July 21, 1964 W. M. OATES 3,141,336

PIPETTE

Filed March 8, 1961

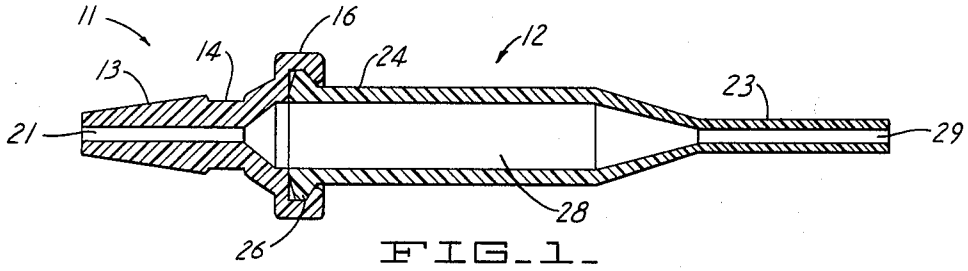



FIG_1_

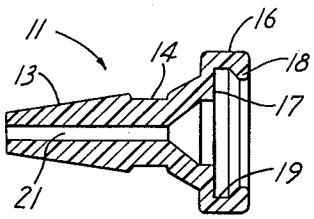



FIG_2_

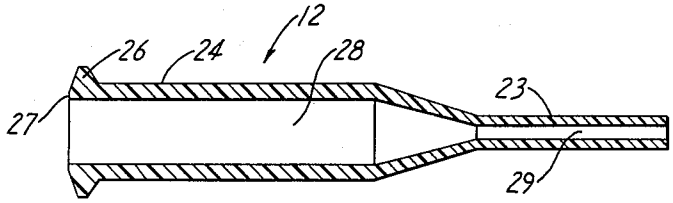



FIG_3_

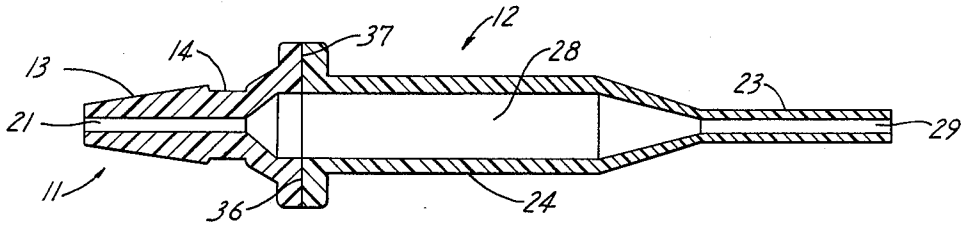



FIG_4_

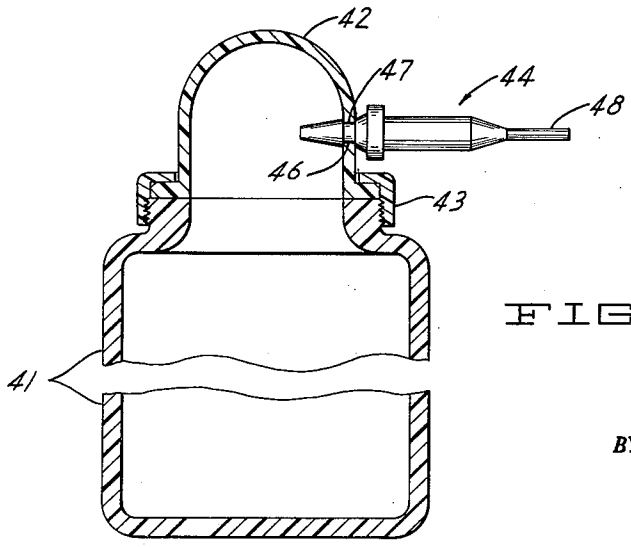



FIG_5_

INVENTOR.
William M. Oates.
BY
Fleht and Swain.
ATTORNEYS.

United States Patent Office 3,141,336 Patented July 21, 1964



3,141,336

# PIPETTE

William M. Oates, San Carlos, Calif., assignor to Beckman Instruments, Inc., a corporation of California

Filed Mar. 8, 1961, Ser. No. 94,381
5 Claims. (Cl. 73—425.4)

This invention relates generally to a pipette and more particularly to a precision pipette.

Pipettes are employed for measuring and dispensing accurate volumes of liquid. One type of pipette includes a body portion which defines the major portion of the volume to be dispensed and end portions which terminate in capillary passages. When appropriately calibrated, pipettes of this type retain an accurate volume of liquid between the meniscuses formed at the capillary ends.

One method of forming pipettes of this type is to warm predetermined regions of a thermoplastic tube and draw the tube down at these regions to form a pipette whose body portion has substantially the diameter of the original tube and whose ends are of reduced diameter. Pipettes manufactured by this method are preferably individually calibrated.

Another method of forming pipettes is to place a tube in an exterior mold and then expand the plastic into the mold. However, the final volume may not be accurate since the thickness of the material forming the walls of the pipette may vary considerably.

It is a general object of the present invention to provide an improved pipette.

It is another object of the present invention to provide a precision pipette which is easy and inexpensive to manufacture.

It is another object of the present invention to provide a pipette which can be molded around a core of predetermined volume.

