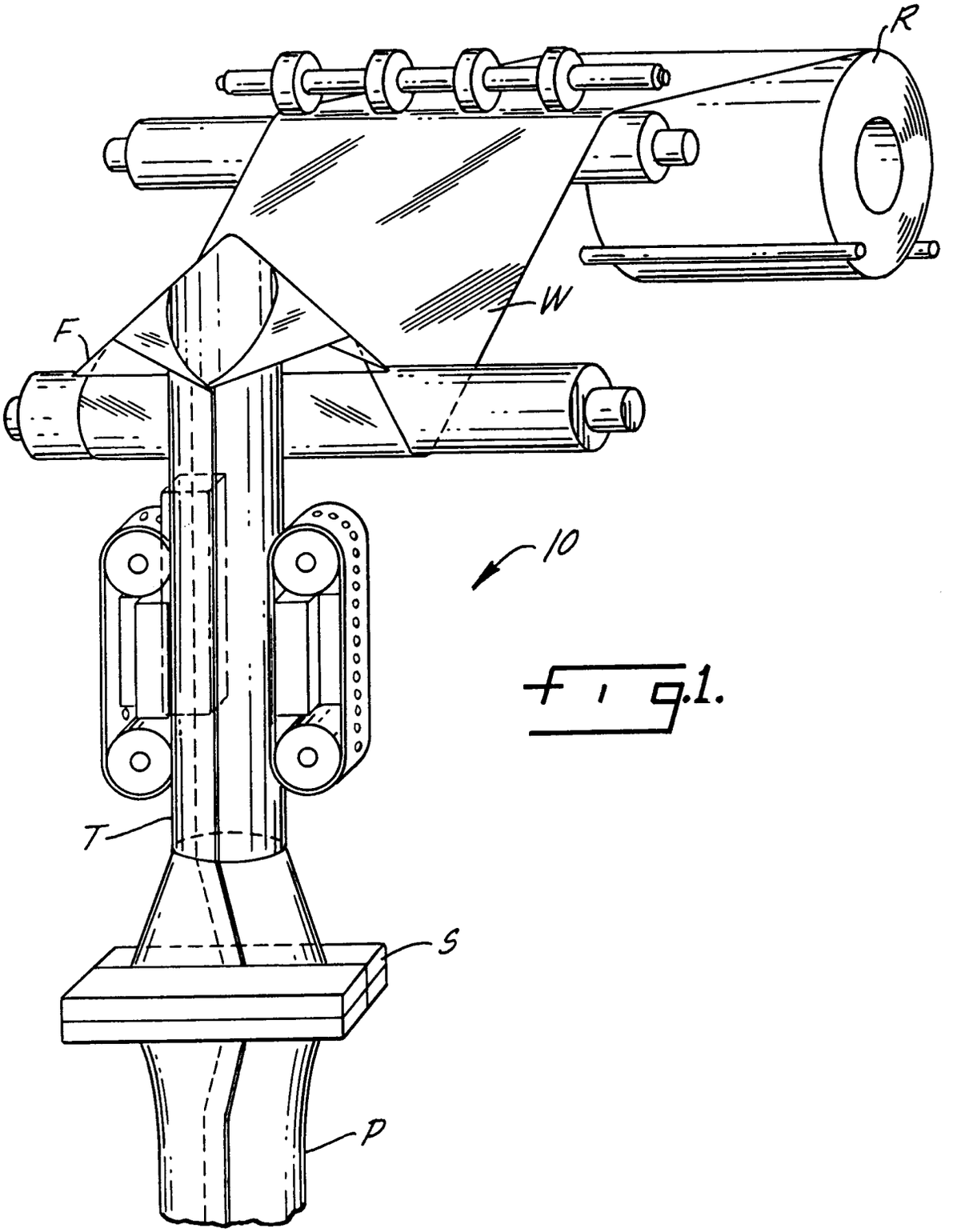

Fig.1.

