

S. D. BEARD.
AUTOMATIC BURETTE.
APPLICATION FILED FEB. 3, 1909.

939,382.

Patented Nov. 9, 1909.

Fig. 1.

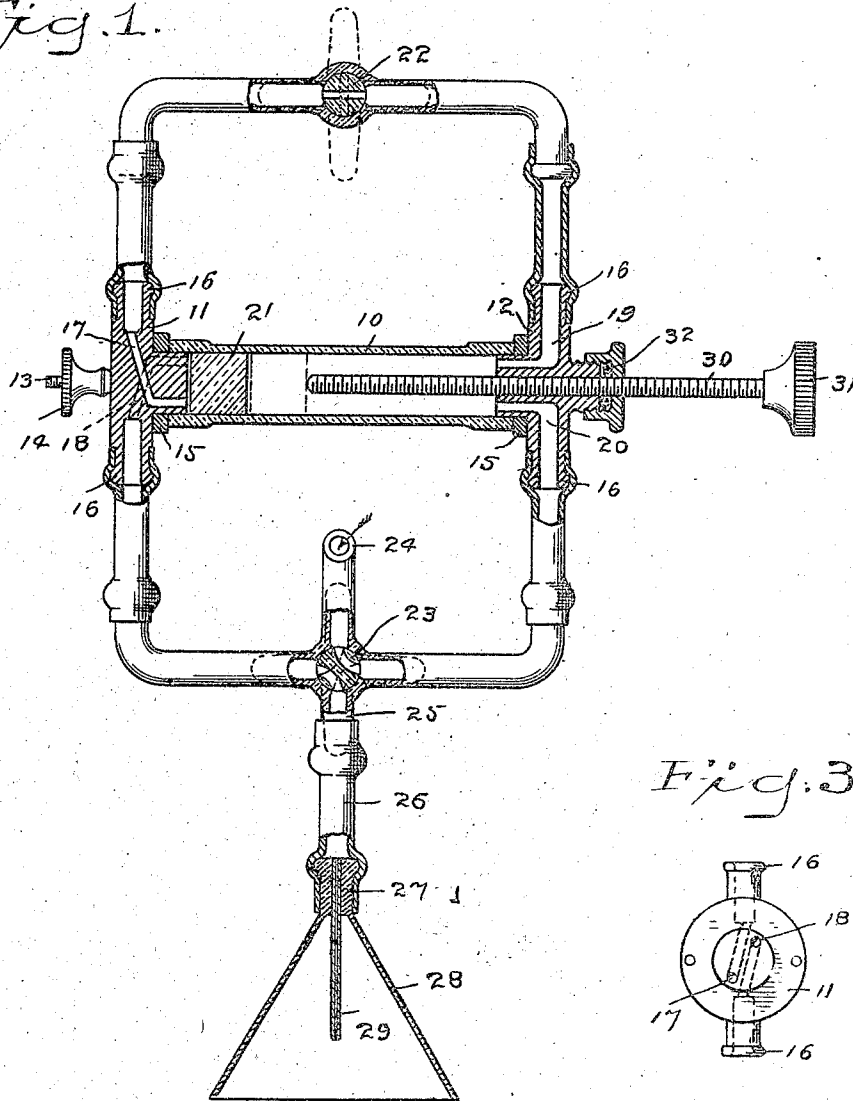


Fig. 3.

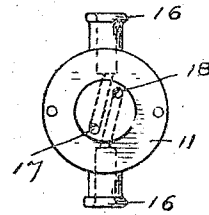
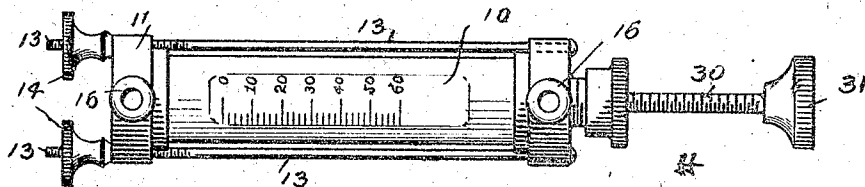


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

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AUTOMATIC BURETTE.

939,382.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed February 3, 1909. Serial No. 475,849.

To all whom it may concern:

Be it known that I, STANLEY D. BEARD, a citizen of the United States, residing at Shelton, county of Fairfield, State of Connecticut, have invented a new and useful Automatic Burette, of which the following is a specification.

The ordinary burette provides for supplying accurately a predetermined quantity of fluid, but has no means for enabling it to be kept in a condition for continuous repeated use; that is, it must be filled and then emptied.

The object of this invention is to provide a device or apparatus which will repeatedly deliver, with precision, any required volume of a liquid, without possibility of there being any variation between different charges.

A further object of the invention is to provide a device of this character which may be utilized in connection with aseptic fluids for such purposes as filling or charging hypodermic syringes.

