

Dec. 19, 1961

J. J. RODRIGUES, JR

3,013,435

BURET

Filed April 6, 1959

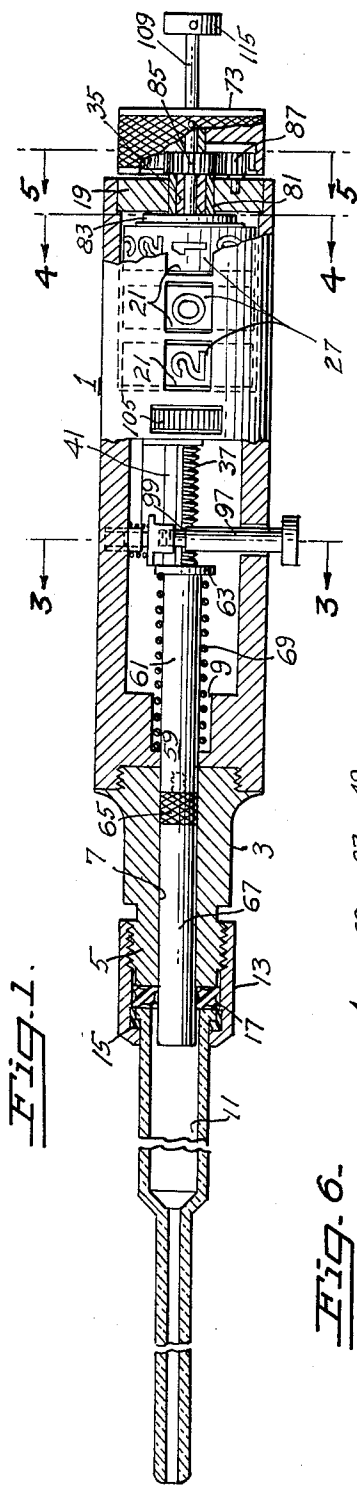


Fig. 6.

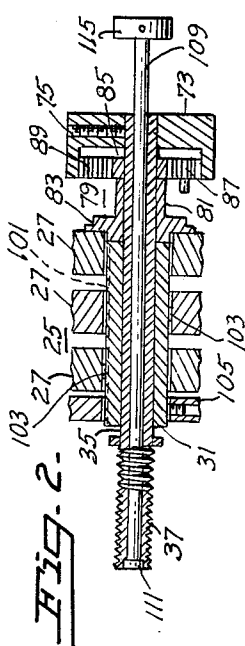
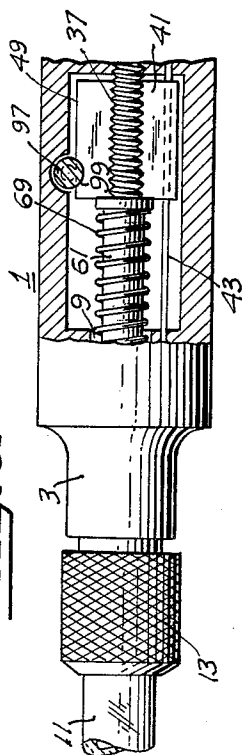


Fig. 5.

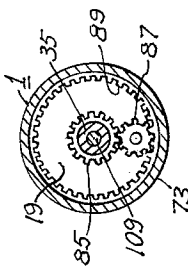


Fig. 4.

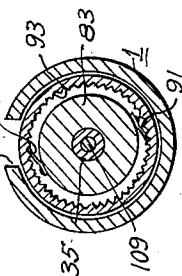
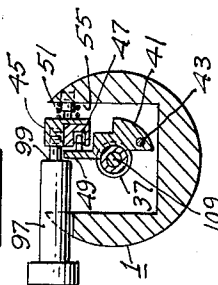


Fig. 3.



INVENTOR.

JOHN J. RODRIGUES, JR.

BY

Bruce & Brosler

HIS ATTORNEYS.

1

3,013,435
BURET

John J. Rodrigues, Jr., Berkeley, Calif., assignor to Microchemical Specialties Co., Berkeley, Calif., a corporation of California

Filed Apr. 6, 1959, Ser. No. 804,312
5 Claims. (Cl. 73-425.6)

My invention relates to laboratory equipment and more particularly to devices such as burets and pipets.

Among the objects of my invention are:

- (1) To provide a novel and improved buret;
- (2) To provide a novel and improved buret for precision dispensing of minute amounts of a liquid;
- (3) To provide a novel and improved buret of the precision type which is compact and readily adjustable for the dispensing of very minute quantities of liquid with accuracy and precision;
- (4) To provide a novel and improved buret adjustable with precision and quickly resettable to a starting position;
- (5) To provide a novel and improved buret capable of use in pipetting.