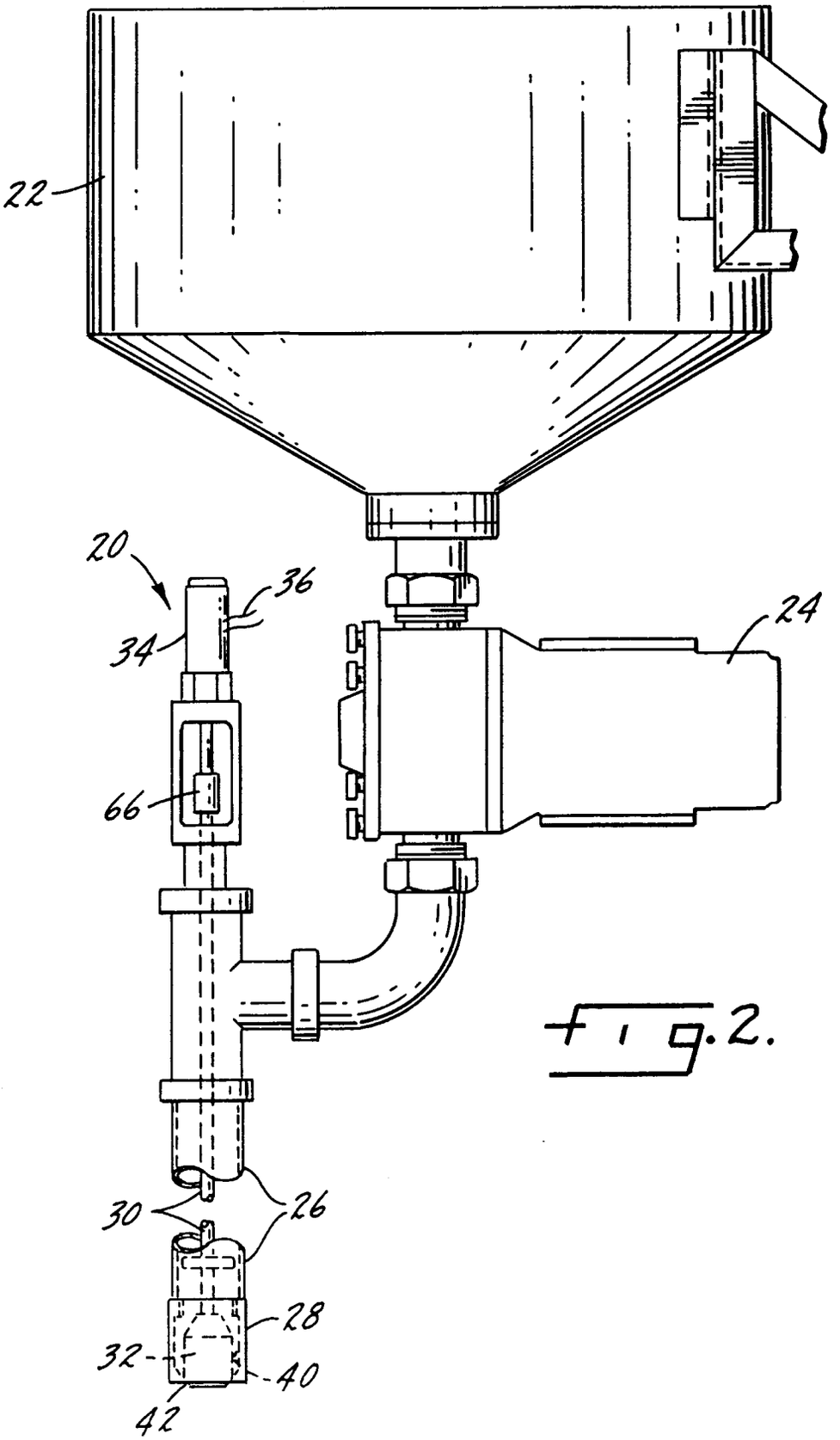

Fig. 2.

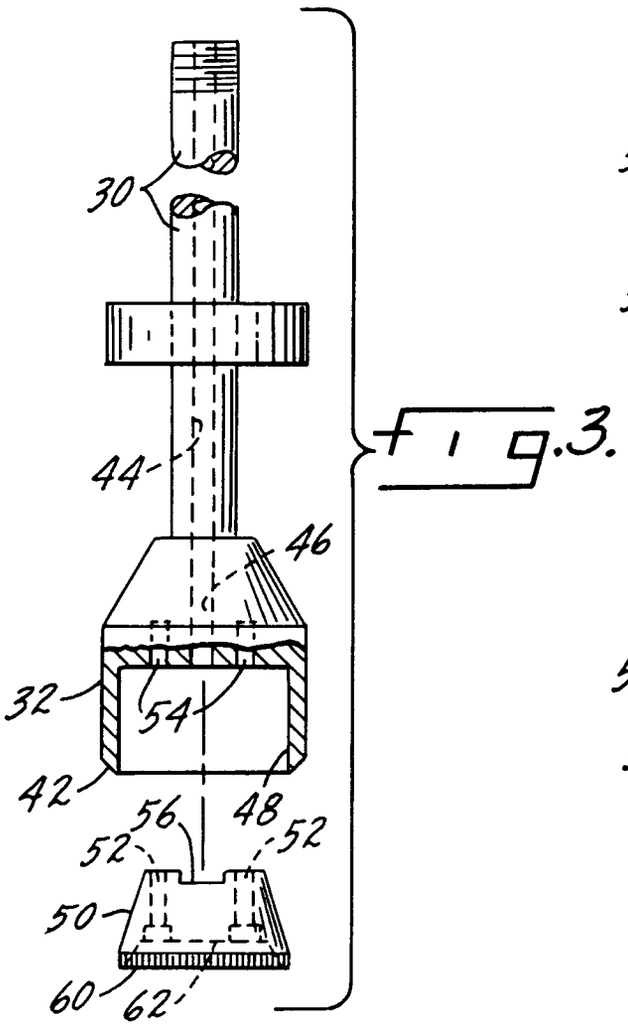

Fig.3.

