

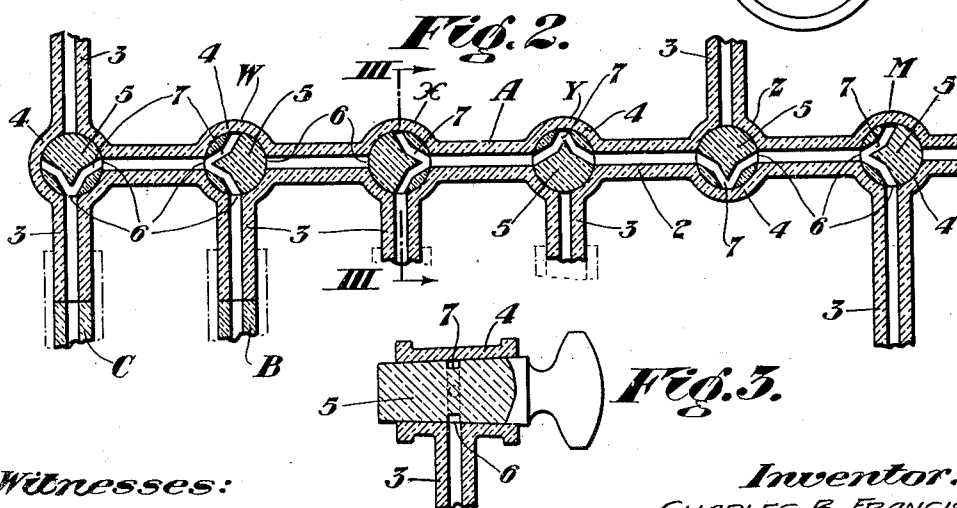
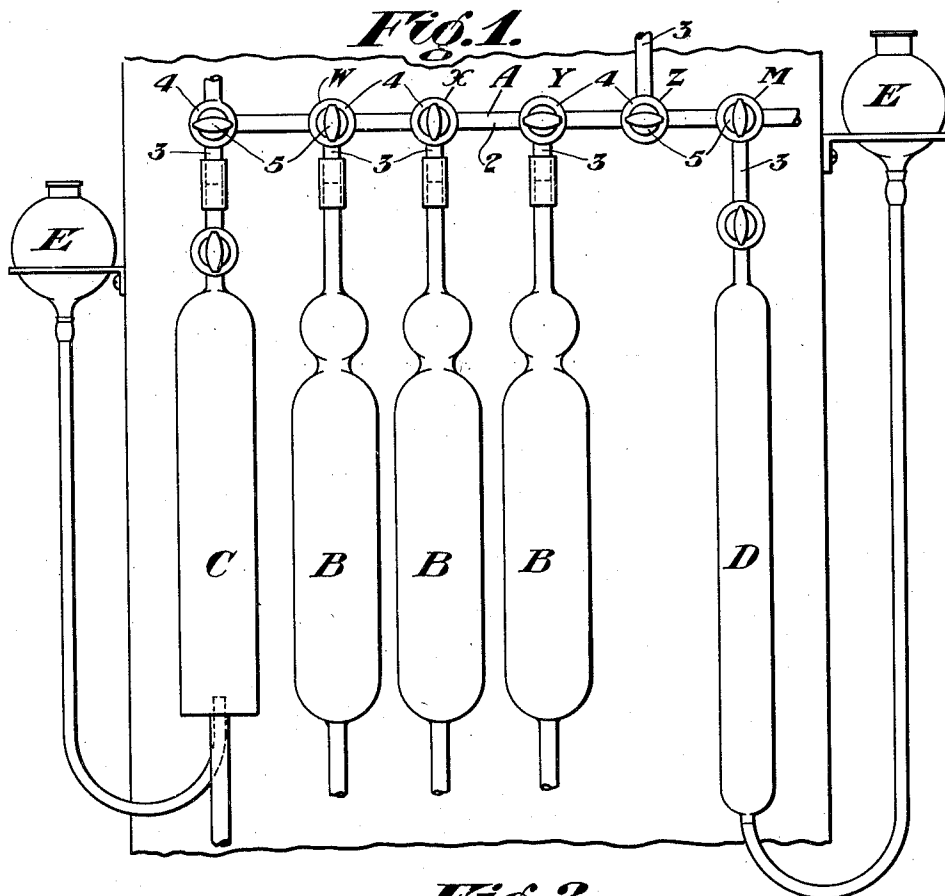
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C. B. FRANCIS

MANIFOLD FOR GAS ANALYSIS APPARATUS

Filed Feb. 19, 1927



Witnesses:

Edwin Truel

Inventor:

CHARLES B. FRANCIS,

by:

Anthony Usina

his Attorney.

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UNITED STATES PATENT OFFICE.

CHARLES B. FRANCIS, OF PITTSBURGH, PENNSYLVANIA.

MANIFOLD FOR GAS-ANALYSIS APPARATUS.

Application filed February 19, 1927. Serial No. 169,632.

This invention relates to manifolds and more particularly to manifolds for gas analysis apparatus, and has for its object the provision of a novel form of manifold having a novel form of stop-cock valve for controlling the flow through and to and from the manifold.

