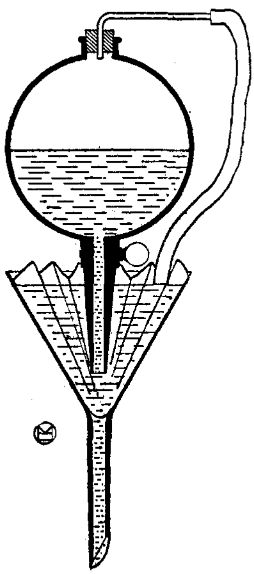
NOTES.

An Automatic Filter.—I have found the apparatus shown in the cut useful in filtering large amounts of solution from a precipitate of such a character that it passes readily through the stem of a separatory funnel. It is, of course, only a modification of the inverted flask principle, but it possesses the advantage that it can be refilled without moving or unclamping any large piece of glass apparatus. It can be made from apparatus always on hand in the laboratory.



To set it up, a separatory funnel as large as possible is mounted on a ring stand over a filter funnel containing a folded filter in such a manner that the stem of the separatory funnel is a little above the vertex of the paper. A tube passing through a one-hole rubber stopper in the top of the separatory funnel is brought down so that its outer end is held at the level at which it is desired to maintain the liquid in the filter funnel. When the separatory funnel is filled, the stopper put in and the stopcock opened, the solution runs into the lower funnel until it cuts off the air inlet through the tube to the upper vessel. When the level in the lower funnel has fallen sufficiently, a small amount of liquid is siphoned over into the upper one and the lower one fills up again.

The apparatus was used in filtering off barium carbonate from large amounts of solution in the preparation of inositol.

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A Rapid Filtering Funnel.—The ordinary funnels used in analytical work may be made to filter far more rapidly than usual—by deeply etching lines from a point below the apex of the funnel to points forming a ring about two-thirds of the way up the sides, in the following manner:

Coat the inside of the funnel with a layer of paraffin wax (containing a little turpentine or other agent to render the wax non-brittle) and allow part of the wax to run down into the tail and form a solid plug about 5 mm. below the apex of the funnel or well below the lowest point reached by the filter paper.

Scratch six or eight lines in the wax coating extending from the point *B*, to the wax plug at *A*, now fill the funnel to a point above *B* with hydrofluoric acid and allow to stand twenty-five minutes; then pour out the acid into another funnel prepared as the first and so on until as many funnels have been prepared as required.

The funnel should be covered with a waxed beaker cover. The wax may be removed by hot water and the deeply etched grooves cleaned out with the point of a mechanic's scratch-awl or other suitable tool.

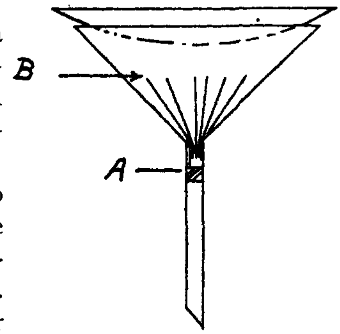

Fig I

These grooves are not large enough to allow a filter paper to be broken by the stream from a wash bottle, but afford efficient channels for the filtrate to flow down.

The funnels may be used with the filter cone and are especially valuable in filtering gelatinous precipitates, alumina, etc. The speed of filtration is increased by this means to about two and a half times the normal rate for a funnel not so treated. H. SPURRIER.

DETROIT, MICH.

A Method of Filling Reagent Bottles.—In a chemical laboratory in which several hundred students are working, it is very desirable, especially from an economical standpoint, that each student fill his own desk reagent bottles. There is, however, a serious objection to having students, especially Freshmen, pour concentrated acids from heavy bottles. To obviate this difficulty the following apparatus was devized, in which the acids are forced from the bottles by means of air pressure.

The acid bottles are placed upon a glass-topped table, two feet above which runs a pipe connected with a source of air pressure (Fig. 1). From this pipe valves are suspended by means of rubber tubing. On pressing the lower end of the valve in the funnel *B*, the valve is opened and the air pressure forces the liquid from *C* into the receptacle. As soon as the valve is taken out of the funnel it closes again, and the air pressure is released from the bottle through the open funnel. The instantaneous release of the pressure prevents any dipping from *C*.

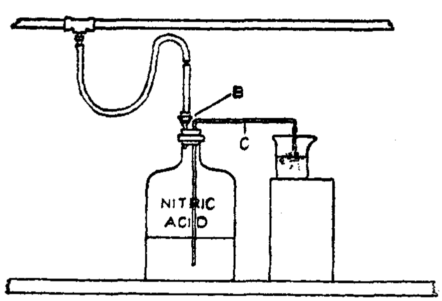

Fig. 1.

The details of the valve are shown in Fig. 2. Its essential parts are: The brass plunger *D*, provided with a nut *E*, the rubber stopper *F*, the rubber collar *G*, and the spring *H*. When the end of the valve is pressed against the funnel of the bottle, the plunger is forced upwards as a result of forcing the nut against the sides of the funnel. This permits the escape of the compressed air; the rubber stopper, however, is placed so near the nut that the act of pressing the valve down brings the rubber against the side of the funnel so tightly that the air cannot escape around the edges of the stopper but is forced into the bottle. On removing the valve from the funnel, the spring at once closes it by forcing the piston down.

