United States Patent

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[15] **3,656,351**

[45] **Apr. 18, 1972**

[54] PIPETTE

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[22] Filed: **June 25, 1970**

[21] Appl. No.: **49,685**

[52] **U.S. Cl.** **73/425.6,** 141/27, 222/79

[51] **Int. Cl.** **G01n 1/14**

[58] **Field of Search** 141/25, 26, 27, 28; 222/79; 23/254; 73/425.6; 128/233; 285/DIG. 22, 382

[56] **References Cited**

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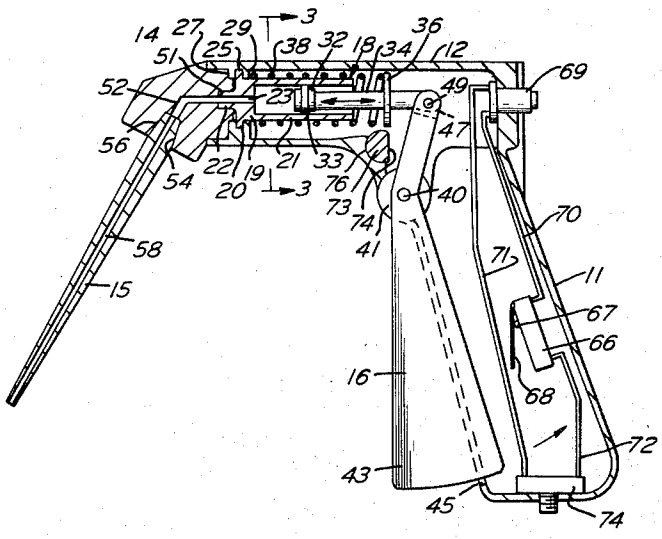
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[57] **ABSTRACT**

A pipette having a piston grip with a downwardly and outwardly directed nozzle to be inserted into a vessel containing the liquid. The pipette includes a trigger-actuated plunger for raising and discharging liquid therefrom.

