

[54] **FLUID TRANSFER APPARATUS**

[72] Inventors: **Richard Norman Jones**, 37 Woodlawn Ave., Ottawa, Ontario;
Joseph Marcel Armand Nadeau, 43A Montclair St., Hull, Quebec, both of Canada

[22] Filed: **Sept. 17, 1970**

[21] Appl. No.: **73,230**

Related U.S. Application Data

[63] Continuation of Ser. No. 710,239, March 4, 1968, abandoned.

[52] U.S. Cl.141/285, 141/326, 222/481

[51] Int. Cl.B65b 1/04, B65b 3/04

[58] Field of Search.....141/285, 309, 310, 325, 326; 222/478, 479, 481

[56]

References Cited

UNITED STATES PATENTS

2,840,123	6/1958	Metcalf	141/285
890,018	6/1908	Burt	222/481

Primary Examiner—Houston S. Bell, Jr.

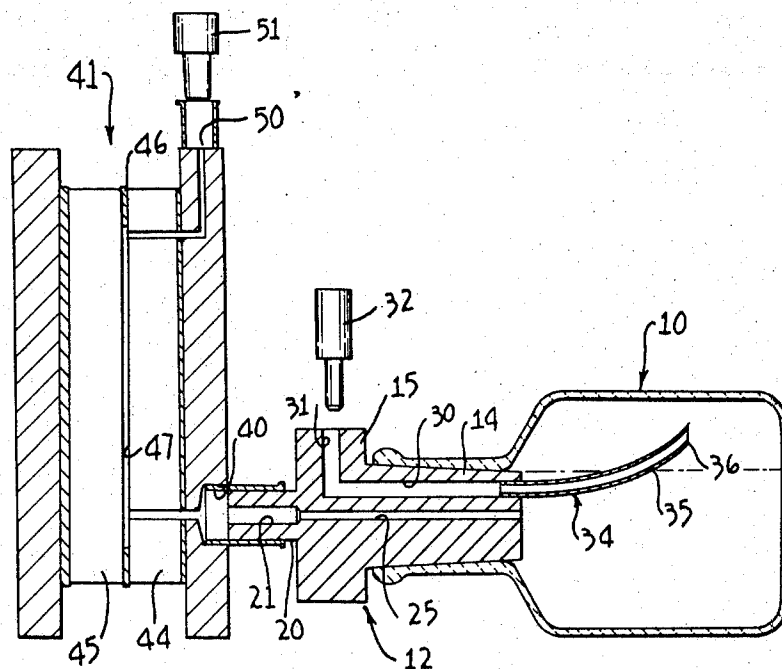
Attorney—Robert G. Hendry

[57]

ABSTRACT

A fluid transfer apparatus for handling volatile liquids including a container and a stopper in fluid tight engagement with the neck of the container, the stopper being provided with a liquid passage, an air passage including a tube extending into the container and a plug to close the air passage. A nozzle communicating with the liquid passage tightly engages an opening in the vessel into which the liquid is to be transferred and the plug in the air passage is removed so that liquid will flow into the vessel.

3 Claims, 3 Drawing Figures



Patented Aug. 15, 1972

3,683,978

2 Sheets-Sheet 1

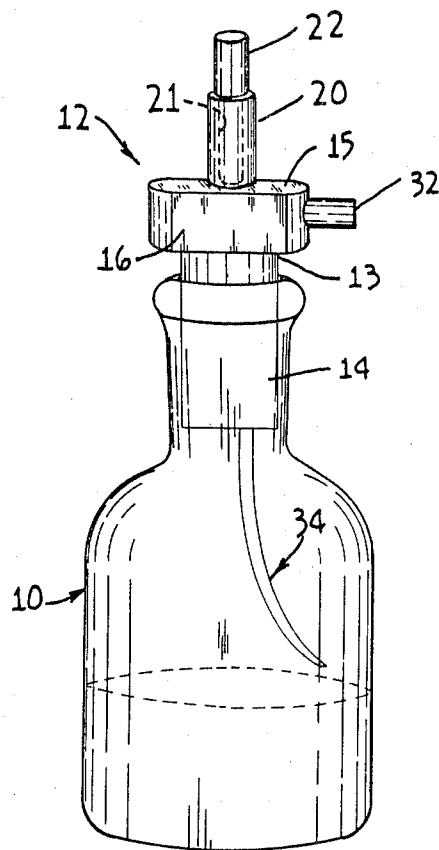


FIG. 1.

