United States Patent

Remane

[15] **3,683,976**

[45] **Aug. 15, 1972**

[54] **FILLING HEADS FOR LIQUID CONTAINERS**

[72] Inventor: **Roger Remane,** Sainte-Colombe-Les-Vienne, France

[73] Assignee: **Application Des Gaz,** Paris, France

[22] Filed: **Feb. 6, 1970**

[21] Appl. No.: **9,321**

[52] **U.S. Cl.** **141/59,** 137/386, 141/62, 141/141, 141/198, 141/287, 141/368

[51] **Int. Cl.** **B65b 3/30**

[58] **Field of Search**.....141/39, 40, 46, 59, 62, 192, 141/198, 275, 276, 284, 286–288, 291, 292, 296, 301, 303, 307, 368, 140, 141, 160; 137/386, 393, 588

[56] **References Cited**

UNITED STATES PATENTS

3,421,554	1/1969	Carter	141/286 X
51,370	12/1865	Webber et al.	141/307 X
1,820,480	8/1931	O'Neil	141/368 X
2,136,421	11/1938	Everett	141/59 X
2,325,419	7/1943	Minard	141/292 X
2,329,426	9/1943	Valiton	141/307 X
2,513,143	6/1950	Carter	141/59 X
3,207,189	9/1965	Vergobbi	141/198 X

FOREIGN PATENTS OR APPLICATIONS

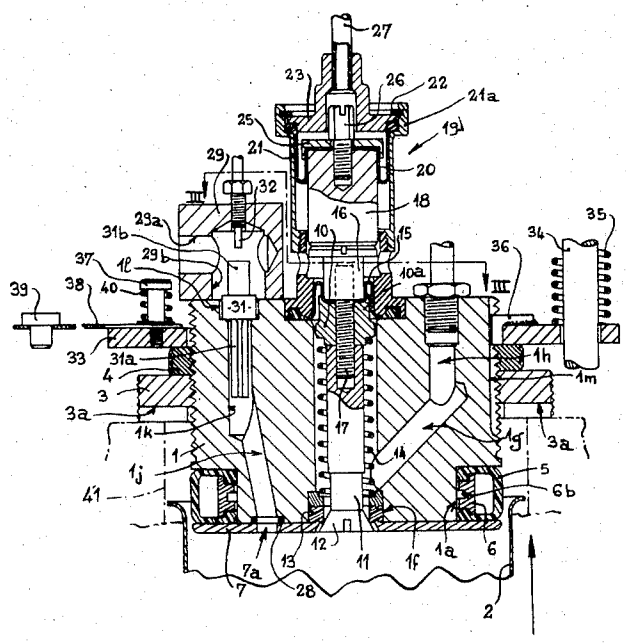
983,326	2/1965	Great Britain	141/39

Primary Examiner—Edward J. Earls
Attorney—Alexander & Dowell

[57] **ABSTRACT**

A filling head, particularly for liquefied gas cartridges, comprises a body adapted to extend downwardly into the container to be filled, and a base adjustable in position on the body to rest on the upper edge of the container. The body has an inflatable peripheral gasket to form a seal against the inner wall of the container, a liquid inlet conduit with pneumatically actuated valve means, and an exhaust passage formed with a vertical bore enclosing with a small clearance a slidable piston-like member. When the head is raised by a container on an automatic filling machine, the valve means are opened and after a short while the gasket is inflated, this delay permitting free escape of the burst of gas which appears when the cold liquid contacts the relatively hot container wall, without the said burst actuating the piston-like member. During the subsequent filling operation air and gas may freely flow through the exhaust passage at a moderate velocity without noticeably actuating said member, but when the container is filled, the liquid flowing through said passages raises said member, which causes closing of the valve means.