3 Claims, 3 Drawing Figures



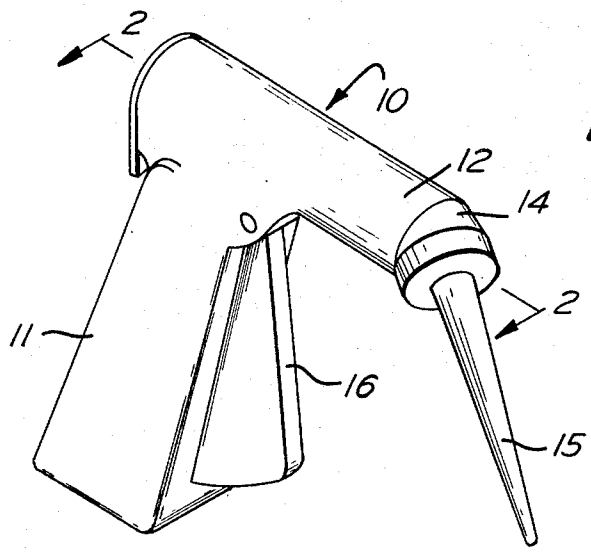


FIG. 1

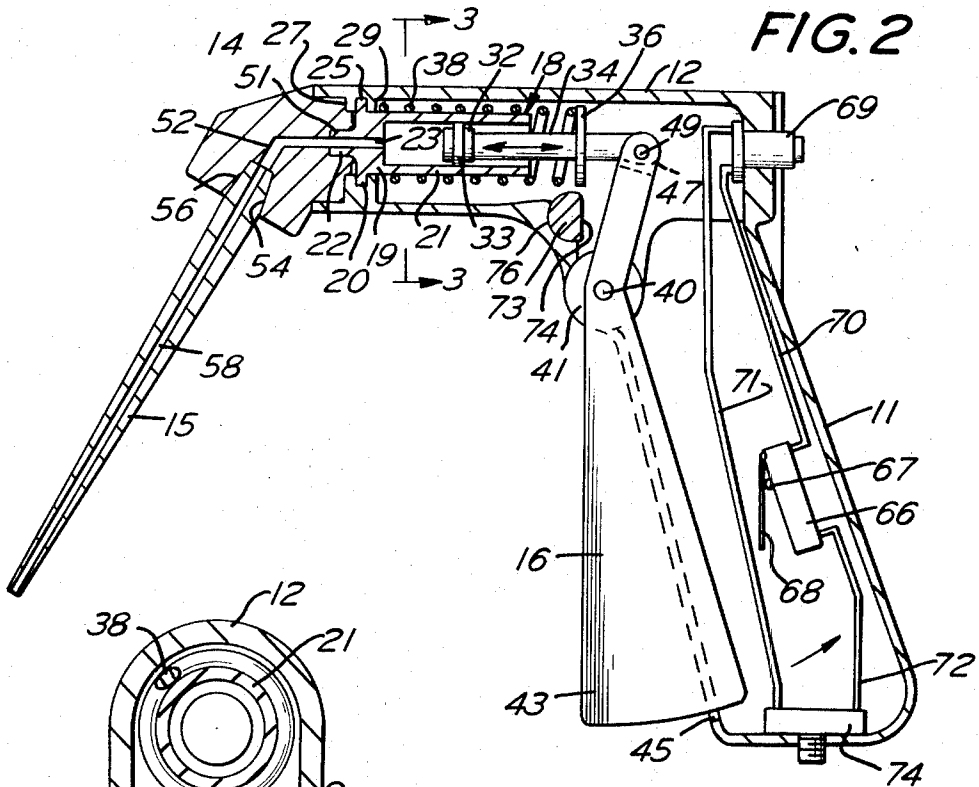


FIG. 2

FIG. 3

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PIPETTE

This invention relates to a pipette and more particularly to a pipette which is in the form of a hand gun.

Pipettes used heretofore have been generally made of straight tubular glass elements which are adapted to be filled by the user sucking on one end in a manner similar to sucking on a straw until a sufficient amount of liquid has been drawn into the pipette. Additionally, rubber bulbs have been utilized for achieving the sucking function when caustic liquids are drawn into the pipette. Both of the devices are awkward in that they require the utilization of both hands of the operator and he cannot readily see the graduations along the pipette to determine when sufficient liquid has been drawn into it. In addition, there is always the danger of drawing the liquid up past the pipette and into the mouth of the operator or into the bulb.

Accordingly, it is an object of this invention to provide a pipette which avoids the dangers and inconveniences associated with prior art devices.

It is another object of this invention to provide a pipette which can be operated with one hand.

It is still another object of this invention to provide a pipette which is in the configuration of a hand gun.

It is a further object of this invention to provide a pipette that can be adjusted to selectively discharge different quantities of liquid.

It is still a further object of this invention to provide a pipette that is operable to complete an electric circuit when it discharges.

Generally, the invention relates to a pipette having a housing, said housing having a grip and a barrel, a fluid holding chamber supported in said barrel, said chamber being hollow and having a wall at one end with an aperture defining a conduit therein and being open at its other end, nozzle means supported by said barrel adjacent said fluid holding chamber, said nozzle means having a second conduit in communication with said conduit in said wall, piston means mounted for axial movement in said chamber for drawing and discharging liquid from said pipette, and actuating means pivotally mounted to said housing, said actuating means being elongated and having one end connected to said piston means so that when said other end is moved, said piston means is moved in said fluid holding chamber.

Other objects and advantages will become apparent from the following detailed description of the invention wherein:

FIG. 1 is a top perspective view of one form of the invention.

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2.

Referring now to the drawings for a detailed description of the invention, the pipette **10** which is shown in FIG. 1 includes a grip **11** which is connected to one end of a hollow elongated barrel **12**. An elbow **14** which may support a downwardly and outwardly directed nozzle **15** at one end is connected to the barrel at its other end. A suitable actuator such as trigger **16** is supported by and is received in the grip as will be explained more completely herein.