Heretofore manifolds of this type have been provided with a standard form of three-way stop-cock valve having one hole extending through the plug and a second hole extending at right angles to the first hole from one side of the plug and communicating with the first hole. The disadvantage of this former type or form of valve is that after gas has been passed through the valve, it is impossible in most cases, and always very difficult, to displace all the gas in the passages of the plug. In order to partly overcome the disadvantages from the use of this old form of valve it has heretofore been the practice in gas analysis work to place a one-way stop-cock valve in the vertical branches of the manifold, and to draw the liquids up to some point below the stop-cock. This practice left considerable dead space in the manifold which is always filled with gas and, owing to variations in the temperature and pressure of this gas, the space was a source of variable error in the analysis. It also made it necessary, in case two or more gases differing in composition were to be successively analyzed, to flush out the manifold and all its branches with an inert gas after each analysis.

With the novel manifold and three-way stop-cock valve of this invention all the gas is readily displaced by drawing a liquid through the manifold.

In the drawings—

Figure 1 is an elevation showing a manifold constructed in accordance with my invention and connected to a plurality of pipettes.

Figure 2 is a sectional elevation through the manifold.

Figure 3 is a sectional view taken on the line III—III of Figure 2.

Referring more particularly to the drawings, the letter A designates the manifold as a whole, which connects a plurality of pipettes B or other apparatus for use in the usual gas analysis apparatus. A flushing pipette C is connected to the left-hand end of the manifold A, and a measuring burette D is connected to the right-hand end of the

manifold. The usual leveling bottles E are also provided for creating pressure and suction in the burette D and flushing pipette C.

The manifold A consists of a main conduit 2 and a plurality of branch conduits 3. In the construction shown the complete manifold is made of glass, and the main conduit 2 and branch conduits 3 are formed integral; it will be understood, however, that the manifold may be made of any suitable material other than glass and may be made in sections if desired.

The main conduit 2 is enlarged at each of its junction points with the branch conduits 3 to form hollow cylindrical valve bodies 4. The valve bodies 4 have a tapered internal bore to receive a tapered valve plug 5. The valve bodies 4 have ports 6 which communicate with the bore of the main and branch conduits, and the valve plug is adapted to connect any two of the ports 6 so as to form a three-way stop-cock valve. The several stop-cock valves are successively designated by the letters W, X, Y, Z, and M. The valve plugs 5 are provided with a substantially V-shaped transverse port 7, the legs of which are slightly curved and open through the plug at diametrically opposite points, while the junction point of the port legs opens through the plug at a point intermediate the ends of the legs, thus forming a port through the valve plug, which when the plug is turned to connect the opposite sides of the main conduit, will form a continuous passage which may be flushed to remove all the gases trapped in the valve.

In the prior art three-way stop-cock valves, a T-shaped passage was generally used, and when the valve plug was turned to cut off a branch, the leg of the T-shaped passage retained a quantity of gas which was not removed by flushing and which remained to cause an error in the analysis being made.

In operation, assuming that a certain constituent of a gas being analyzed is to be removed by absorption, and that the pipette to be used is connected to the branch conduit 3 controlled by the valve X. With the desired quantity of gas in the burette D, valves X, W and M are turned to the same position as that shown for valves Y and Z in the drawings, and the main conduit of the manifold is filled with water or other suitable liquid from the flushing pipette C by changing the level of the leveling bottles E.

Then by turning the valve M to the position shown in the drawings and raising the leveling bottle E attached to the burette D, the liquid is forced back through the manifold by the gas from the burette D, and when the liquid is forced back to a line with the branch 3 to which the pipette to be used is connected, the valve X will be turned to the position shown in the drawings so as to connect the pipette in line to receive the gas from the burette D.

The gas is then passed back and forth from the burette D to the pipette until all of the constituent sought in the gas is removed by the absorbing solution in the pipette. After the last pass the solution in the pipette is drawn up to the lower edge of the valve X, which is then turned to a position corresponding to that shown for valve Y. The valve W is then turned so that it has the same position as that shown for Y, and the main conduit 2 of the manifold is filled with liquid from the flushing pipette C, thus forcing all the gas into the burette D, where it may be measured.

While the most important advantage gained by applicant's invention is that of providing for drawing all the gas from the manifold, the placing of the valves in the position shown also permits the entire front

of the apparatus occupied by the pipettes to be covered with a transparent safety shield, which protects the operator from danger in cases of explosions, which may occur during the analysis.

The novel form of manifold of this invention also enables the operator to avoid mixing the chemical reagents from the different pipettes with each other or the flushing liquid, which mixing was a common occurrence with the manifolds of the prior art.

I claim—

The combination with a main conduit and a branch conduit, of a three-way stop-cock valve connecting said conduits, said valve comprising a cylindrical body formed integral with said main conduit, and a valve plug rotatably mounted therein, said plug portion being provided with a substantially V-shaped passage of constant cross-section extending transversely therethrough and adapted to connect said branch conduits with one or both sides of said main conduit or to close said branch conduit and connect both sides of said main conduit.

In testimony whereof, I have hereunto signed my name.

CHARLES B. FRANCIS.