6 Claims, 7 Drawing Figures



Patented Aug. 15, 1972 3,683,976

3 Sheets-Sheet 1

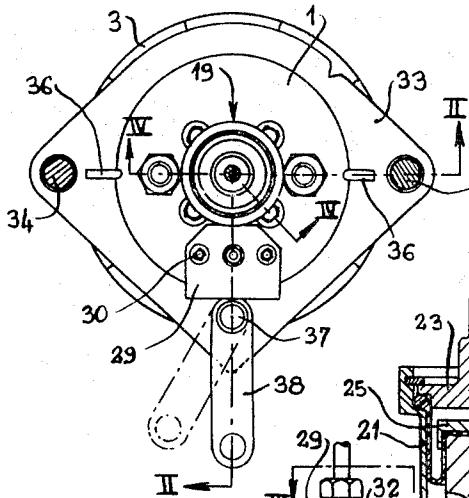


Fig. 1

Fig. 2

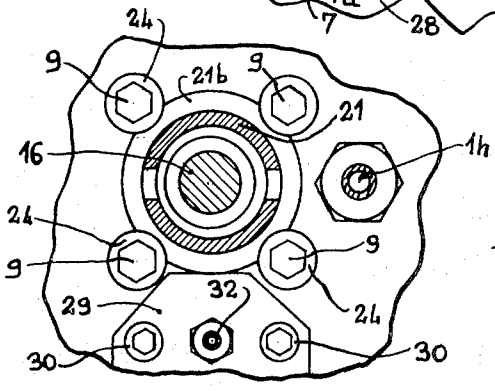


Fig. 3

INVENTOR.
Roger Renaux
BY
Alexander Howell
attorneys

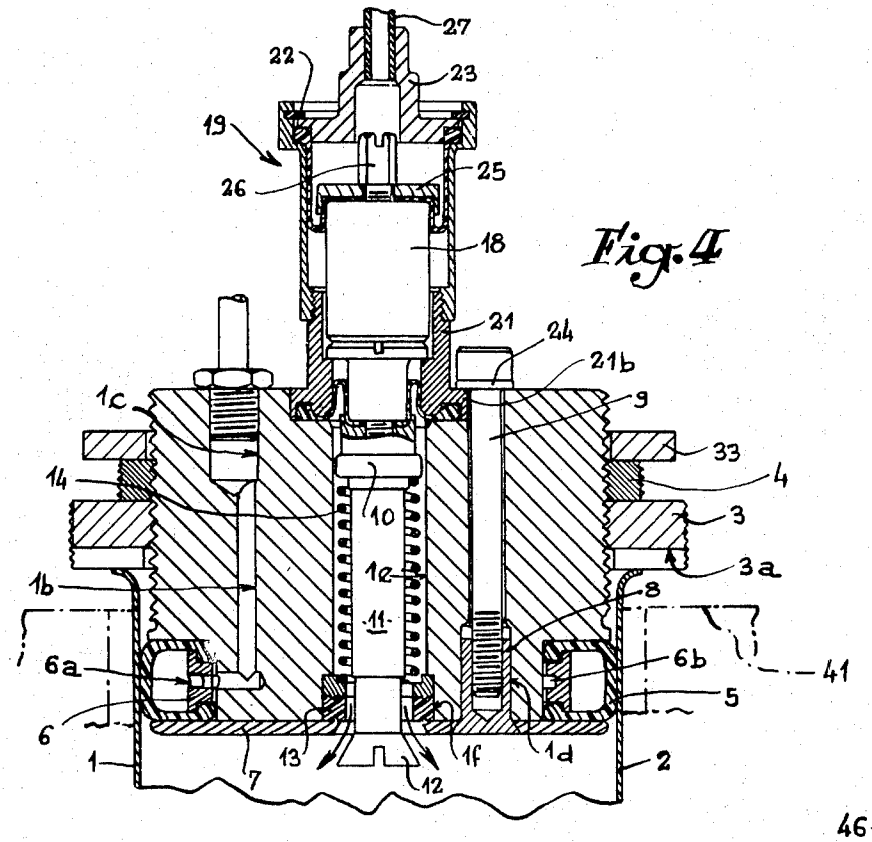


Fig. 4

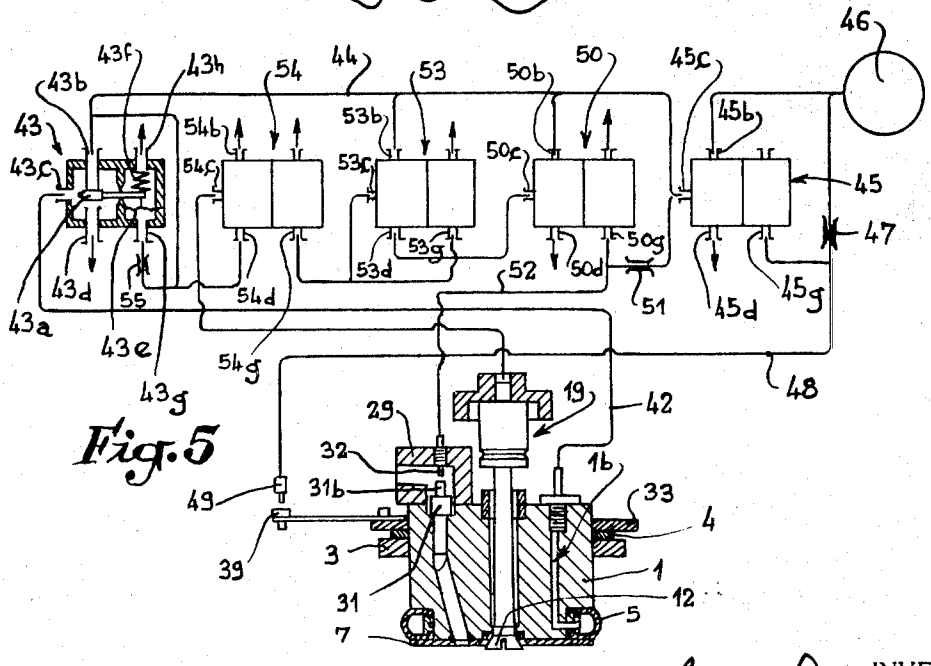


Fig. 5

INVENTOR
Roger Lamare
BY Alexander M. Wall
Attorneys

Pl.

