Sept. 26, 1967 D. G. McSMITH 3,343,422

PIPETTE SAFETY DEVICE

Filed Aug. 12, 1965

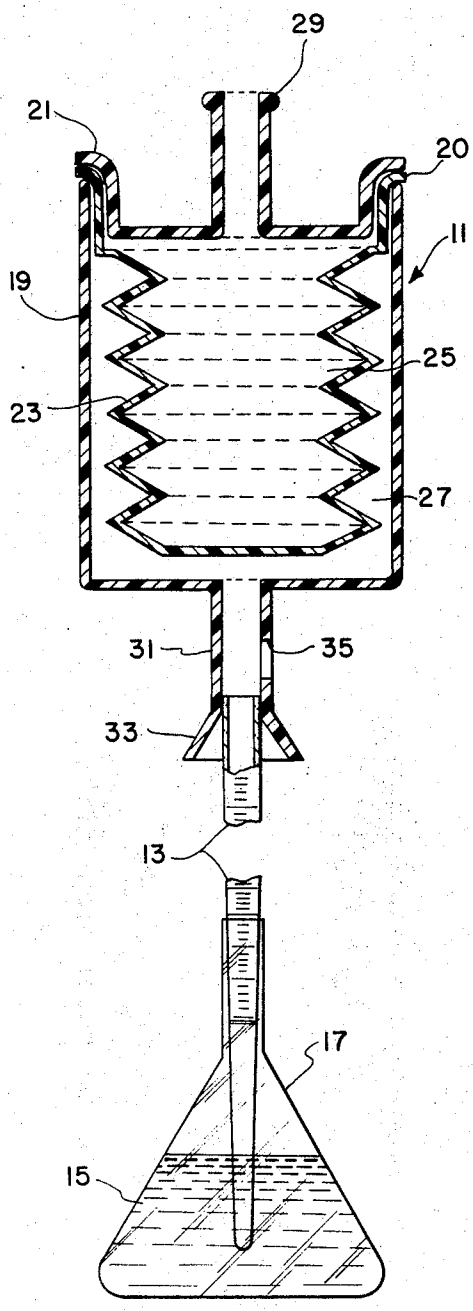

FIG. 1

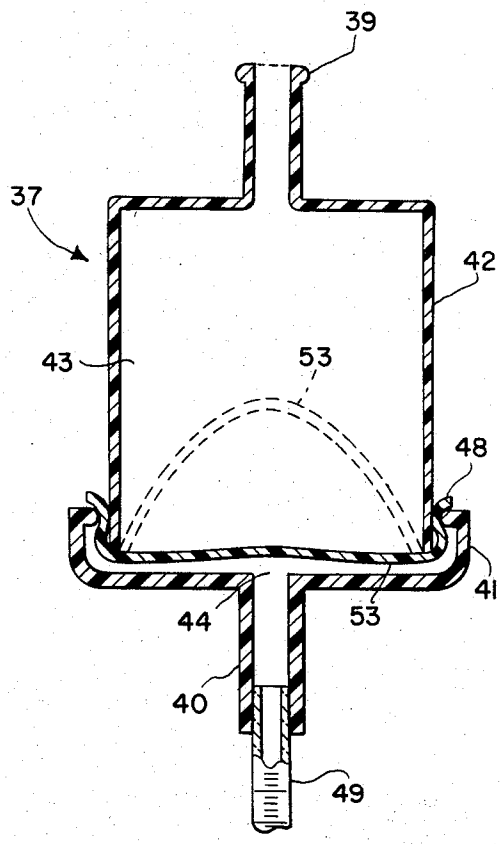

FIG. 2

INVENTOR
DWIGHT G. McSMITH

BY

ATTORNEYS

United States Patent Office 3,343,422 Patented Sept. 26, 1967

3,343,422

PIPETTE SAFETY DEVICE

Dwight G. McSmith, 500 Chapel St., Hampton, Va. 23369

Filed Aug. 12, 1965, Ser. No. 479,354
10 Claims. (Cl. 73—425.6)

ABSTRACT OF THE DISCLOSURE

A pipette safety device including a combination mouthpiece and adapter for standard pipettes that prevent any liquid or fumes evolving from a harmful liquid that is being measured by the pipette from coming into contact with the lips and mouth of the pipette operator.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates generally to a pipette safety device and relates wtih particularity to a combination mouthpiece and adapter for standard pipettes that prevent any liquid or fumes evolving from the liquid that is being measured by the pipette from coming into contact with the lips and mouth of the pipette operator.