To these ends the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:—Figure 1 is a side elevation, partly in section of a device or apparatus embodying the invention. Fig. 2 is a plan view of the same, with the upper connections between the two heads removed. Fig. 3 is a detail elevation of the left hand head shown in Fig. 1, looking from the inside.

Similar reference characters indicate the same or similar parts in all of the views.

The barrel 10 of the device, preferably of glass and graduated in any suitable manner and degree, is provided with two heads 11 and 12 which may be of any suitable metal that will not be affected by the character of the fluid being passed through the same. These heads may be connected tightly to the ends of the barrel by any suitable means. I have illustrated clamping rods 13 passed through the heads and provided with nuts 14 as the means for holding the heads and barrel together, said heads having hub portions which slightly enter the ends of the barrel, gaskets 15 being employed at the ends of the barrel to make fluid tight joints.

Each head is formed with oppositely projecting nipples 16 said nipples being tubular and connecting by ports with the interior of the barrel. The ports of the head 11 pref-

erably cross each other so that the port 17 from the upper nipple will lead to the lower portion of the hub which enters the barrel, while the port 18 connects the upper portion of the barrel with the lower nipple. The upper and lower ports of the head 12 are indicated respectively at 19 and 20.

A plunger 21 closely fits the interior of the barrel but not so tightly as to prevent it from being shifted along the barrel in the manner of a piston. This plunger may be of any suitable or preferred material, the essential feature being that it is actuated lengthwise of the barrel solely by the pressure of the fluid which, in use, shifts it first in one direction and then in the other, and that it shall so fit the barrel as to force the liquid ahead of it through one head under the pressure of fluid entering the barrel through the other head.

The upper nipples of the two heads are connected by a conduit having a stop cock 22 both the plug and casing of which are preferably of glass, and the lower nipples of the two heads have suitable pipe connections with a four-way cock 23. The finger pieces or handles of the stop cock and four-way cock are indicated only by dotted lines because when the plug members are in the positions shown by the full lines, the said handles or finger pieces are in line with the fluid conducting branches.

The branch of the casing of the four-way cock 23, through which fluid is to be supplied to and through the apparatus, is indicated at 24, and the outlet branch through which fluid is delivered from the apparatus is indicated at 25. This branch 25 is shown as connected by a short pipe section 26 to the hub 27 of a hood 28 centrally arranged in which is a small nozzle 29. This latter feature of the construction is to enable the apparatus to be conveniently used for filling or charging a hypodermic syringe the barrel of which may be simply pushed up under the hood 28 with the nozzle 29 entering the barrel of the syringe.

Projecting through the head 12 and entering the barrel 10 is a screw 30 having a milled head 31, a gland 32 being employed to prevent the escape of fluid around the screw 30. Said screw is for the purpose of limiting the movement of the plunger 21 toward the head 12. By adjusting said screw 30 in or out according to the scale on the barrel 10, the charge of fluid supplied through the

device may be determined with precision in a manner that will presently be understood.

In use, connection is made between the supply branch 24 with any suitable reservoir or receiver holding the fluid under a pressure of say two or three pounds to the square inch, the pipe which conducts the fluid to the branch 24 leading from a point, of course, below the level of the fluid in such reservoir or receiver, when such fluid is a liquid. With the parts in the position shown by full line in Fig. 1, the fluid will flow through the supply branch 24 and through one of the ports of the four-way cock 23 and through the pipe connections into the barrel 10 and from there through the upper conduit including the stop cock 22, the fluid being allowed to run until it begins to appear at the nozzle 29. This is simply to fill all parts of the apparatus. It will be understood that during this filling operation the plunger 21 will not shift because pressure is equal on both sides. As soon however as the apparatus is filled, the stop cock is closed by turning it to the dotted line position. Since pressure continues against the right hand end of the plunger 21 and since there is nothing to prevent the escape of fluid through the port 18, the plunger will be moved over close to the head 11 if it is not already there. Now upon turning the four-way cock 23 to the dotted line position, the pressure from the supply branch 24 will be turned through the connections to the head 11 so that the fluid entering the barrel at the left of the plunger 21 will force said plunger to the right as far as it is permitted to go by the adjustable stop screw 30. Since the stop cock 22 is still closed, and since the way is open from the head 12 to the delivery branch 25, the described travel of the plunger 21 expels a volume of fluid through the nozzle 29 equal to the volume of the space traveled by the plunger or piston. Of course by setting the stop screw differently, the volume of the fluid delivered can be varied. As soon as the plunger ceases its movement, no further flow can take place. By simply turning the four-way cock back to its full line position another charge of the same volume will be delivered through the nozzle 29 because this time the fluid entering through the branch 24 passes first through the port 20 of the head 12 and so increases the amount of fluid in the barrel 10 at the right of the plunger 21 that the said plunger is shifted from its dotted line position to its full line position, driving ahead of it the liquid which was between it and the head 11 so as to force out through the nozzle 29 an amount of fluid equal to the volume of the space existing in the barrel 10 between its dotted line and full line positions. The arrangement of the ports and con-