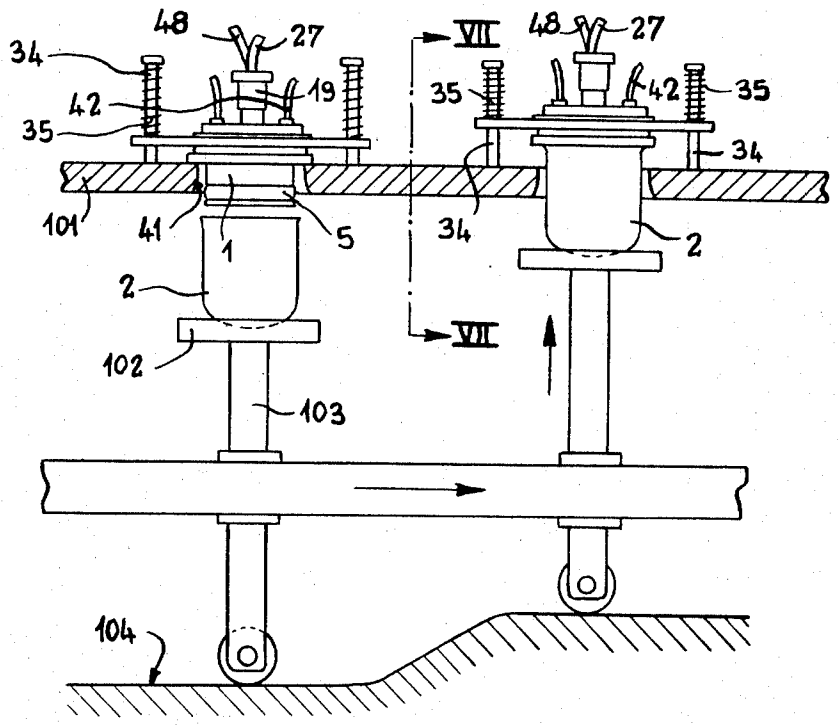


Fig. 6

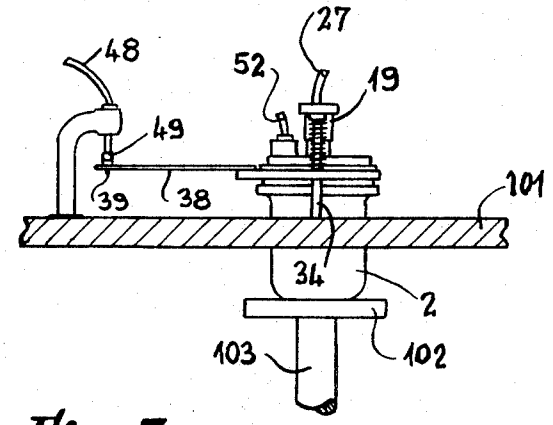


Fig. 7

INVENTOR.
Roger Remane
BY
Brandenburg
attorneys

FILLING HEADS FOR LIQUID CONTAINERS

The present invention relates to a volumetric filling head for containers in which the liquid level should be maintained below the upper end of the container, and it more particularly concerns canisters or "cartridges" which are to be filled with a liquefied gas such as butane or propane and wherein a free space should be provided above the liquid once the cartridge is closed by a generally inwardly bulging closure member adapted to form the bottom thereof.

The filling operation is generally effected under atmospheric pressure, the liquid being maintained at a quite low temperature. The filling head may comprise a base adapted to be supported by the upper edge of the container to be filled and a body which extends downwardly from the base into the container, the periphery of the said body carrying an inflatable gasket which in the inflated state forms a tight seal between the body and the inner wall of the container, and the said body having a valve through which liquid may flow into the container and an exhaust passage through which air and gas may escape from the container during the filling operation. The operating cycle of the automatic filling machine on which such a filling head is used, is so timed that when the valve is closed, an excess of liquid has been supplied to the container, this excess escaping through the exhaust passage and being collected and appropriate vessel from which it is pumped back to the liquid reservoir associated to the machine.

This excess of liquid cannot be provided too small, lest a container could be incompletely filled. It therefore constitutes a marked disadvantage owing to the loss due to the unavoidable evaporation of the low-temperature liquid under atmospheric pressure. Moreover the gas which results from this evaporation may constitute a danger for the operators or for the plant itself, as for instance in the case of butane and propane which may form an explosive mixture with atmospheric air.

