Nov. 16, 1965 E. A. WEAVER 3,217,891

PIPETTE DRAINER

Filed May 14, 1962 3 Sheets-Sheet 1

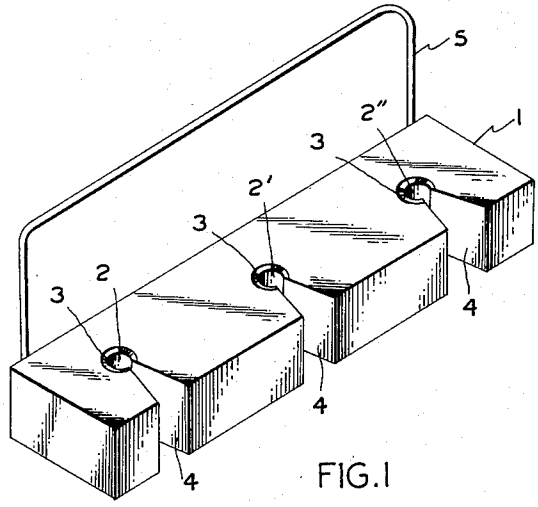


FIG. 1

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PIPETTE DRAINER

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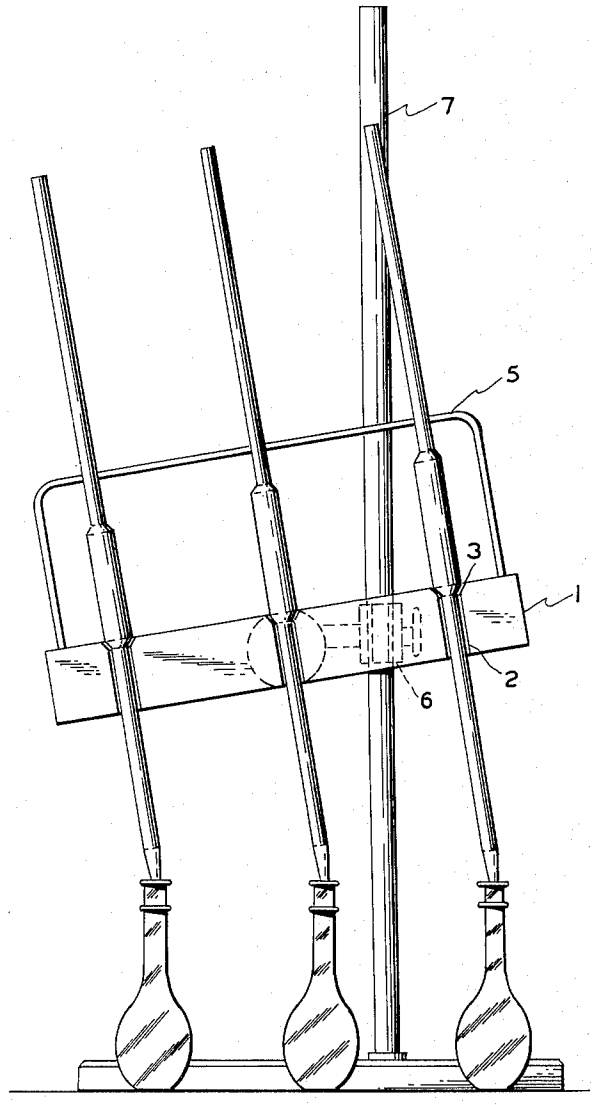


FIG.2

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PIPETTE DRAINER

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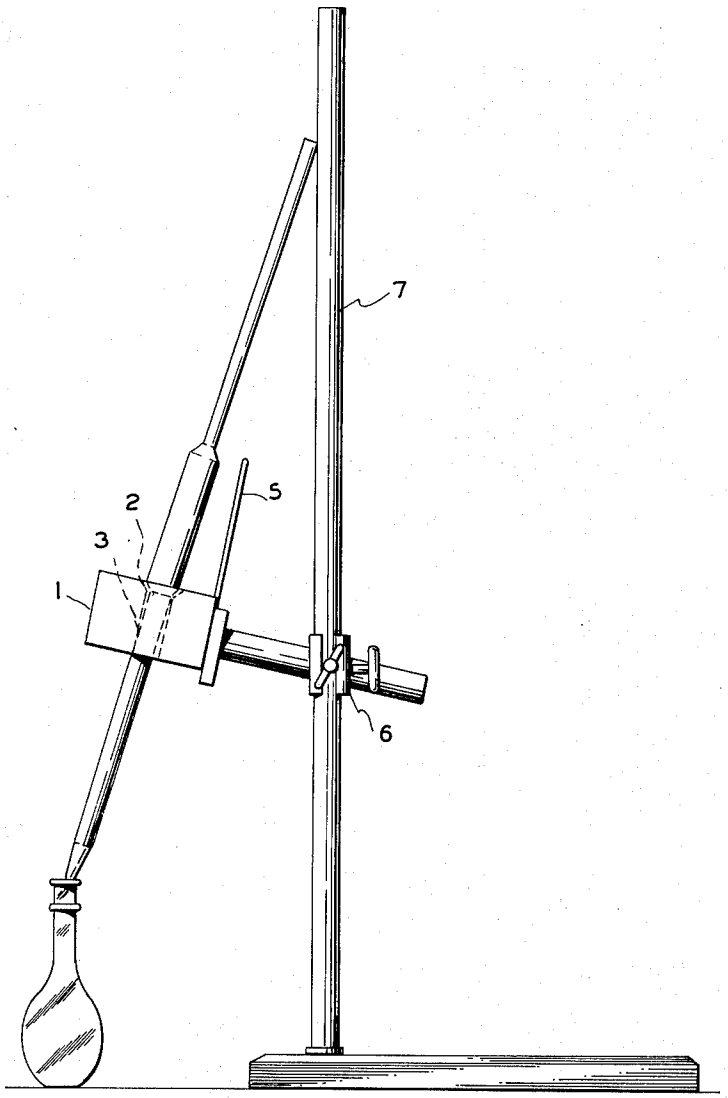