It will be appreciated that in today's laboratories, chemists, bacteriologists, and laboratory technicians are continuously called upon to dispense many harmful liquids, such for example, cyanide solutions, strong acids, strong alkalis, dyes, and numerous bacteriological solutions. The conventional method of dispensing small quantities of these harmful liquids as to draw up in a standard pipette, through suction applied by the mouth, the necessary quantity to be dispensed which is measured by the calibrated pipette. It is readily apparent that many liquids of this type if permitted to come in contact with the mouth can cause painful and even fatal injury. In addition, the fumes from numerous solutions are, at times, almost as harmful as the liquids themselves.

Accordingly, an object of the present invention is the provision of a new and improved safety device for use with the standard pipettes to prevent the mouth from harmful liquids.

Another object of the instant invention is the provision of a new and novel mouthpiece adapter for pipettes to protect an operator's lips, mouth and lungs from harmful fumes in the laboratory.

A further object of the present invention is the provision of a pipette safety device employing an elastic bellows to isolate the mouth of the operator from the liquid to be drawn up into the pipette.

Another object of the present invention is a novel method of protecting the lips and mouth of laboratory personnel during the use of hazardous liquids.

Yet another object of the present invention is a pipette safety device employing a pliable membrane to protect the mouth of the operator from the liquid being measured by the pipette.

According to the present invention, the foregoing and other objects are obtained by providing in a pipette safety device, a separable container divided into two compartments by a pliable diaphragm or bellows arrangement. One end of the separable container terminates in an open tubular mouthpiece for application of the lips of the pipette operator with the other end of the separable container terminating in a flared tubular opening for receiving the end of a pipette. Thus, the operator applies his lips to the mouthpiece and draws up air from a sealed-off compartment above the liquid in which the pipette is positioned thereby moving the pliable divider and producing a partial vacuum in the end of the container leading to this pipette. This permits the ambient air pressure to force liquid up into the pipette in a conventional means. Due to the impermeability of the elastic bellows or pliable diaphragm arrangement, none of the liquid or its fumes in a pipette can reach the mouth of the operator.

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a part sectional view of one embodiment of the pipette safety device according to the present invention, and

FIG. 2 is a part sectional view of a slight modification of the pipette safety device according to the present invention.

Referring now more particularly to the drawings, and more particularly to FIG. 1, there is shown a pipette safety device or adapter, generally designated by reference numeral **11**, in operative connection with a conventional pipette **13**. Pipette **13** leads to a source of liquid **15** contained in a conventional flask **17**. Liquid **15** may be any liquid that could be harmful, either alone or with its fumes, to the mouth and respiratory tract of the pipette operator. Such liquids include cyanide solutions, strong acids, strong alkalis, various dyes, and numerous bacteriological solutions, and the like. Obviously, if fluids of this type come into contact with the lips, mouth and the respiratory tract of the operator, serious or fatal injury may result.

Adapter **11** includes a cup-shaped lower section **19** and a separable cover **21** for cup-shaped section **19**. An elastomeric bellows **23** is hermetically sealed between cover **21** and section **19** as at **20**. Bellows **23** divides adapter **11** into an inner and outer compartment designated, respectively, by reference numerals **25** and **27**. A tubular mouthpiece **29** is provided on cover **21** and is adapted for engagement by the lips of the operator. Mouthpiece **29** may be integral with or sealingly attached to cover **21** and serves to provide fluid communication with the mouth of the operator and inner compartment **25** of adapter unit **11**. A tubular stem **31** leads from the base of cup-shaped section **19** and provides fluid communication with outer compartment **27** and pipette **13** when adapter **11** is attached to the pipette. Stem **31** is provided with a flared opening **33** to permit the use of adapter **11** with various size pipettes **13**. Also provided in stem **13** is a conventional finger vent control **35** for selective actuation by the operator.