The object of the present invention is to provide a volumetric filling head wherein the excess of liquid escaping from the container at the end of the filling operation is reduced to a quite negligible value.

In accordance with the invention, in a volumetric filling head of the kind above referred to, the exhaust passage comprises a substantially vertical bore in which a piston is slidably disposed with a noticeable clearance, in such manner that air and gas may freely escape during the filling operation without substantially lifting the said piston, but that as soon as liquid begins to flow through the said exhaust passage, the said piston may be lifted to such an extent as to actuate means adapted to close the said valve.

Under such conditions when the liquid level within the container has reached the lower side of the body of the filling head, the excess of liquid which may flow through the head is limited to the quantity required for raising the piston. This quantity is practically quite small and it may be taken into account when devising the filling head itself.

The piston may be made of an appropriate plastics unaffected by low temperatures.

In a preferred embodiment the piston actuates a pneumatic relay.

The invention further concerns a particular arrangement of such pneumatic relays, in order to realize an entirely automatic control of the filling head on a conventional automatic filling machine.

In the accompanying drawings:

FIG. 1 is a plan view of a filling head according to the invention.

FIG. 2 is a section thereof taken along line II—II of FIG. 1, the parts being illustrated at their position before the end of the rising step of the container to be filled.

FIG. 3 is a section taken along line III—III of FIG. 2.

FIG. 4 is a section taken along line IV—IV of FIG. 1, but corresponding to the step wherein the container is being filled.

FIG. 5 is a diagram showing the arrangement of the pneumatic relays which control the operation of the filling head.

FIG. 6 is a diagrammatic representation in elevation with parts in section showing a conventional filling machine equipped with filling heads according to this invention.

FIG. 7 is a gragmental section taken radially of the filling machine of FIG. 6, as indicated at VII—VII in FIG. 6.

The filling head illustrated in FIGS. 1 to 4 comprises a cylindrical body 1 adapted to penetrate into the container 2 to be filled (this container being of course itself cylindrical). In order to permit accurate adjustment of the level down to which this body may be lowered into the container, the periphery of the said body is screw-threaded and it carries an annular nut 3 which forms a resting abutment for the upper edge of the container. This nut 3 may be locked in position by a counter-nut 4. In the vicinity of its lower end the body 1 is formed with an annular groove 1*a* in which is disposed a hollow inflatable gasket 5 made of an appropriate elastomeric material. As shown this gasket has a C-shaped transverse sectional profile, the ends of the C being clamped between the bottom of the groove and a ring 6 provided with radial holes 6*a* (Fig. 4) which communicate with an inner groove 6*b* of the said ring, and this inner groove communicating in turn with a conduit 1*b* provided in body 2. This conduit 1*b* opens into a cylindrical recess 1*c* through which the inner space of the gasket 5 may be connected with an appropriate inflating source. In order to permit the mounting of gasket 5, groove 1*a* opens downwardly, a circular plate 7 being removably applied against the underside of body 1 to retain gasket 5 within the said groove, this plate being integral with upwardly directed tubular bosses 8 which are engaged into corresponding vertical holes 1*d* provided in body 1, these bosses being internally screw-threaded to receive the lower ends of securing screws such as 9.

Body 1 is formed with an axial bore 1*e* in which is slidably mounted a piston-like member 10 to which is secured to stem 11 of a liquid valve 12. This valve 12 is disposed with a substantial clearance in a central opening of the lower plate 7 and it is applied against a seat-forming seal 13 mounted in an inner groove 1*f* at the lower end of bore 1*e* and retained in position by the lower plate 7 itself, A spring 14 is interposed between the seal 13 and the piston-like member 10 in order to urge valve 12 against the said seat.

An obliquely directed conduit 1*g* (FIG. 2) opens into the axial bore 1*e*. This conduit communicates with a vertical cylindrical recess 1*h* adapted to be connected with a reservoir (not illustrated) containing the liquid with which the containers are to be filled (as for instance liquefied butane maintained at an appropriate low temperature).

The piston-like member **10** has an upwardly directed extension **10***a* on which is applied a flexible diaphragm **15**. The latter is retained against extension **10***a* by a head **16** formed with a screw-threaded rod **17** which passes through the said diaphragm and through member **10** itself so as to be screwed into a blind bore provided in the stem **11** of valve **12**. Under the action of spring **14** this head **16** is applied against the movable member **18** of a small pneumatic ram **19**. The latter comprises a flexible diaphragm **20** adapted to urge member **18** downwardly. The edge of this diaphragm **20** is retained within the enlarged upper end **21***a* of a cylindrical housing **21** made in two parts, the lower one clamping the edge of the diaphragm **15** against the bottom of an annular recess of body **1**. A split ring **22** retains the cover **23** of the pneumatic ram **19** within the enlarged end **21***a* so as to clamp the edge of diaphragm **20**. The lower part of housing **21** is itself retained in position by washers **24** (FIG. 4) clamped under the heads of the aforesaid screws **9**. The movable member **18** has a blind screw-threaded axial bore which receives a screw **26** by means of which the central portion of the lower diaphragm **15** is retained against the upper side of the said member by a cover **25**. The air line associated with the pneumatic ram **19** has been referenced **27**.