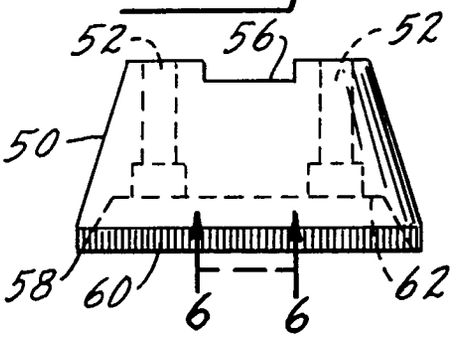

Fig.4.

Fig.5.

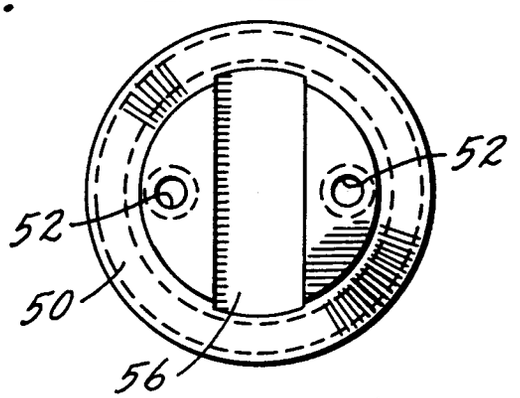

Fig.6.

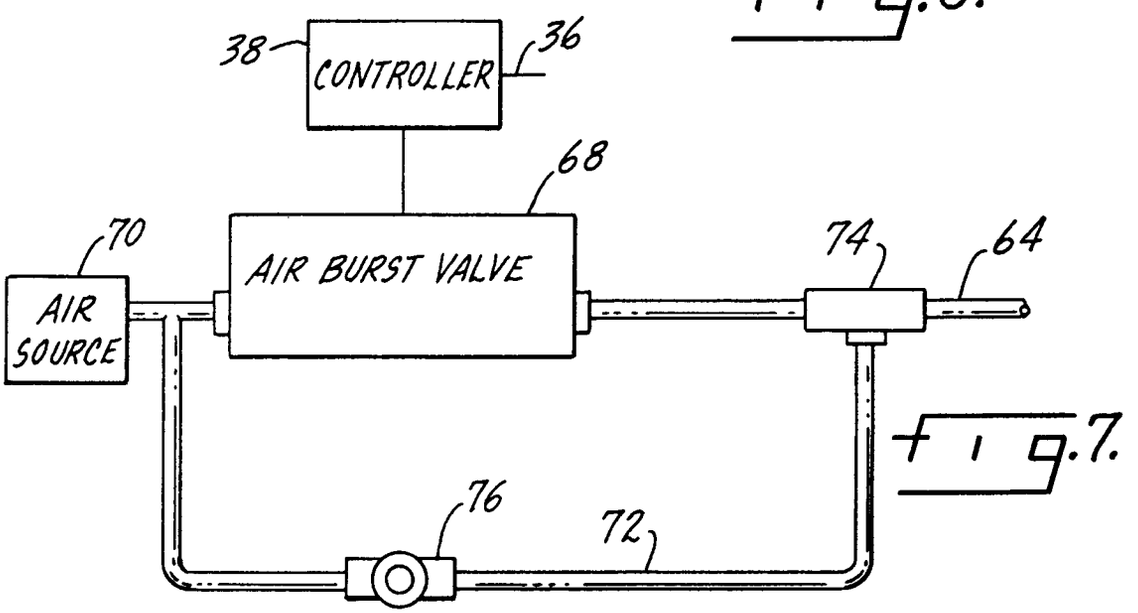

Fig.7.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 31 0851

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-1 484 763 (SCHOLLE) * page 2, line 120 - page 3, line 45; figure 1 *	1,3,5-9	B65B39/00
A	US-A-3 789 888 (HAYSSEN) * column 3, line 5 - line 62; figure 1 *	1,3,5, 12-15	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65B
B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 APRIL 1993	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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