

July 19, 1966

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3,261,208

AUTOMATIC PIPETTE

Filed May 13, 1964

2 Sheets-Sheet 1

Fig. 1.

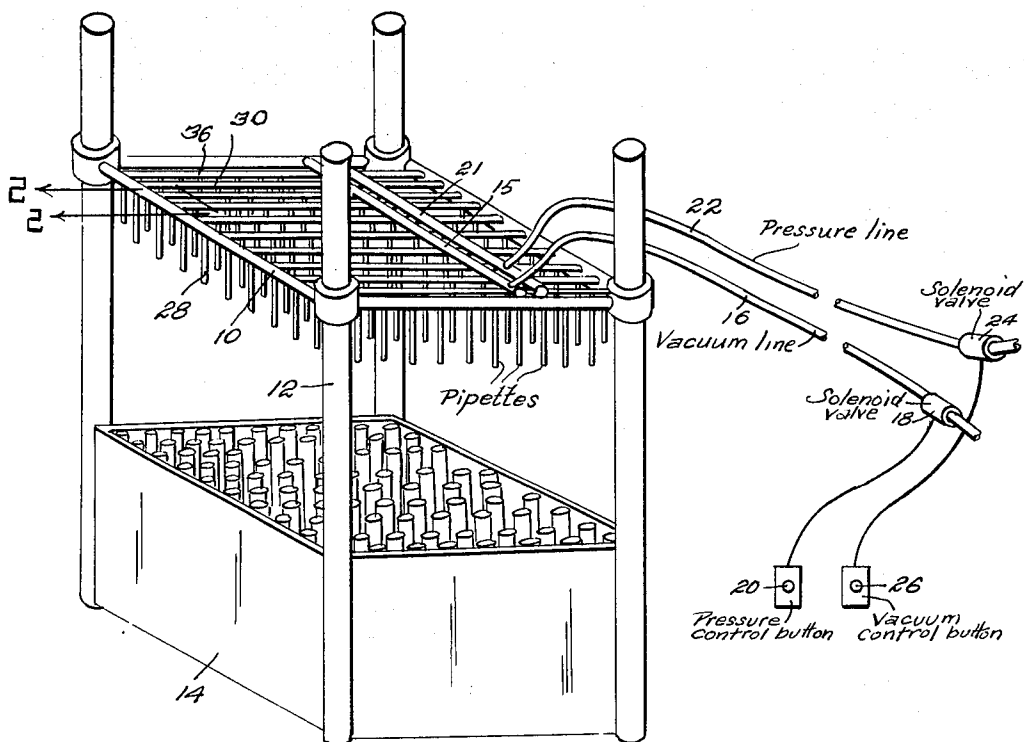
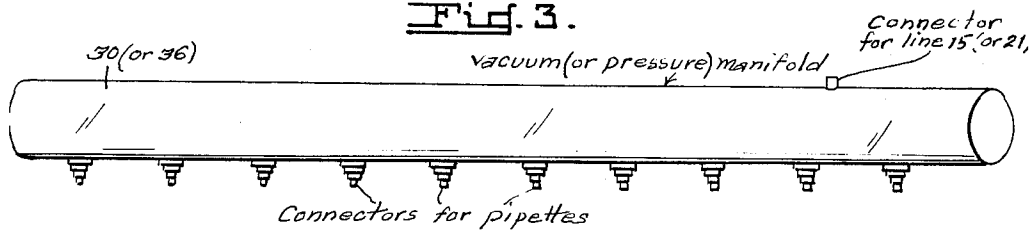


Fig. 3.



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Fig. 2.

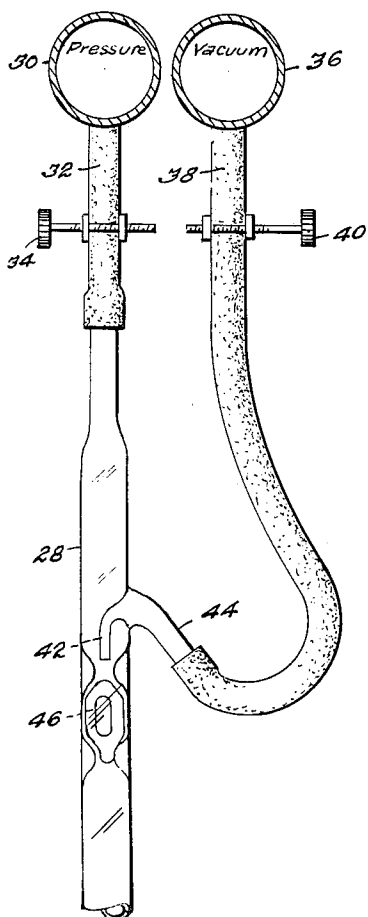


Fig. 4.