Referring now more particularly to FIG. 2, a slight modification of the safety adapter, generally designated by reference numeral **37**, is shown.

Adapter **37** includes a mouthpiece **39** for engagement by the lips of an operator and a tubular stem **40** for telescopingly receiving a pipette **49**. Stem **40** merges with an integral open receptacle **41** while mouthpiece **39** terminates in an open inverted cup-shaped closure **42** for receptacle **41**. A membrane or diaphragm **53** is sealingly disposed between the mating edges of closure **42** and receptacle **41** with the hermetically sealed area being designated by reference numeral **48**. Diaphragm **53** thus divides adapter **37** into an upper compartment **43** and a lower compartment **44**. Diaphragm **53** may be constructed of plastics, rubber or any suitable material as long as it is impermeable and chemically inert relative to the fluid to be measured by pipette **49**. Accordingly, any suitable pliable material may be stretched between receptacle **41** and closure **42** to form diaphragm **53**. Additionally, other suitable membranous materials, such for example latex

rubber, Mylar film (a tradename for polyethylene terephthalate), cellophane, and the like, may be employed as the diaphragm with an excess of the material being enclosed within the sealed area **48** to permit volume variance between compartments **43** and **44**.

As apparent from the foregoing description, both of the embodiments described in reference to FIG. 1 and FIG. 2 provide ease in disassembly and cleaning due to the separable nature of the adapter parts maintaining the elastic bellows and diaphragms in sealed engagement therein. The specific material construction of the adapters **11** and **37** described herein is not considered critical although it is readily apparent that it is desirable to construct the adapters of a chemically inert material such for example Teflon (a tradename for polytetrafluoroethelyne), polyethylene, or similar plastics.

OPERATION

The operation and the numerous advantageous features of the present invention is believed now readily apparent. More particularly, referring to FIG. 1, adapter **11** is placed on the open end of a pipette **13** and the pipette immersed in the hazardous fluid **15** in flask **17**. The mouth of the operator is placed over mouthpiece **29** and the index or another finger of the operator is placed in position to selectively close vent **35**. The operator then applies his lips to the mouthpiece **29** and draws up air from the sealed-off inner compartment **25** in bellows **23**, thereby producing a partial vacuum in compartment **27** and permitting the ambient air pressure to force the liquid **15** up into the pipette **13**. When the desired liquid level is achieved in pipette **13**, the operator closes the finger vent control **35** and removes the pipette, with adapter **11** still attached, from the flask for transfer of the hazardous fluid to the desired location. It is readily seen that bellows **23** serves to completely isolate the operator's mouth from the hazardous fluid thereby preventing any possibility of fumes or fluid from damaging the mouth of the operator. The operation of the embodiment illustrated in FIG. 2 is similar to that of FIG. 1 with the exception that no finger vent control has been illustrated. In this respect, the pipette **49** would be removed from stem **46** upon the attainment of the desired liquid level in pipette **49** and the operator would place his finger over the end of the pipette **49**, as in conventional pipette operation, to dispense the desired quantity of liquid from the pipette. In each embodiment the lips and mouth of the operator are completely protected from the hazardous fluid through the use of the flexible bellows and diaphragm members.

Although the operation of the device according to the present invention has been described in connection with two specific embodiments, there are obviously many modifications and variations of the present invention possible in the light of the above teachings. For example, the finger vent control described in connection with FIG. 1 may be utilized on the embodiment of FIG. 2, in each embodiment the vent could be located on the tubular mouthpiece, or it could be omitted entirely and finger control effected over the mouthpiece or by quickly removing the pipette from its adapter and placing the finger over the pipette. Other modifications and variations will be readily apparent to those skilled in the art in the light of these teachings.