Additional objects of my invention will be brought out in the following description of a preferred form of my invention taken in conjunction with the accompanying drawings wherein;

FIG. 1 is a longitudinal view in section through a device involving the present invention;

FIG. 2 is a fragmentary view depicting important shaft relationships involved in the device of FIG. 1;

FIG. 3 is a view in section taken in the plane 3-3 of FIG. 1;

FIG. 4 is a view in section taken in the plane 4-4 of FIG. 1;

FIG. 5 is a view in section taken in the plane 5-5 of FIG. 1; and

FIG. 6 is a fragmentary view partly in section through the device of FIG. 1.

Referring to the drawings for details of my invention in its preferred form, the device comprises a substantially cylindrical casing 1 including an end extension 3 having a threaded tip 5 and provided with a passageway 7 there-through to the interior of the casing at which point, the interior wall of the casing is provided with a counter-bore 9.

Removably secured to the threaded tip end of this casing, is a liquid cylinder 11, the attaching end of which is preferably flanged for securing by a coupling nut 13 with a sealing washer 15 between the flange of the cylinder and the proximate end of the coupling nut, and a sealing ring 17 between the end of the cylinder and the threaded tip of the casing extension 3.

Adjacent its opposite end, the casing is provided with a closure 19 while adjacent thereto are window openings 21. Within this end of the casing is a counter 25 including a plurality of numbers wheels 27 rotatably mounted on a hollow shaft 31, this counter being disposed in the casing with the hollow shaft substantially concentric with the longitudinal axis of the casing 1 and with the numbers wheels exposed through the window openings.

Passing through the hollow shaft of the counter and extending therebeyond at each end, is a second hollow shaft 35, that end 37 facing toward the cylinder 11, being provided with a fine thread for engagement by a fractional nut 41.

This fractional nut is pivotally mounted on a rod 43 of small diameter anchored at its ends to fixed points within the casing and permitting the fractional nut to slidably travel therealong in response to rotation of the second shaft 35 while the nut is held in engagement with the threaded end 37 of this shaft. Such threaded engagement between the fractional nut and the threaded

2

shaft is normally maintained by a pressure block 45 including a supported roller 47 urged against a flange 49 along the upper edge of the nut by a compression spring 51 interposed between the block and an internal wall surface 55 of the casing.

Within the passageway 7 communicating between the cylinder 11 and the interior of the casing, is a plunger assembly 59 preferably including a section 61 of metal within the casing, having at one end a spring retainer flange 63 and at its other end being provided with a threaded recess to threadedly secure a holding socket 65 for a glass rod or the like section 67 of the plunger assembly. This latter section is precision ground and snugly passes through the sealing ring 17 into the cylinder.

A compression spring 69 about the metal portion 61 of the plunger assembly and having one end disposed within the counterbore 9 and the other end bearing against the flange 63, serves to normally urge the plunger assembly into maintained engagement with the proximate end of the fractional nut. The overall length of the plunger assembly is such as to cause the glass portion 67 to move a substantial distance into the cylinder 11 within the travel range of the fractional nut.

Such travel of the fractional nut is accomplished from the remote end of the second shaft 35. The means for accomplishing this includes a drive cap 73 affixed to the exposed end of the second shaft by means of the set screw 75. For each complete rotation of the drive cap, the fractional nut will move a distance equal to the pitch of the thread on the threaded end 37 of the shaft and move the plunger assembly 59 forward into the cylinder a comparable minute distance.

To record such distances on the counter 25, requires a drive coupling 79 between the drive cap 73 and the counter, such drive coupling including a sleeve 81 about the extended end of the second shaft 35, terminating at one end adjacent the first numbers wheel, in a flange 83, and at its other end, having affixed thereto, a pinion 85 within the drive cap.

This pinion meshes with an idler pinion 87 carried by the closure 19 of the casing, and this idler, in turn, is engaged by an internal peripheral gear 89 within the drive cap.

The flange 83 carries a pair of angularly disposed leaf springs or pawls 91 and adapted to engage ratched teeth 93 provided within the periphery of the first numbers wheel to form a drive clutch whereby rotation of the drive cap 73 in the direction of producing travel of the plunger assembly into the cylinder, will at the same time bring about rotation of the numbers wheels on the counter to accurately record such forward movement, when a proper ratio exists in the drive coupling 79 between the drive cap and the counter. Reverse rotation of the numbers wheels, as when resetting the counter, will cause the clutch to slip and not transmit motion back to the drive cap.