It is another object of the present invention to provide a pipette which includes two portions which are secured to one another.

These and other objects and features of the invention will be more clearly understood from the following description in conjunction with the accompanying drawing.

Referring to the drawing:

FIGURE 1 shows a pipette in accordance with the present invention;

FIGURE 2 shows the mounting end of the pipette of FIGURE 1;

FIGURE 3 shows the body portion of the pipette of FIGURE 1;

FIGURE 4 shows another pipette in accordance with the invention; and

FIGURE 5 shows a typical application of pipettes in accordance with invention.

Referring to FIGURES 1 and 2, the pipette includes a mounting member **11** and a body **12**. The pipette is preferably made of plastic material, such as polyethylene. The mounting member is tapered **13** for insertion into an accommodating opening. An annular groove **14** provides means for locking the mounting member **11** in the accommodating opening. The enlarged end **16** of the member **11** includes an internal shoulder or face **17** and a lip **18** which define an internal groove **19**. The member **11** includes a small diameter or capillary passage **21**.

Referring to FIGURES 1 and 3 the mounting member **11** is adapted to receive and hold the body portion **12**. The body portion is generally cylindrical and has one end **23** of reduced diameter. The other end **24** includes a rim or flange **26** which is adapted to fit into the annular groove **19** of the mounting member. The face **27** of the



body portion is adapted to abut the shoulder **17** and form a fluid tight seal therewith. The lip **18** serves to hold the parts together and to provide an axial force which maintains the shoulder and face in sealing relationship. The body includes a passage **28** of enlarged diameter throughout the major portion of its length. The end **29** of the passage is of smaller or capillary diameter.

The pipette serves to retain liquid by the capillary faces arising at the capillary passages **21** and **29** at the ends. Relatively large amounts of liquid can be measured, however, since the passage **28** is of enlarged diameter the total amount of liquid retained in a filled pipette is determined in general by the length and diameter of the passage **28**.

The pipette described is relatively easy to manufacture since the two portions can be formed on removable cores of exact volume. This simplifies production since it eliminates having to calibrate each pipette. Production is further simplified since only one size of mounting member **11** is required for a large variety of bodies **12**.

Rather than making a pipette in which the body **12** is removably retained in the mounting member **11** the pipette may be formed with the body **12** permanently sealed to the mounting member **11**. This is illustrated in FIGURE 4 wherein the mounting member **11** includes a face **36** adapted to be sealed to the face **37** of the body **12**. In other respects the mounting member **11** and body **12** are as previously described and bear the same reference numerals.

A pipette of the above type may, for example, be used in an assembly of the type shown in FIGURE 5. The assembly includes a deformable bottle **41** provided with a dome **42** which is held by a cap **43**. This pipette **44** is inserted through the accommodating opening **46** in the dome and retained by the cooperation of the groove **47** and the dome.

In use the bottle is squeezed, the end **48** of the pipette inserted in a liquid and the bottle released until the pipette is filled. Excess liquid flows into the bottle which acts as a reservoir. To dispense the accurate amount of liquid retained in the pipette the bottle is again squeezed.

I claim:

1. A pipette comprising a mounting member formed to include a capillary passage and a relatively enlarged hollow portion, the interior of said capillary passage gradually diverging from one end into said enlarged hollow portion to provide a gradual interior transition therebetween, the exterior of said mounting member being formed with a relatively long conically tapered end region bounded by an annular groove, said annular groove being adapted to lock into an opening in a resilient wall of a dispensing bottle to support the end region cantilevered into the interior of said dispensing bottle, said pipette further comprising a body member formed to include a capillary passage and a relatively enlarged hollow portion, the interior of said body member gradually diverging from the inner end of the last said capillary passage into the last said enlarged portion to provide a gradual interior region of enlargement therebetween, said body member being connected to said mounting member with the interior surfaces of both said enlarged portions dimensioned and aligned to provide a smooth juncture therebetween.

2. A pipette as in claim 1 wherein said body is permanently secured to the mounting member.

3. A pipette as in claim 1 which is made of polyethylene.

4. A pipette comprising a mounting member formed to include a capillary passage and a relatively enlarged hollow portion, the interior of said capillary passage gradually diverging from one end into said enlarged

hollow portion to provide a gradual interior transition therebetween, said pipette further comprising a body member formed to include a capillary passage and a relatively enlarged hollow portion, the interior of said body member gradually diverging from the inner end of the last said capillary passage into the last said enlarged portion to provide a gradual interior enlargement therebetween, said body member being removably secured to said mounting member with the interior surfaces of both said enlarged portions dimensioned and aligned to provide a smooth juncture therebetween.

5. A pipette as in claim 4 which is made of polyethylene.



**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,204,125 | Brosnan | Nov. 7, 1916 |
| 2,376,231 | Cohn | May 15, 1945 |
| 2,667,074 | Whitehill et al. | Jan. 26, 1954 |
| 2,702,125 | Willinger et al. | Feb. 15, 1955 |
| 2,974,528 | Sanz | Mar. 14, 1961 |

OTHER REFERENCES

Kirk Quantitative Ultra Micro Analysis, John Wiley & Sons, Inc., New York 1950 (pages 24 and 25).