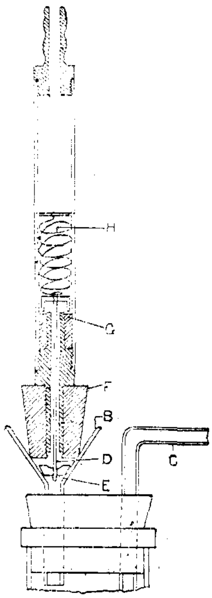

Fig. 2.

The valve is six inches long. The metal parts are of brass and were made by the University mechanic. An air pressure of about three pounds is found to work satisfactorily in this apparatus.

The above principle is particularly useful in drawing stock solutions. Barium chloride solutions, for example, are prepared by placing the weighed quantity of the salt in the bottle, adding warm water and shaking from time to time. A piece of muslin is fastened over the lower end of *C* (Fig. 1) so that reagent bottles may be filled as soon as the salt is dissolved, the necessity of filtering the solution by the usual slow process being thus obviated.

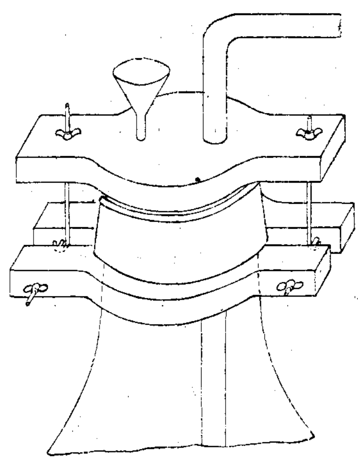
Fig. 3.

In forcing solutions from carboys in this manner, it was found that the pressure necessary in this case was sufficient to force the stopper from the neck of the carboy. To prevent this the apparatus shown in Fig. 3 was devized. It consists of three pieces of maple, two of which fit under the flange at the neck of the carboy, the third rests on top of the stopper. The thumb screws shown in the figure permit adjustment to different sized carboys. A conical rubber stopper is used, as the internal diameter of the necks of different carboys varies considerably.

J. H. Walton, Jr.

A Hydrogen Sulfide Tap.—Not the least of the problems connected with the distribution of hydrogen sulfide gas to large classes in qualitative analysis is that of providing an outlet tap which cannot be left open by the student. In the author's laboratory, in which seven hundred students are studying qualitative analysis, many attempts were made to solve this difficulty before a satisfactory apparatus was devized. The apparatus described below is the result of several years' experience, and in its present form seems to be "fool-proof."

It is obvious that a satisfactory outlet tap should close automatically after the student is through using it. Certain types of mercury valves which are connected with the tap and close automatically as soon as the student is through with them are in use in some laboratories. These are usually made of glass, however, and since they are easily broken their use has been found impracticable.

The tap shown in Fig. 1 is essentially a strong spring pinch clamp, *A*, fastened to a board. By pushing the lever *B* (made of a piece of iron $^3/_8$ inch square) the clamp is opened, permitting the hydrogen sulfide to pass through the rubber tube *C*. The student attaches his glass delivery tube at *C*, pushes the lever until he has obtained sufficient hydrogen sulfide, then on releasing *B* the supply of gas is at once cut off. The rate of flow of gas is regulated by the screw pinchcock *D*.[1] Different kinds of rubber tubing have been used in this apparatus. It has been found, however, that a thick-walled gum tubing gives best service, for the usual grade of tubing employed for burners, etc., after being used a very few weeks, cracks at the point at which it is pinched by the spring clamp. An essential part of the apparatus is *E*, a rubber stopper cemented to the rubber tube. It rests on the board *F* and prevents the rubber tube from being pulled from its connection when a careless student pulls his glass delivery tube from the end of *C*. It has been found advizable to enclose the tap in a box, so that the student has access to the end of the lever and about two inches of the end of the rubber tube.

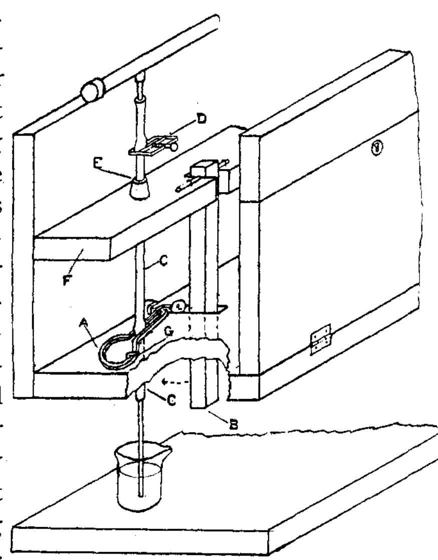

Fig. 1.

The spring clamps used are the strongest on the market. They must be renewed occasionally, but this is easily done if they are screwed down as shown in the figure at *G*.

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[1] A piece of glass, capillary tubing of very small bore is used for this purpose in many laboratories.— Editor.