The body **1** of the filling head further has a conduit 1*j* (FIG. 2) which opens downwardly through a perforation **7***a* of the lower plate **7**, an O-ring **28** being interposed between this plate and an annular recess of body **1**. The other end of this conduit communicates with a vertical bore 1*k* which opens on the upper side of body **1** in the form of an enlarged portion 1*l*. On this portion there is disposed a block **29** having an elbow-shaped conduit formed of an outwardly opening horizontal portion **29***a* and of a vertical portion **29***b* which opens above the enlarged portion 1*l* of bore 1*k*–1*l*. Screws **30** maintain block **29** in gas-tight engagement with the upper side of body **1**.

The bore 1*k*–1*l* encloses a very light piston (preferably made of an appropriate plastics unaffected by low temperatures) comprising a head disposed with a substantial clearance in the enlarged upper portion 1*l* of the bore, and a tail **31***a* which slides within the lower portion 1*k* of the said bore, this tail being grooved, as shown. The head **31** has an upper extension **31***b* adapted to act as a valve or plug for the downwardly directed outlet of a feeler nozzle **32** axially carried by block **29**.

A flat annular member **33** is freely mounted on the periphery of body **1**. As illustrated in FIGS. **1** and **2** this annular member is slidable on two vertical columns **34** secured to the revolving supporting plate of the filling machine, each carrying a spring **35** which urges member **33** downwardly. The latter rests on nuts **3** and **4** and it transmits the downward pressure to the body **1** of the filling head.

The annular member **33** is formed with two inwardly directed teeth **36** which slide in longitudinal grooves 1*m* provided in the periphery of body **1**, in such manner as to prevent any relative rotation between the two parts.

A headed gudgeon **37** is screwed in the annular member **33**, and it rotatably carries a resilient blade **38** the other end of which has a plug **39** adapted to cooperate with an appropriate pneumatic feeler nozzle, not shown in FIGS. **2** and **4**. On the gudgeon **37** is mounted a spring **40** which maintains blade **38** in frictional engagement with the annular base **33**.

The filling head described is normally adapted to be mounted on an automatic filling machine of conventional type which comprises a revolving supporting plate **101** (FIGS. **6** and **7**) having a number of apertures such as indicated at **41**, to receive the successive containers **2** to be filled. The above-mentioned columns **34** are secured to this plate each side of each aperture **41**. The latter has a diameter which is slightly larger than the outer diameter of the upper edge of the containers such as **2**, in order to form a guide for them. Under each aperture **41** there is disposed a vertically movable individual support **102** in the well known manner, these supports rotating with the revolving plate and being vertically reciprocated by means of a slidable rod **103** and of an appropriate stationary annular cam **104**. In the absence of a container the nut **3** of each filling head rests on the revolving plate **101** under the action of springs **35**. This nut **3**, together with its counter-nut **4** and with the annular member **33** may therefore be considered as forming the base of the filling head.

In operation a container to be filled is placed on a vertically movable support **102** in a zone of the machine wherein these supports are at their lowermost position. Then the container rises and its upper edge passes around the lower portion of the body **1** of the filling head within the corresponding aperture **41**, as illustrated in FIG. **2**. This edge engages the nut **4** and raises the latter together with the filling head itself and with the annular base **33** against the action of springs **35**. At the end of this upward displacement the plug **39** (FIGS. **2** and **7**) cooperates with the feeler nozzle (not shown in FIG. **2**, but indicated at **49** in FIGS. **5** and **7**) with which it is associated and it thus actuates a pneumatic relay.

As a consequence of this actuation compressed air is supplied to the pneumatic ram **19** which lowers its movable member **18** together with the liquid valve **12** (position of FIG. **4**). The liquefied gas at very low temperature begins flowing into the container, the walls of which are at a much higher temperature. There is thus produced an explosive evaporation of the first liquid drops and a burst of gas is evolved. But since the gasket **5** is not yet inflated, this gas may freely escape outwardly without creating any noticeable counter-pressure within the container. In the embodiment illustrated the lower side of nut **4** has been grooved as indicated at **3***a* in order to facilitate free exhaust of the gas.

A short while after the opening of valve **12** a delayed relay causes inflation of the gasket **5**. The container **2** is now sealed in a gas-tight manner, but the air enclosed therein may freely escape through conduit 1*j* together with the residual gas evolved from the liquid. Since the

container walls are now relatively cold, the gaseous stream which flows through conduit **1***j* is quite moderate and it may escape outwardly through the grooves of the tail **31***a* of the piston **31***a*–**31**–**31***b* and by very slightly lifting the head **31** thereof. The outlet **29***a* of the block **29** may be connected with any appropriate apparatus, if desired.