It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A mouth protective safety device for use with a pipette when extracting measured quantities of hazardous liquids comprising:
   - a separable container,
   - pliable means dividing said container into two compartments,
   - first tubular means leading from one of said compartments and adapted to serve as a mouthpiece,
   - second tubular means leading from the other of said compartments and adapted to frictionally engage a pipette, whereby
   - upon application of suction on said mouthpiece said pliable means will move in said one compartment toward said mouthpiece causing a partial vacuum in said other of said compartments and thereby permit the ambient air pressure to force a quantity of the hazardous liquid into said pipette without endangering the mouth to the liquid or its fumes.

2. The safety device of claim **1** wherein said pliable means is a collapsible bellows opening into said first tubular means.

3. A safety device as in claim **1** wherein said pliable means is a disposable membrane.

4. A safety device as in claim **1** wherein said second tubular means is provided with a flared opening for telescopingly receiving diverse size pipettes.

5. A safety device as in claim **1** including a finger vent control on at least one of said tubular means.

6. A mouth protective safety device for use with a pipette when extracting and transferring measured quantities of hazardous liquids in the laboratory, comprising:
   - a separable container,
   - movable means sealed within and dividing said container into two compartments,
   - said movable means being impermeable to hazardous liquids and their fumes,
   - first tubular means leading from one of said compartments and adapted to serve as a mouthpiece,
   - second tubular means leading from the other of said compartments and adapted to engage a pipette, whereby
   - upon application of suction on said mouthpiece said movable means will move in said one compartment toward said mouthpiece causing a change in compartment volume thereby producing a partial vacuum in said other of said compartments to permit the ambient air pressure to force a quantity of the hazardous liquid into said pipette without endangering the mouth to the liquid or its fumes.

7. The safety device of claim **6** wherein said movable means is a collapsible bellows opening into said first tubular means and maintained in sealed relationship between the separable portions of said separable container.

8. A safety device as in claim **6** wherein said movable means is a disposable pliable membrane, said membrane being maintained in sealed relationship between separable parts of said separable container.

9. Apparatus for protecting the mouth of an operator from harmful chemical or bacteriological solutions, and the like, comprising in combination: a source of liquid, a pipette, and a safety extraction means for use with said pipette,
   - said safety extraction means including a separable container,
   - a first tubular means comprising a mouthpiece opening into and disposed in fluid-tight relationship with said container,
   - a collapsible bellows disposed in said container and opening into said first tubular means,
   - a second tubular means secured to and opening into said container, said second tubular means being so constructed and arranged as to telescopically receive said pipette,
   - whereby an operator may apply his lips to said mouthpiece and extract air from said collapsible bellows to thereby produce a partial vacuum in said container and permit the ambient air pressure to force liquid into said pipette without endangering the lips and mouth of the operator.

10. A method of protecting the lips, mouth and respiratory tract of an operator when extracting and measuring hazardous chemical or bacteriological solutions with a pipette, comprising:

providing an adapter for said pipette, said adapter being provided with a movable partition dividing said adapter into a pair of compartments, said movable partition being impermeable to the hazardous liquid,

connecting the pipette in fluid connection with one of said compartments, and

applying mouth suction to the other of said compartments, whereby

said movable partition will move toward the suction source and thereby create a partial vacuum in said adapter to permit ambient air pressure to force the hazardous liquid into said pipette, said impermeable partition serving to prevent the hazardous liquid or its fumes from coming into contact with the lips, mouth and respiratory tract of the operator.

References Cited

UNITED STATES PATENTS

2,595,493	5/1952	Slaby et al.	73—425.6
2,692,503	10/1954	Crecelius	73—425.4
2,728,232	12/1955	Bremmer	73—425.6
3,037,497	6/1962	Roberson	222—386.5

LOUIS R. PRINCE, *Primary Examiner.*

S. C. SWISHER, *Assistant Examiner.*