and slipping the end of the rubber tubing over the turned up end of the glass tube by which air is admitted to the bottle to replace the solution drawn up the filling tube. But this is hardly necessary in any ordinary usage.

In many cases, however, it is necessary to exclude the carbon dioxide and other impurities of the laboratory air from volumetric solutions, and to prevent concentration of the solutions by evaporation of their water. These conditions are met in the modification shown in Fig. 2, of the second cut. Here a small wash-bottle is added, through which all the air admitted to the apparatus, either above or below, must pass, and be washed in passing. This bottle may be supplied with baryta water or lime water when it will serve to saturate the air through it with moisture, and free it from ordinary gases and vapors. In using this apparatus a pinch-cock is necessary on the rubber suction tube near the mouth-piece, by which the mouth-piece is conveniently handled, and during the suction this pinch-cock is opened and the rubber tube below is pinched at A by the thumb and finger of the left hand. This apparatus is constantly sealed from the external air, and is safe and accurate for any length of time, and is always in readiness for use, care being taken to well wash the end of the stop-cock, and to waste the solution that is outside of the cock whenever the apparatus has stood unused for even a few hours.

These burettes are very well made by Mr. Emil Greiner, of 146 William Street, near Fulton, New York City, who supplies them with or without the bottles as ordered. The only advantage in ordering the burette and bottle together is to have the internal tube of the right length to reach the bottom of the bottle.

A COMPRESSED AIR WASH-BOTTLE.[1]

By W. C. Ferguson.

THIS idea, not yet put in practical operation, was suggested by the difficulty attending the washing of such precipitates as hydrate of alumina, the complete removal of very small amounts of finely divided material from the sides of the contain-

[1] Read December 8, 1893.

ing vessels, such as gold in commercial copper, or of such precipitates as adhere with persistency, when the ordinary wash-bottle, with comparatively little pressure available, is used. It would also seem that such a device would facilitate the general washing of precipitates in a laboratory where sometimes a hundred or more filtrations are made in a single day.

The features of the idea are about as follows:

Compressed air would be the source of pressure, and in the laboratory of which the writer has charge it could be introduced very conveniently from the factory where it is used on a large scale. Mr. J. B. F. Herreshoff, the distinguished chemical engineer, suggested using a gasometer where no source outside of the laboratory was available.

The air pipe would be arranged with branches to the filter pumps, and also to any other part of the laboratory where filtrations would be carried on.

The wash-bottles would be large and stout, and the apparatus arranged so that they could be removed readily and refilled or replaced as required. The air pipes would be provided with stop-cocks, just above the bottle, for regulating the supply of air. Glass nozzles of about the same form and length as in the ordinary wash-bottle, but with orifices of different sizes would be used, so that a very fine jet or a large stream of water could be employed as desired.

Rubber tubing of suitable length and strength would connect the water-bottle and nozzle.

The jet would be further regulated by a pinch-cock just above the nozzle so as to be conveniently manipulated while washing.

The advantages of this device would seem to be a minimum amount of work in manipulation, and a more thorough washing due to increased pressure. Where a large amount of work is done each day and accurate, prompt reports are absolutely necessary, it is self-evident that all devices that reduce labor and in other ways increase efficiency, tend to raise the standard of results.