FIG. 3

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United States Patent Office

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PIPETTE DRAINER

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1 Claim. (Cl. 211—60)
(Granted under Title 35, U.S. Code (1952), sec. 266)

A nonexclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to laboratory apparatus, and particularly relates to apparatus for supporting pipettes in a draining position.

Many analytical procedures require the use of large numbers of quantitative transfer pipettes. Highly accurate pipettes, especially large volume transfer pipettes, require a long time to empty completely. An object of the present invention is to relieve the operator from the task of holding the pipette while it is emptying.

Among the factors determining volume delivered from a pipette are contact of the pipette tip with the inner wall of the receiving vessel and the angle at which the pipette is held during delivery. Another object of the present invention is to provide more accurate control of exactly reproducible conditions of operation, a highly desirable goal in analytical work.

It is survey procedures aliquots of unknowns are run at dilutions above and below the suspected value, employing series of aliquots of the sample, such as 1 ml., 2 ml., and 5 ml.; 2 ml., 5 ml., and 10 ml.; or 5 ml., 10 ml. and 15 ml. Still a further object of the present invention is to make it possible for the operator to have one or more pipettes draining simultaneously while preparing aliquots in other pipettes.

The above and other objects, advantages and features of the present invention will become more apparent from the following description taken in conjunction with the accompanying drawing wherein

FIG. 1 is a perspective diagrammatic view of the pipette drainer,

FIG. 2 is a front view of the apparatus illustrating longitudinal tilting, and

FIG. 3 is an end view of the apparatus, illustrating transverse tilting.

The pipette drainer comprises a bearing member **1** containing a plurality of holes **2** originating in a counter-sunk depression **3** in a generally upper surface of the member and extending through the surface in apposition to the origin, the diameter and depth of each of said holes being sufficient to align a pipette in a direction approximately perpendicular to the long axis of said bearing member. Also included is access slot **4** extending in a generally perpendicular direction from the axis of the hole to a generally front surface, the width of the slot at the hole being less, preferably about one-sixteenth inch smaller, than the diameter of the hole and increasing progressively with distance from the hole to form a tapered, easily accessible entrance to the hole, an adjustably supporting means or backstop **5** for the upper stem of a pipette, integrally proceeding from the bearing member **1** to a position in the rear of the hole **2** and at a height above the upper surface sufficient to contact the upper stem of a volumetric pipette, and means **6** for adjustably positioning **1** on support **7** to provide the desired height and angle of inclination of the pipette.

The apparatus shown in FIGS. 1 to 3 is presented to demonstrate a particular embodiment of the present invention and is not intended to be in limitation thereof. The apparatus is further exemplified as follows:

Example 1

Three holes, 5/16 inch, 3/8 inch, and 7/16 inch, respectively, were drilled across the shortest distance of a wooden block 10 inches long, 2½ inches wide, and 1½ inches deep. The holes were centrally located in regard to the width and, beginning at 1½ inches from one end, were spaced equi-distance from each other (3½ inches on center). The holes were counter-sunk about ⅛ inch to provide a tapered lip which was ¼ inch larger in diameter at the surface than the size of the hole. A slot, ¾ inch wide at the edge of the block and narrowing to 1/16 inch less than the diameter of the hole, was cut to provide an entrance to each hole for the lower stem of a pipette. About ¼ inch in each direction from the corners of the block in the opposite direction from the holes than the entrance slots a 1/16 inch hole was drilled to a depth of about ¾ inch. A 1/16 inch diameter stiff wire about 18 inches long was inserted in the holes and bent to form three sides of an approximately rectangular shaped opening about 3½ inches high and with the top (forming the backstop for the pipettes) parallel with the long axis of the block. An aluminum alloy foot was attached centrally on the rear edge of the block. A short section of aluminum alloy rod was secured in the foot and the other end of the rod adjustably secured in a fitting on a rod stand.