When the container is filled, the liquid rises in conduit **1***j* and in the bore **1***k*–**1***l*. But the resistance to the flow of the liquid being more important than in the case of the gas, and also the density of the liquid being much higher, the piston **31***a*–**31**–**31***b* is lifted to a greater extent and its upper extension **31***b* is applied against the lower end of the feeler nozzle **32** which is thus closed. This has for its effect to actuate another pneumatic relay which connects the ram **19** to the outer atmosphere, thus closing the liquid valve **12**. The flow of liquid into the container is stopped.

Then the support of the container begins its downward stroke together with the container itself and with the filling head which rests thereon. But as soon as the plug **39** is lowered it no more actuates the relay through which the inflatable gasket **5** receives compressed air. The container is thus liberated from the filling head and at the end of the downward stroke of its support, it may be removed from the machine in the filled state, i.e., with the liquid therein rising exactly to the desired level. The quantity of liquid which may have reached the conduit **29***a*–**29***b* of block **29** is quite negligible.

As above indicated the filling head described is preferably controlled by pneumatic relays, though of course any other kind of controlling means could be used, if desired.

FIG. **5** illustrates a preferred arrangement of pneumatic relays which has provided satisfactory in this respect.

The conduit **1***b* through which the gasket **5** is inflated is connected by a line **42** with a first pneumatic relay **43**. The latter is of the conventional type, i.e., it comprises a valve member **43***a* which normally closes a first conduit **43***b*, but which may rock in such manner as to open this conduit while connecting it with a second conduit **43***c*, and to close a third conduit **43***d* which communicates at rest with the second conduit **43***c*. In other words valve member **43***a* and conduits **43***b*, **43***c* and **43***d* form a three-way valve. The valve member **43***a* is actuated by a diaphragm **43***e* and by a biassing spring **43***f*. The diaphragm is disposed in a chamber which it divides into two portions respectively connected with a main actuating inlet **43***g* and with an auxiliary actuating inlet **43***h*, the latter being generally connected with the outer atmosphere.

The first conduit **43***b* is connected by a line **44** with the second conduit **45***c* of another pneumatic relay or master relay **45**, the first conduit **45***b* of which is connected with a compressed air source **46**. This source **46** is also connected with the main actuating inlet **45***g* of relay **45**, but through a calibrated orifice **47** downstream of which there is provided a branch line **48** the other end of which is connected with the feeler nozzle **49** disposed above plug **39** when the filling head is at its lowermost position. The air which flows through the calibrated orifice **47** may thus escape freely through nozzle **39** and the master relay **45** is not actuated as long as the filling head is not sufficiently raised.

The arrangement of FIG. **5** further comprises a third relay **50** the first conduit **50***b* of which is connected with the line **44** while its main actuating inlet **50***g* is connected with line **44** through a calibrated orifice **51**. Downstream of this orifice there is provided a branch line **52** the other end of which is connected with the feeler nozzle **32** disposed within block **29**. Here again at the position of rest nozzle **32** is freely open and relay **50** is unactuated even when line **44** is under pressure. The second conduit **50***c* of relay **50** is connected with the third conduit **53***d* of a fourth relay **53** the first conduit **53***b* of which is also connected with the line **44**. The second conduit **53***c* of this relay **53** is connected with the main actuating inlet **53** g thereof and also with the main actuating inlet **54***g of a fifth relay 54. The first conduit 54b* of the latter opens to the atmosphere, its third conduit **54***d* is connected with line **44**, and its second conduit **54***c* is connected with the pneumatic ram **19** of the filling head.

It will further be noted that line **44** is connected with the main actuating inlet **43***g* of relay **43** through a calibrated orifice **55**. Finally the third conduits **45***d*, **50***d* of relays **45** and **50** communicate with the outer atmosphere.

In operation, when the filling head is at its lowermost position, the master-relay **45** is at rest and line **44** is connected with the outer atmosphere through the third conduit **45***d* of this relay. The four other relays are therefore at rest and the filling head receives no compressed air.

When the filling head is sufficiently raised by the container **2** to be filled, the plug **59** closes the corresponding feeler nozzle **49**. The main actuating inlet **45***g* of the master-relay **45** is therefore under pressure and this relay is actuated, whereby line **44** is supplied with air under pressure. The first relay **43** receives compressed air both into its first conduit **43***b* and into its main actuating inlet **43***g*, but owing to the presence of the calibrated orifice **55**, its diaphragm **43***e* can only respond slowly to the action of the air pressure. In other words the actuation of relay **43** is somewhat delayed with respect to relay **45**. It results therefrom that compressed air will only be supplied to the inflatable gasket **5** a given time after actuation of relay **45**.