In FIG. 2, the interior mechanism of the pipette is shown. A chamber **18** which may be a hollow cylindrical member open at one end and closed at its other end is provided. The chamber comprises an end wall **19** having an outwardly directed flange **20** which supports it on the interior of the barrel as will be more fully explained herein. On one side, end wall **19** supports side wall means **21** which define the chamber. At the other side, end wall **19** supports an outwardly projecting boss **22** having a reduced diameter. The end wall **19** and boss **22** have a conduit **23** therein in communication with the interior of the chamber **18**.

The interior of the barrel has suitable means for engaging and constraining the chamber against axial movement. Preferably such a means includes resting flange **20** in a recess **25** defined by the facing walls of inwardly directed, spaced flanges **27** and **29** on the interior of the barrel.

A pistol which comprises a piston head **32** connected to an elongated pistol rod **34** is slidably received in chamber **18**. The

piston head **32** includes a piston ring **33** for closely engaging wall means **21** on the interior of the chamber. Rod **34** has an enlarged outwardly directed flange **36** at its end remote from piston head **32**. A spring, or other suitable biasing means, is interposed between flange **29** on the interior of the barrel and flange **36** on the piston rod so that the piston is normally biased toward the open end of the chamber.

The free end of piston rod **34** is directed rearwardly of flange **36** so that it can be connected to the trigger **16** in a manner to be explained.

Trigger **16** is pivotally mounted by a pin **14** so that it is in sliding contact with bearing surfaces **41** on the grip. The trigger comprises a lower triangular shaped member **43** which is normally partially received in a suitable opening **45** in the front of the grip. When the trigger is squeezed, member **43** may be completely received in the grip. The upper portion of the trigger comprises a yoke **47** which is connected to the aforementioned free end of rod **34** by a suitable pin **49**.

Elbow **14** which is connected to barrel **12** at its foremost end has a recess **51** therein which is adapted to slidingly receive boss **2**. A conduit **52** in the elbow has one end in alignment with the conduit in boss **22** and has its other end at an angle with respect thereto. If preferred elbow **14** and barrel **12** may be integral. A recess **54**, having downwardly directed and outwardly diverging conical walls, houses a nozzle **58**. The nozzle **58** has upwardly directed converging conical walls **56** at its upper end to be nestingly received in the aforementioned recess **54**. The nozzle has a conduit **58** therein adapted to be in communication with the aforementioned conduit **52**.

While many materials would be suitable for each of the elements described herein, it has been found that preferably the grip **11** and barrel **12** of the pipette should be made of opposed matching halves of suitable plastic material such as acrylonitrile-butadiene-styrene. Having the grip and barrel made of opposed sections simplifies the assembly of the device and substantially reduces its cost.

Additionally, it is preferred that the chamber and the piston be comprised of aluminum. The aforementioned piston ring may be comprised of any suitable inert material.

Operation of the pipette is by squeezing trigger **16** so that it retreats into grip **11** to urge piston head **32** against the force of spring **38** toward wall **19** in the chamber. The nozzle **58** is then inserted into the liquid which is to be drawn into the pipette. When the trigger is released, the action of spring **38** against flange **36** urges the piston rearwardly in the fluid holding chamber and thereby draws the liquid up through conduit **58** in the nozzle, conduit **52** in the elbow, and into the aforementioned chamber. If desired, the nozzle can be graduated so that the amount of liquid held therein can be measured. To discharge the liquid from the pipette, the operator merely squeezes the trigger.

Alternatively, the pipette can be utilized in an environment where contamination of the interior of chamber **18** must be avoided. Such environments occur when the pipette is used to handle different types of liquids and it is not possible to clean the chamber. Avoidance of contamination is achieved by making the volume defined by conduit **58** greater than the volume of chamber **18** when the piston is against its rear wall. Thus, when the trigger is released, the piston is urged rearwardly in the chamber. This causes the air that is in conduit **58** to be moved into the chamber and be replaced by the liquid. Squeezing the trigger will cause the liquid to be discharged. Thus, only the nozzle will become contaminated. As explained above, the nozzle can be easily removed and be replaced by one that is not contaminated.