Inventors:

Richard M. Jones

Joseph M. A. Madeau

By

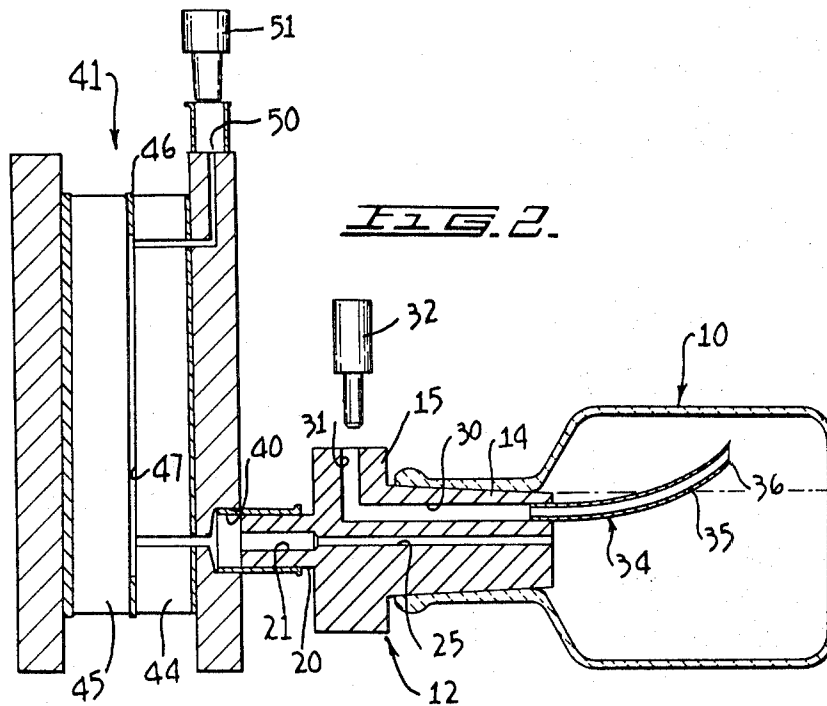
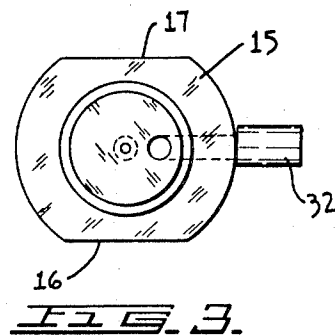
Agent

Robert L. Hendry

Patented Aug. 15, 1972

3,683,978

2 Sheets-Sheet 2



FLUID TRANSFER APPARATUS

This is a continuation of applicant Ser. No. 710,239, filed Mar. 4, 1968, and now abandoned.

This invention relates to containers and, more particularly, to a stopper for a transfer bottle to facilitate introducing a sample into another container without appreciable loss due to evaporation.

The transfer bottle is particularly useful for introducing samples into a cell of a spectro-photometer. The conventional spectro-photometer cell has a fluid inlet, an air outlet and a pair of spaced apart plates of transparent crystalline material. The sample is dissolved or suspended in a solvent and, when introduced at the inlet, fills the space between the plates by capillary action as air escapes through the outlet. Due to the fact that solvents having the desired optical properties are highly volatile, it has been the practice to use a hypodermic syringe to transfer the sample from a measuring or weighing bottle to the cell of the spectro-photometer. This has not been entirely satisfactory, as air enters the hypodermic syringe and the measuring bottle. Furthermore, it is not convenient to use the syringe for removing the sample from the cell.

It is, therefore, an object of the present invention to provide a simplified, inexpensive bottle which minimizes evaporation of volatile liquids.

In the accompanying drawings which illustrate a preferred embodiment of the invention,

FIG. 1 is a perspective view of a transfer bottle and stopper therefor;

FIG. 2 is a sectional side elevational view of the transfer bottle of FIG. 1, in use with a conventional sample cell of a spectro-photometer, and

FIG. 3 is a top plan view of the stopper of the sample bottle.

Referring now in detail to the drawings, the transfer bottle shown generally at 10, in FIG. 1, has a stopper 12 received in air-tight engagement in the neck thereof. The stopper 12 has a body 13 preferably formed of polytetrafluoroethylene due to the self-lubricating and chemically inert properties of this material. The body 13 has a tapered, cylindrical plug portion 14 to engage the neck of the bottle 10, and a head 15 having flat portions 16 and 17 (see FIG. 3).

A nozzle 20, provided on the head 15, has a bore 21 to receive a plug 22, which is preferably formed of steel or a hard plastic such as a phenolic resin. A bore 25 having a diameter slightly less than that of bore 21 extends through the plug 14 and the head 15 to interconnect the nozzle 20 and the interior of the bottle 10, thus forming a fluid passage.