Pipettes are securely held in position by the pipette drainer through a combination of a counter-sunk hole, depth of hole, and the stiff aerial wire support extending above and behind the pipette holes. This design combination makes it possible to have complete freedom of movement of the pipette while at the same time maintaining effective stability for the drainage time required.

Referring to the example, the 5/16 inch hole (**2** in FIG. 1) is satisfactory for holding 1, 2, and 5 ml. volumetric pipettes, the ⅜ inch hole (**2'** in FIG. 1) for 5, 10 and 15 ml. pipettes, and the 7/16 inch hole (**2''** in FIG. 1) for 10, 15, 20, 25, 50 and 100 ml. pipettes. In dilution work, as when using a 5, a 10, and a 15 or 20 ml. pipette, the draining ends of the different size pipettes can be adjusted to approximately the same horizontal level by tilting the block as in FIG. 2 so that the largest hole is farthest above horizontal, and the pipettes will be tilted at a good angle for contacting the inner surface of the receiving vessel, thereby promoting good drainage of the pipettes.

For work requiring use of many pipettes of the same size the apparatus is constructed with a plurality of holes of the same size. Since the pipettes stems will be of the same length, the proper drainage angle will be provided by adjustment of the backstop and/or by tilting the block on its width axis as in FIG. 3. Such a pipette drainer could be of circular design with a backstop of adjustably smaller diameter than the diameter at the holes, a circular platform of larger diameter for holding vessels, with means for adjusting the height of the drainer from the platform and means for revolving the whole unit on a central support.

When pipettes of radically different size are being used at the same time, two or more of the drainers may be arranged in series, overlapping or end to end, to bring the tips to the same level. As another means of adapting for this purpose, the pipette drainer can be made so that each pipette hole assembly is individually movable, as by attaching a vertical track on either or both sides of an individual hole assembly, with means for securing the assemblies in the desired relationship to each other.

Instead of a wooden block, the bearing member **1** may be made of other material such as metal or plastic. A light weight material is preferred. The bearing member may be cast instead of shaped, and may have rounded

edges or be elliptical as long as the central area where the holes are situated has sufficient depth, preferably about 1½ inch, to prevent appreciable sideways movement along the backstop. The size of the hole **2** will depend upon the size of pipette for which the drainer is designed, a range of about from 5/16 to 7/16 inch being satisfactory for 1 ml. to 100 ml. volumetric pipettes. The slot **4** may be tapered from the hole to the edge of the bearing member or may have a short straight channel beginning at the hole, then increasing in width as the slot proceeds from the straight channel to the edge of the bearing member. The counter-sunk area **3** receives the lower end of the bulb of the pipette and prevents the pipette from slipping out of the hole. The bearing surface of the counter-sunk area is enhanced by making the slot slightly less in width, preferably about 1/16 inch, than the diameter of the hole. The angle of slope and the diameter of the counter-sunk area may be varied considerably and still function for the intended purpose.

A stiff wire is a convenient means of providing an adjustable backstop for the upper stem of the pipette. The wire may be bent forward or backward. By drilling holes through the bearing member and by providing longer ends on the wire, the height of the wire may be adjusted by regulating the position of the wire in the holes. Better leverage on the pipette is obtained with increase in distance above the surface but a height of about 3½ inches was found satisfactory for general use and a shorter height may suffice in many instances. Other adjustable means of support may be substituted for the wire.

Various types of clamps and swivel supports may be used for adjustably mounting the pipette drainer on a support such as a rod stand, pipe frame, grid-work or rods, or a solid frame.

A desirable feature in the design of this apparatus is the durability of construction materials. Nondurable materials such as springs, clips, sponge pressure parts and the like, all of which are subject to fatigue and thus short-lived have been avoided in this apparatus.

Pipettes are easily placed on and removed from the pipette drainer, minimizing the possibility of breaking the pipette or of volume loss through spillage from a loaded pipette. Accuracy of results is favored by the reproducible conditions of draining a pipette or series of pipettes.

I claim:

A pipette drainer comprising an elongated bearing member, a plurality of holes in said member distributed along the long axis thereof, each hole extending from a counter-sunk depression in a generally upper surface of said member through the surface in apposition to said upper surface, the diameter and depth of said hole being sufficient to align a pipette in a direction approximately perpendicular to the long axis of said bearing member, an access slot to each hole, the width of the slot at the hole being less than the diameter of the hole and the width of the slot increasing with distance in a direction generally perpendicular to the axis of the hole to a generally front surface, thereby providing a tapered entrance to the hole, adjustable supporting means for the upper stem of a pipette integrally proceeding from the bearing member to a position to the rear of the hole and at a height above the upper surface sufficient to contact the upper stem of the pipette, and means for adjustably positioning the bearing member on a support to provide the desired height and angle of inclination of the pipette.

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