Compressed air from line **44** is also supplied to the third conduit **54***d* of relay **54**. Since the latter is at rest, this third conduit communicates with its second conduit **54***c* , which has for its result that the pneumatic ram **19** of the filling head receives air under pressure and opens valve **12**. Since no calibrated orifice is provided here, valve **12** opens immediately, before gasket **5** is inflated.

compressed air also reaches the calibrated orifice **51**, but since the feeler nozzle **32** is presently fully open, no pressure can build up in the main actuating inlet **50***g* of relay **50** which remains at rest. It second conduit **50***c* is therefore without any air pressure. The second and third conduits **53***c* and **53***d* of relay **53** are also under atmospheric pressure as well as the actuating inlets **53***g* and **54***g* of relays **53** and **54**. These relays are thus at rest.

As soon as the container is filled up to the desired level, the extension **31***a* of the piston head **31** closes the feeler nozzle **32**. Relay **50** is thus actuated and compressed air flows towards the third conduit **53***d* of relay **53**; since this third conduit communicates with the

second conduit **53***c* of the relay, the air under pressure reaches the actuating inlets **53***g* and **54***g* of both relays **53** and **54** which are therefore actuated. The second conduit **54***c* of relay **54** thus communicates with the outer atmosphere and ram **19** is returned to its initial position by the biassing spring of valve **12** which closes.

When the filling head begins its downward stroke, plug **39** liberates the feeler nozzle **49** and the master-relay **45** is therefore returned to its position of rest. Line **44** and calibrated orifice **51** are separated from source **46**. Relays **50**, **53** and **54** also return to their position of rest and the operating cycle is terminated.

I claim:

1. In an automatic unit to control a filling head adapted to be raised by the container to be filled, with said head having an inflatable gasket adapted to form a seal between said head and said container, normally closed valve means to control the flow of liquid into said container, and an exhaust passage provided with detecting means to detect the flow of liquid through said passage,

means to open said valve means when said filling head is raised by said container;

means to cause inflation of said gasket a pre-determined time after opening of said valve means;

and means activated by said detecting means to close said valve means when liquid begins to flow through said exhaust passage.

2. A filling head to fill from a source of liquid a substantially cylindrical container having an open upper end defined by the substantially horizontal upper edge of a lateral wall having an inner side and an outer side, with valve means to control liquid flow from said source, said head comprising:

a base to rest on the upper edge of said container;

a body carried by said base to extend downwardly into said container, said body having a lower portion, said body being formed with a filling conduit having an upper inlet for connection with said source of liquid to fill said container and an inner outlet in said lower portion, and said body further being formed with an exhaust passage having an inner inlet in said lower portion, a substantially vertical bore and an outer outlet;

a peripheral gasket carried by said body above the lower portion thereof to form a gas-tight seal between said body and the inner side of the lateral wall of said container below the outlet of said exhaust passage;

a piston-like member made of a material heavier than said liquid movably disposed in the bore of the exhaust passage of said body with such a clearance that when said container is being filled, gases escaping from said container through the outlet of said exhaust passage only raise said piston-like member to a first level, while when said container is filled liquid flowing through said exhaust passage raises said piston-like member to a second level situated above said first level;

and feeler means actuated by said piston-like member when same is raised to said second level to in turn act on said valve means to cut off liquid flow from said source into said container;

said filling head being for use on a filling machine operating by successive automatic filling cycles, of the kind comprising an apertured plate to receive the body of the filling head and to support the base thereo, a vertically movable support to raise the container to be filled so as to cause the upper edge of same to pass around the body of said filling head, to engage the base thereof and to raise said head from said apertured plate, and vertical columns to vertically guide said filling head;

said base including an annular plate supported by said body and non-rotatable thereon, said annular plate having perforations to slidably receive said guiding columns;

said annular plate carrying a laterally extending resilient blade having a free outer end;

and the outer end of said blade supporting a plug to act on a pneumatic feeler nozzle carried by said machine when said filling head is raised by said vertically movable support to actuate control means to initiate an automatic filling cycle of said machine.

3. In a filling head as claimed in claim **2**, said body being formed with a peripheral groove to receive said gasket, with said groove having a bottom of given diameter; said gasket being formed of a hollow inflatable member having an outer diameter and an inner diameter, with said inner diameter being substantially equal to the diameter of the bottom of said groove, and with said inflatable member including an inner space; and said body having an inflating conduit communicating with the inner space of said gasket, with said inflating conduit having an outer inlet through which fluid under pressure may be forced into said gasket to expand the outer diameter thereof and to apply said gasket against the inner side of the lateral wall of said container.