As shown more clearly in FIGS. 2 and 3, an air passage 30, having a right angle bend 31, extends through the head and the plug portion 14 to communicate with the interior of the bottle 10. The outer end of the plug 30 receives a plug 32, identical to the plug 22, previously described. The inner end of the passage 30 receivably engages one end of a tube 34, preferably formed of stainless steel. The tube 34 has a curved portion 35 so that its mouth 36 extends close to a wall of the bottle 10. It will be appreciated that the mouth of the tube will thus be above the level of the fluid (as shown by the broken line in FIG. 2). It will be noted that the passage 30 has a greater diameter than the bore 25 to avoid capillary action in the air passage 30.

In FIG. 2, the transfer bottle 10 is shown with the plug 22 removed, and the nozzle in operative engagement with the inlet 40 of a conventional spectro-photometer cell 41. A pair of plates 44 and 45, spaced apart by a lead gasket 46, define a chamber 47. The passage 40 extends through the transparent crystalline material 44 into the chamber 47.

An air vent 50 is provided, normally closed by a stopper 51, at the other end of the chamber 47. The dimensions of the inlet 40 and chamber 47 are such that liquid from the bottle 10 will be drawn into the cell by capillary action. A further plug (not shown) identical to the plug 51 is provided in the inlet 40 of the cell 41.

In operation, the sample and solvent are measured and mixed in the bottle 10. The stopper 12, having plugs 22 and 32 in place therein, is positioned in the bottle to prevent evaporation until the sample is to be transferred to the cell 41.

Transfer is accomplished by removing the plugs from the cell 41 and the plug 22 from the transfer bottle 10. The nozzle 20 is then inserted in the inlet 40 of the cell, as shown in FIG. 2. When the plug 32 is removed, the liquid in the bottle 10 will flow into the chamber 47. The plug 51 is then inserted in the air vent 50. Before removing the nozzle 20 from the inlet 40 of the cell, the plug 32 is replaced in the stopper to prevent loss of liquid from the bottle 10, if any remains after the cell is filled. If any of the sample remains in the bottle 10, the plug 22 may be replaced to prevent evaporation, and the sample stored for future use.

The foregoing procedure is reversible, as the liquid will flow from the cell 41 into the transfer bottle 10, when the device is used substantially, as shown in FIG. 2.

The provision of the curve 35 in the tube 34 of the apparatus is considered desirable to keep the liquid level below the mouth of the tube during use (as shown in FIG. 2). Otherwise, there is the possibility that liquid retained in the lower portion of the tube 34 will be forced out of the passage 30 by vapor pressure within the bottle 10.

Some of the solvents in common use, for example, carbon tetrachloride and carbon disulphide are recognized as being toxic and, therefore, it is an added feature of this device that very little, if any, liquid or vapor is allowed to escape during transfer of a sample. It will be appreciated that the instant invention is not limited to the particular use described herein, and might have other uses such as the transfer of radioactive liquids or samples which would be contaminated by contact with the air.

It is claimed:

1. A fluid transfer device for transferring volatile liquids or liquids which may easily become contaminated by exposure to the atmosphere into a receiver comprising first and second openings fitted with first and second plugs, said device comprising a container having a body portion and a neck portion, said neck portion being constructed and arranged to receive a stopper in fluid tight relation; a stopper having a body including a top and a side wall engaged in said neck portion of said container and extending beyond said neck portion and being constructed and arranged to form a nozzle adapted to be received by

3

one of said first and second openings of said receiver when one of said first and second plugs is removed, said stopper having two separate passages extending through said stopper, the first of said passages extending through said stopper in a straight line and exiting through said top and the second of said passages extending partly through said stopper and thereafter forming a right angle bend to exit through a side wall of said stopper; a tube forming an extension of said second passage, the outer end of said tube being curved toward a side wall of said container; a third plug removably received in said nozzle and a fourth plug removably received in said second passage, said transfer device being constructed and arranged whereby fluid in said body portion of said container will

4

flow through said first passage and into said receiver when said third plug is removed from said nozzle, and said nozzle is received by one of said first and second openings of said receiver and the other of said first and second plugs is removed from the other of said first and second openings in said receiver, and air will enter said body portion through said second passage when said fourth plug is removed.

2. A transfer device as claimed in claim 1 wherein said body of said stopper is formed of polytetrafluoroethylene.

3. A transfer device as claimed in Claim 1 wherein said outer end of said tube is cut so as to be substantially parallel with a bottom wall of said vessel.

* * * * *

20

25

30

35

40

45

50

55

60

65