To restore the plunger assembly to its initial starting position when desired, all that is necessary is to lift the fractional nut 41 from its engagement with the threaded end 37 of the second shaft, whereupon both the plunger assembly 59 and the nut 41 will be restored to their initial starting position by the compression spring 69.

This can be effected very simply and conveniently by providing a push pin 97 which enters the casing through the wall thereof and terminates in a reduced threaded end for threaded engagement with the spring pressed block 51 while the shoulder 99 formed by the reduced end, engages the flange 49 along the upper edge of the fractional nut. Thus by pressing in on this push pin, the fractional nut may be lifted from its threaded engagement with the shaft, the engagement between the shoulder and the flange permitting the nut to slide along its

pivot rod mounting 43 in response to the pressure of the spring 69.

Resetting of the counter to conform with such restoration of the plunger assembly to its starting position, can be effected by providing the hollow shaft 31 with a longitudinal slot 101 adapted during reverse rotation of the numbers wheels 27, to receive a pawl 103 associated with each wheel, which upon continued reverse rotation of the shaft, will restore its associated number wheel to starting zero position.

The shaft carries a thumb wheel 105 which is exposed through slot in the casing to enable a user to accomplish such resetting of the counter. During such resetting operation the slip clutch constituting part of the drive coupling between the counter and the drive cap 73 will effect a disconnection between the two.

By initially providing the counter 25 with a hollow shaft 31 to concentrically receive the second hollow shaft 35, a rod 109 can be run down through the second hollow shaft to effect direct contact with the plunger assembly at its contacting end, the rod preferably being provided with a flange 111 to seat within a counterbore at the threaded end of the second hollow shaft to prevent withdrawal thereof, while at its exposed end, this rod will be provided with a knob 115 or the like.

The installation of this rod permits of direct actuation of the plunger assembly in drawing liquid up into the cylinder for subsequent buretting purposes, but what is of added importance to the present device, the rod further permits of the use of the device in pipetting, that is in the complete discharge of the cylinder contents with one stroke of the plunger assembly.

In employing the device for buretting, the plunger assembly is restored to its innermost or starting position with the counter set at zero reading on all the numbers wheels. The maximum quantity of liquid is then drawn into the cylinder by forcing the plunger assembly forward to the extent provided for by the push rod, then the cylinder tip is immersed in a liquid and the push rod withdrawn permitting the plunger assembly to restore itself to its initial position. Then by rotating the drive knob and watching the numbers wheels on the counter, predetermined minute amounts of the liquid may be dispensed from the cylinder as desired.

When employing the device for pipetting purposes, a precise quantity of liquid is to be drawn into the cylinder and then discharged all at once. Such precise quantity is measured by preliminary adjustment of the plunger assembly through manipulation of the counter. Knowing the maximum capacity of the device, the counter may be adjusted to subtract the necessary amount to thereby reduce the capacity of the cylinder by that same amount. When so adjusted, the device will accurately withdraw the desired quantity of liquid into the cylinder and discharge the same, through the simple operation of manipulating the push rod.

From the foregoing description of my invention in its preferred form, it will be apparent that the same fulfills all the objects attributed thereto, and while I have illustrated and described my invention in its preferred form and in considerable detail, it will be apparent that the same is subject to alteration and modification without departing from the underlying principles involved, and I accordingly do not desire to be limited in my protection to such details except as may be necessitated by the appended claims.

I claim:

1. A buret assembly comprising a substantially cylindrical casing having a liquid cylinder at one end with a passageway connection therefrom into said casing; a counter including a plurality of numbers wheels rotatably mounted on a hollow shaft, said counter being disposed in said casing with said hollow shaft substantially concentric with the longitudinal axis of said casing and with said numbers wheels exposed therethrough; a second

shaft concentrically passing through said first shaft beyond both ends thereof, a plunger assembly in said passageway including means normally urging said plunger assembly toward the proximate end of said second shaft, a disconnectible drive between said second shaft and said plunger assembly, and means for actuating said counter in accordance with drive movement of said second shaft.