nections is such that when the device is first filled, the liquid passing out from the barrel must escape through an upper port which is located close to the upper side of the barrel, so as to prevent the trapping of any air in the barrel. As has been stated, the liquid is supplied to the branch 24 under pressure. With the four-way cock 23 turned so as to direct the liquid to the end of the barrel containing the adjusting screw, and with the stop cock 22 open, the device will completely fill, the liquid driving all air ahead of it. As soon as a drop appears at the outlet 25, the stop cock 22 is closed. Then each time the four-way cock is given a quarter turn, a definite quantity of liquid will be delivered, the stop cock remaining closed. If the pressure be released, and the two cocks set as for filling, the liquid will flow back into the supply reservoir when the latter is below the level of the device. Therefore, when such reservoir is a bottle, with suitable pressure supplying means, the device can be used to fill a small number of syringes, even one, and the liquid remaining in the device can be run back into the bottle, and the latter stoppered, so that there is no waste whatever.

The device may be sterilized and connected aseptically to a bottle of sterile solution, used, taken down, and the bottle stoppered, without wasting or contaminating the sterile solution.

It is to be understood that while I have illustrated and described the invention in what I consider to be its preferred embodiment, I do not limit myself to all of the details of construction since I may variously modify the same within the limits of mechanical skill, and may construct the various parts of the apparatus of whatever material or materials may be best suited to the characteristics of the fluid to be passed there-through.

Having now described my invention, what I claim is:—

1. A fluid measuring device comprising a barrel, a freely mounted plunger in the barrel, a conduit connecting opposite ends of the barrel and having a stop cock which, when open, will permit fluid to flow from one end of the barrel to the other, a four-way cock, and conduits connecting the casing of the latter with opposite ends of the barrel.

2. A liquid measuring device comprising a horizontal barrel, a freely mounted plunger therein, a conduit connecting opposite ends of the barrel and having a stop cock which, when open, will permit liquid to flow from one end of the barrel to the other, and connections whereby liquid passed into said barrel at one end will cause liquid to be ejected from the other end of the barrel by means of said plunger, the barrel having

two ports at each end, one port of each pair being close to the upper side of the barrel to prevent trapping of air when the device is being filled.

3. A fluid measuring device comprising a barrel having heads each formed with upper and lower ports and having nipples, a freely mounted plunger in the barrel, a controllable connection between two of the nipples of the heads respectively and a controllable connection between the other two nipples of the heads respectively, one of the controlling devices being a stop cock and the other controlling device being a four-way cock.

4. A liquid measuring device comprising a horizontal barrel, a freely mounted plunger therein, means for adjustably restricting the play of the plunger in the barrel, a conduit connecting opposite ends of the barrel and having a stop cock which, when open, will permit liquid to flow from one end of the barrel to the other, a four-way cock, and conduits connecting the casing of the latter with opposite ends of the barrel.

5. A liquid measuring device comprising a horizontal barrel, a freely mounted plunger therein, an adjustable screw extending into said barrel for limiting the play of the plunger, a conduit connecting opposite ends of the barrel and having a stop cock which, when open, will permit liquid to flow from one end of the barrel to the other, a four-way cock and conduits connecting the casing of the latter with opposite ends of the barrel.

6. A liquid measuring device comprising a horizontal barrel having heads each provided with upper and lower ports, a freely mounted plunger in the barrel, two connections between said heads one of said connec-

tions having a stop cock, the other connection having a four-way cock, means whereby liquid may be supplied through said four-way cock, and means whereby liquid may be discharged through said four-way cock.

7. A liquid measuring device comprising a horizontal barrel having heads each provided with upper and lower ports, liquid tight connections being provided between the ends of the barrel and the heads, clamping rods for holding the heads to the barrel, a freely mounted plunger in the barrel, a conduit connecting said heads and having a stop cock, and connections whereby liquid passed into said barrel at one end will cause liquid to be ejected through the upper port at the other end of the barrel by means of said plunger.

8. A liquid measuring device comprising a horizontal barrel, a freely mounted plunger therein, means for adjustably limiting the play of the plunger in the barrel, a conduit connecting opposite ends of the barrel and having a stop cock which, when open, will permit liquid to flow from one end of the barrel to the other, and connections whereby liquid passed into said barrel at one end will cause liquid to be ejected from the other end of the barrel by means of said plunger, the barrel having two ports at each end, one port of each pair being close to the upper side of the barrel to prevent trapping of air when the device is being filled.

In testimony whereof I affix my signature, in presence of two witnesses.

STANLEY D. BEARD.

Witnesses:

EDW. H. GILBERT,
EDGAR C. LEAYCROFT.