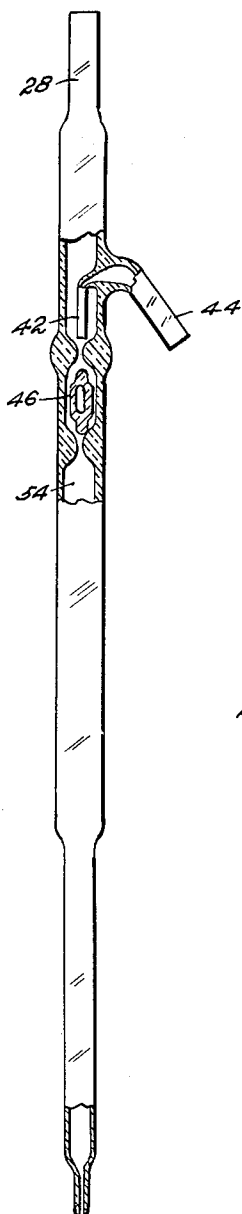
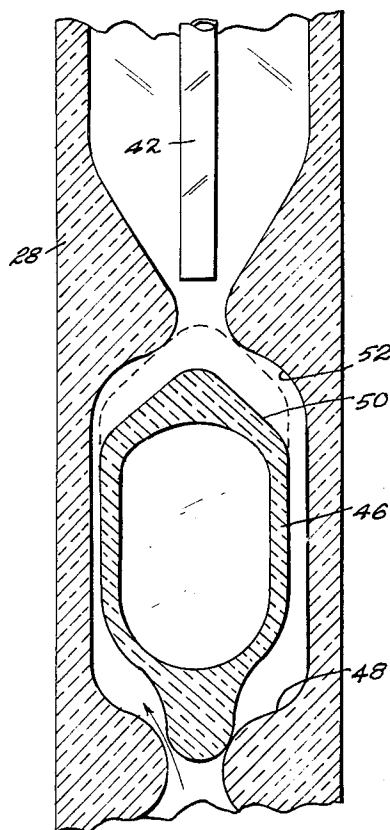


Fig. 5.



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**AUTOMATIC PIPETTE**

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1 Claim. (Cl. 73—425.6)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

Pipettes are used in varying ways. As one example, a pipette may be used to extract a sample of a fluid from a test tube and to then insert the sample into another test tube or container.

The quantity of the sample transferred should be uniform in sample-after-sample for many types of experimental work. Also, large numbers of samples can be transferred simultaneously with properly designed equipment, thus saving valuable and expensive scientist and technician time.

The present invention improves pipettes and pipette-sample transferring techniques.

In the drawings:

FIG. 1 is a perspective view of a setup embodying the present invention;

FIG. 2 is a detail of one pipette and the associated vacuum and pressure lines;

FIG. 3 is a detail of a vacuum or pressure manifold;

FIG. 4 is a partial cross-sectional view of a pipette; and

FIG. 5 is a detail of the pipette of FIG. 4.

In detail, FIG. 1 illustrates a complete setup say of fifty pipettes 28 mounted on a vertically movable rack 10 supported by posts 12. A box 14 is placed beneath rack 10 and may contain fifty test tubes, one mounted beneath each pipette.

Rack 10 carries five pairs of vacuum and pressure manifolds 36, 30 respectively each manifold having connections for ten pipettes. Each vacuum manifold is connected, through conduit 15, to a vacuum line 16 to which vacuum may be applied by use of solenoid valve 18 and switch 20. Each pressure manifold is connected, through conduit 21, to a pressure line 22 to which pressure may be applied by use of solenoid valve 24 and switch 26.

Vacuum line 15, 16 connects with a plurality of vacuum manifolds 36 (FIG. 2) and pressure line 21, 22 connects with a plurality of pressure manifolds 30 so that vacuum or pressure may be applied alternatively to the pipettes 28.

FIGS. 4 and 5 show glass pipette 28 having neck 42 communicating with conduit 44 to which vacuum is applied. Hollow float 46 is limited in downward movement by stops 48. Float 46 has a seat 50 cooperating with seat 52 to form a valve. The pipette has a fixed volume in the area 54 below float 46 and valve 50, 52. Means could be provided to vary this volume, or pipettes having different capacities could be used interchangeably.

*Operation*

FIG. 1 illustrates a plurality of say fifty pipettes for extracting samples of liquid from an equal number of test tubes, say fifty for example. If there are only forty test tubes then pinch-clamps 34, 40 (FIG. 2) may be closed to

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collapse and close flexible lines 32, 38 for the ten pipettes not to be used.

Rack 10 is lowered to bring the plurality of pipettes into communication with the liquid in the test tubes. Switch 26 is closed to open solenoid valve 24 and thereby apply a partial vacuum to manifolds 36 and pipettes 28 via 38, 44, 42. The partial vacuum causes liquid to rise in the pipettes into area 54 until float 46 is buoyed up by the liquid and closes valve 50, 52. If any liquid escapes above valve 50, 52, then the vacuum applied to extension 42 causes the excess to be drawn off, thereby assuring that only a precisely measured quantity remains in the pipette.

Rack 10 is then raised and the box of test tubes is removed from therebeneath. Other containers which are to receive the samples are placed below pipettes 28. Pressure is applied in line 22 and pressure manifolds 30 by opening valve 24 and the liquid in the pipettes is expelled.

From the foregoing it is seen that this invention can be operated rapidly to withdraw precisely measured quantities of liquid from one container, or from one set of containers, and to deposit such precisely measured quantities into another or other containers. The operator merely presses button 26 and all the pipettes are automatically filled with precisely measured quantities. The operator merely presses button 20 and the pipettes discharge precisely measured quantities.

I claim:

Apparatus comprising:

- a rack mounted for vertical movement on supporting means;
- a plurality of vacuum and pressure manifolds mounted on the rack;
- a plurality of pipettes connected to the vacuum and pressure manifolds;
- vacuum and pressure lines connected to the vacuum and pressure manifolds;
- means to control application of vacuum or pressure alternatively to the lines to thereby apply vacuum or pressure at will to the pipettes; each pipette comprising:

- a section with a cavity of a desired volume;
- a float-operated valve in communication with the cavity;
- vacuum line connection means;
- pressure line connection means;
- the vacuum line connection means communicating with the interior of the pipette at a point immediately above the valve such that any liquid which might get past the valve will be withdrawn from the pipette thereby assuring substantially equal volume even if the valve fails to operate perfectly.

**References Cited by the Examiner**

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**FOREIGN PATENTS**

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