2. A buret assembly comprising a substantially cylindrical casing having a liquid cylinder at one end with a passageway connection therefrom into said casing; a counter including a plurality of numbers wheels rotatably mounted on a hollow shaft, said counter being disposed in said casing with said hollow shaft substantially concentric with the longitudinal axis of said casing and with said numbers wheels exposed therethrough; a second shaft concentrically passing through said first shaft beyond both ends thereof and having that end facing said liquid cylinder, externally threaded; a fractional nut; pivot means slidably supporting said fractional nut in said casing in position for threadedly engaging the threaded end of said second shaft; means normally urging said fractional nut into engagement with said threaded shaft end whereby upon rotation of said second shaft, said fractional nut will be driven along said pivot means; a plunger assembly in said passageway including means normally urging said plunger assembly into engagement with the proximate end of said fractional nut, said plunger assembly being of a length to move a substantial distance into said cylinder with travel of said fractional nut on said pivot means in response to rotation of said second shaft; means for manually rotating said second shaft; means drive coupling said counter to said shaft rotating means to record on said counter, movements of said plunger assembly; flange and said first numbers wheel; and means for restoring said plunger assembly and said fractional nut to their initial starting position.

3. A buret assembly comprising a substantially cylindrical casing having a liquid cylinder at one end with a passageway connection therefrom into said casing; a counter including a plurality of numbers wheels rotatably mounted on a hollow shaft, said counter being disposed in said casing with said hollow shaft substantially concentric with the longitudinal axis of said casing and with said numbers wheels exposed therethrough; a second hollow shaft concentrically passing through said first hollow shaft beyond both ends thereof and having that end facing said liquid cylinder, externally threaded; a fractional nut; pivot means slidably supporting said fractional nut in said casing in position for threadedly engaging the threaded end of said second hollow shaft; spring means normally urging said fractional nut into engagement with said threaded shaft end whereby upon rotation of said second hollow shaft, said fractional nut will be driven along said pivot means; a plunger assembly in said passageway including spring means normally urging said plunger assembly into engagement with the proximate end of said fractional nut, said plunger assembly being of a length to move a substantial distance into said cylinder with travel of said fractional nut on said pivot means in response to rotation of said hollow shaft; means for manually rotating said second hollow shaft from its other end; means drive coupling said counter to said shaft rotating means to record on said counter, movements of said plunger assembly; flange and said first numbers wheel; means for restoring said plunger assembly and said fractional nut to their initial starting position, said means including a push pin passing into said casing through the wall thereof and adapted under application of pressure thereto, to lift said fractional nut out of threaded engagement with the threaded end of said second hollow shaft; and means for resetting said counter following restoration of said plunger assembly.

4. A buret assembly comprising a substantially cylindrical casing having a liquid cylinder at one end with a

5

passageway connection therefrom into said casing, and window openings adjacent its other end; a counter including a plurality of numbers wheels rotatably mounted on a hollow shaft, said counter being disposed in said casing with said hollow shaft substantially concentric with the longitudinal axis of said casing and with said numbers wheels exposed through said window openings; a second hollow shaft concentrically passing through said first hollow shaft beyond both ends thereof and having that end facing said liquid cylinder, externally threaded; a fractional nut; pivot means slidably supporting said fractional nut in said casing in position for threadedly engaging the threaded end of said second hollow shaft; means normally urging said fractional nut into engagement with said threaded shaft end whereby upon rotation of said second hollow shaft, said fractional nut will be driven along said pivot means; a plunger assembly in said passageway including spring means normally urging said plunger assembly into engagement with the proximate end of said fractional nut, said plunger assembly being of a length to move a substantial distance into said cylinder with travel of said fractional nut on said pivot means in response to rotation of said second hollow shaft; means for manually rotating said second hollow shaft; means drive coupling said counter to said shaft rotating means to record on said counter, movements of said plunger assembly; means for restoring said plunger assembly and said fractional nut to their initial starting position, said means including a push pin passing into said casing through the wall thereof and adapted under

6

application of pressure thereto, to lift said fractional nut out of threaded engagement with the threaded end of said second hollow shaft; and means for resetting said counter following restoration of said plunger assembly.

5. A buret assembly comprising a substantially cylindrical casing having a liquid cylinder at one end with a passageway connection therefrom into said casing; a counter including a plurality of numbers wheels rotatably mounted on a hollow shaft, said counter being disposed in said casing with said hollow shaft substantially concentric with the longitudinal axis of said casing and with said numbers wheels exposed therethrough; a second hollow shaft concentrically passing through said first shaft beyond both ends thereof, a plunger assembly in said passageway including means normally urging said plunger assembly toward the proximate end of said second shaft, a disconnectible drive between said shaft and said plunger assembly, means for actuating said counter in accordance with drive movement of said second shaft, and a push rod extending down through said second hollow shaft into contact with said plunger assembly.

References Cited in the file of this patent

UNITED STATES PATENTS

996,128	Payne et al. -----	June 27, 1911
2,660,342	Ruf -----	Nov. 24, 1953

FOREIGN PATENTS

334,828	Switzerland -----	Jan. 31, 1959
---------	-------------------	---------------