4. A filling head to fill from a source of liquid a substantially cylindrical container having an open upper end defined by the substantially horizontal upper edge of a lateral wall having an inner side and an outer side, with valve means to control liquid flow from said source, said head comprising:

a base to rest on the upper edge of said container;

a body carried by said base to extend downwardly into said container, said body having a lower portion, said body being formed with a filling conduit having an upper inlet for connection with said source of liquid to fill said container and an inner outlet in said lower portion, and said body further being formed with an exhaust passage having an inner inlet in said lower portion, a substantially vertical bore and an outer outlet;

a peripheral gasket carried by said body above the lower portion thereof to form a gas-tight seal between said body and the inner side of the lateral wall of said container below the outlet of said exhaust passage;

a piston-like member made of a material heavier than said liquid movably disposed in the bore of the exhaust passage of said body with such a clearance that when said container is being filled, gases escaping from said container through the outlet of said exhaust passage only raise said piston-like member to a first level, while when said container is filled liquid flowing through said exhaust passage raises said piston-like member to a second level situated above said first level;

and feeler means actuated by said piston-like member when same is raised to said second level to in turn act on said valve means to cut off liquid flow from said source into said container;

said feeler means being in the form of a downwardly directed pneumatic nozzle disposed above said piston-like member to be obturated by said member when same is raised to said second level with said pneumatic nozzle being connected with a relay device to actuate same, and with said pneumatic relay device controlling said valve means.

5. A filling head to fill from a source of liquid a substantially cylindrical container having an open upper end defined by the substantially horizontal upper edge of a lateral wall having an inner side and an outer side, with valve means to control liquid flow from said source, said head comprising:

a base to rest on the upper edge of said container;

a body carried by said base to extend downwardly into said container, said body having a lower portion, said body being formed with a filling conduit having an upper inlet for connection with said source of liquid to fill said container and an inner outlet in said lower portion, and said body further being formed with an exhaust passage having an inner inlet in said lower portion, a substantially vertical bore and an outer outlet;

a peripheral gasket carried by said body above the lower portion thereof to form a gas-tight seal between said body and the inner side of the lateral wall of said container below the outlet of said exhaust passage;

a piston-like member made of a material heavier than said liquid movably disposed in the bore of the exhaust passage of said body with such a clearance that when said container is being filled, gases escaping from said container through the outlet of said exhaust passage only raise said piston-like member to a first level, while when said container is filled liquid flowing through said exhaust passage raises said piston-like member to a second level situated above said first level;

and feeler means actuated by said piston-like member when same is raised to said second level to in turn act on said valve means to cut off liquid flow from said source into said container;

said valve means comprising a downwardly directed seat formed in the filling conduit of said body close to the inner outlet of said conduit, a movable valve member cooperating with said seat to close or to open liquid flow through said conduit with said valve member having an upwardly extending stem, and spring means acting on said stem to urge said valve member upwardly against said seat;

said body having an upwardly opening bore for passage of said stem;

a first substantially circular flexible diaphragm having a central portion secured to said stem and a marginal portion secured to said body to form a seal between said body and said stem, with said stem extending above said first diaphragm and terminating into a free end;

a second substantially circular flexible diaphragm having a central portion and a marginal portion with said central portion being secured to said free end of said stem;

and means secured to said body to retain the marginal portion of said second diaphragm and to form above same a gas-tight chamber to receive compressed gas for actuation of said valve means downwardly against said spring means.

6. A filling head to fill from a source of liquid a substantially cylindrical container having an open upper end defined by the substantially horizontal upper edge of a lateral wall having an inner side and an outer side, said filling head comprising:

a base to rest on the upper edge of said container;

a body carried by said base to extend downwardly into said container, said body having a lower portion, said body being formed with a filling conduit having an upper inlet for connection with said source of liquid to fill said container and an inner outlet in said lower portion, and said body further being formed with an exhaust passage having an inner inlet in said lower portion, a substantially vertical bore and an outer outlet;

valve means in the filling conduit of said body to control liquid flow therethrough;

means to form a gas-tight seal between said body and the inner side of the lateral wall of said container below the outlet of said exhaust passage;

a piston-like member movably disposed in the bore of the exhaust passage of said body with such a clearance that when said container is being filled, gases escaping from said container through the outlet of said exhaust passage only raise said piston-like member to a first level, while when said container is filled liquid flowing through said exhaust passage raises said piston-like member to a second level situated above said first level;

a downwardly directed pneumatic nozzle disposed above said piston-like member to be obturated by said member when same is raised to its second level with said pneumatic nozzle being connected with a pnaumatic relay system to actuate same and with said pneumatic relay system controlling said valve means.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,683,976 Dated August 15, 1972

Inventor(s) Roger Remane

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading of the patent between [21] and [52] insert:

--[30] Foreign Application Priority Date

Feb. 14, 1969 France.....69.03679--

Signed and sealed this 12th day of December 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334