It should be noted that the trigger is relatively long compared to the portion connecting it to pin **49**. A ratio of approximately 3:1 is preferred since this provides adequate force to overcome the spring and also permits liquid to be discharged from the pipette at a velocity sufficient to cause complete mixing.

Further, the pipette can be modified so that it can be used as part of a measuring and testing apparatus. The pipette handle

may support a microswitch **66** having a contact **67** which is energized when a lever **68** which is pivoted to the switch housing comes into contact with it. As seen in the drawing, the lever is positioned so that when the trigger is squeezed to discharge liquid from the pipette, its rear wall contacts the lever to close the switch. One end of switch **66** is connected in series with a pushbutton switch **69** by a suitable electrical conductor **70**. The other end of the switch and the pushbutton switch **69** are connected by electrical conductors **71** and **72** to a connecting jack **74** which is inserted in the bottom of the grip **11**. The jack permits the microswitch and the pushbutton to be connected to measuring and testing apparatus. Both switches **66** and **69** must be closed in order to complete the circuit thus preventing inadvertent completion of the circuit.

Additionally, if desired, the amount of liquid which is drawn into the pipette can be adjusted to selectively admit or discharge different quantities of liquid, e.g., 0.1 ml. or 0.2 ml. In this regard, a stop member **73** which comprises a short cylindrical member with a straight side **74** is rotatably mounted in the barrel of the pipette adjacent the upper portion of trigger **16**. The stop member can be rotated into and out of the path of the trigger by virtue of external positioning lever member **75**.

As illustrated in FIG. **2**, the stop member is positioned so that it does not obstruct the forward travel of the trigger when it is squeezed prior to the introduction of liquid into the pipette. However, if it were rotated so that the rounded surface **76** faced the trigger, only a limited amount of liquid could be drawn into the pipette. This is because the stroke of the piston head **32** would be limited to just a portion of chamber **18**.

Thus, when the stop is in position and the trigger is squeezed and released only a reduced amount of liquid can enter and be discharged from the pipette.

The present invention may be embodied in other specific forms without departing form the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A pipette comprising a housing, said housing having a grip and a barrel, said barrel including two inwardly directed spaced flanges, a fluid holding chamber, said fluid holding chamber including an outwardly directed flange, said barrel supporting said fluid holding chamber with said outwardly directed flange disposed between said inwardly directed flanges, said chamber being hollow and having a wall at one end with an aperture defining a first conduit therein, said chamber being open at its other end, nozzle means supported by said barrel adjacent said fluid holding chamber, said nozzle means having a second conduit in communication with said first conduit, piston means mounted for axial movement in said chamber for drawing and discharging fluid through at least said second conduit, said grip having an opening therein, actuating means pivotally connected to said piston means, said actuating means comprising an elongated member pivotally connected to said housing intermediate its ends, one end of said member being disposed within said housing and being connected to said piston means, the other end of said actuating member being substantially triangular in configuration and being moveable about said pivotal connection into said grip when said actuating means is operative to discharge liquid from said pipette.

2. A pipette as defined in claim **1** including stop means selectively engageable with said actuating means to limit the movement of said piston means to at least first and second positions so that the volume of liquid in said pipette can be controlled, said stop means comprising a generally cylindrical member supported in said housing for rotation about a horizontal axis, a portion of said cylindrical member being removed to define a flat surface parallel to the axis of said cylinder, and said flat surface and said remaining portion of said cylinder being engageable with said actuating means to define said first and second positions.

3. A pipette as defined in claim **1** including a circuit, a switch supported in said circuit, said switch being operable to complete said circuit, said switch being disposed in said grip adjacent said other end of said actuating means, and said other end of said actuating means is operative to close said switch to complete said circuit when said other end is moved to discharge liquid from said pipette.

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