At this concentration, therefore, the complex negative ions present in considerable quantity in more concentrated barium chloride solutions are, for the most part, dissociated.

In closing, I desire to state that the accuracy of the experimental results presented in this article are to be attributed in large measure to the analytical skill and perseverance of my assistants, Mr. A. A. Blanchard and Mr. G. V. Sammet.

IMPROVEMENT IN ORSAT APPARATUS.

BY A. BEMENT.

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HAVING experienced considerable trouble in using the Orsat gas apparatus, I have devised a modification with the object of removing what I have found to be a serious and troublesome fault.

Fig. 1 will illustrate the particular difficulty in question. It is that of the usual form of pipette used especially for the caustic and pyrogallate reagents, having a number of small glass tubes

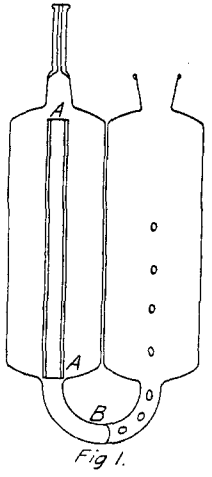

Fig 1.

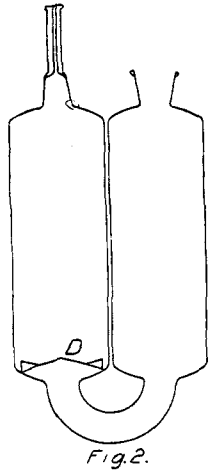

Fig. 2.

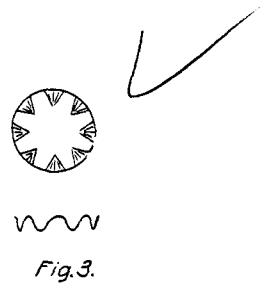
Fig. 3.

inclosed in the front leg. For purpose of illustration only one of these tubes is shown by AA. As this chamber in practice is full of these tubes, it necessarily follows that one of them must

be in the center, and this one may, and often does, drop down in the position indicated in the sketch. The result is that a direct passage from A down through the tube and into the branch B is produced, and at the same time, the outlet from the other tubes and the remainder of the chamber is stopped off, leaving the outlet for the reagent only by way of this center tube, because by its junction at lower A, a close connection is made. The result is, that as gas enters the pipette the reagent instead of uniformly receding before it is driven down the center tube, and this condition may exist to such an extent that the reagent is driven to the point B, when the gas, owing to its lower gravity, will bubble up through the reagent, as shown, and escape to the atmosphere. It does not always follow that this center tube will make as close a junction as shown, but the trouble exists to a greater or less degree in all instruments. I have found cases where it required a period of fifteen minutes to pass the gas sample into the pipette, and have known of frequent errors caused by a loss of gas from this cause. It is, of course, true that if sufficient time be taken, the gas may be worked into the pipette without loss, but it is certainly desirable and important that the analysis be effected with as little trouble as possible, and in the shortest time consistent with careful work. It may be observed when gas is passed into the pipette that the reagent does not recede equally before it, but that contained in the center tube may drop down lower than the surface in the other tubes. Likewise, when the gas is withdrawn the reagent returns in greater volume by way of the center tube, and will rise higher and run over the top.

To overcome this difficulty, I have devised the pipette shown in Fig. 2, which prevents the tubes dropping down into the outlet by interposing a glass disk with corrugated edge, as shown in Fig. 3. This not only affords a support but allows a free passage of larger area from each tube to the connecting branch, as the depressed edges of the disk rest on the bottom of the pipette chamber, leaving ample passage between the corrugations. The connecting passage may also be made larger, thereby affording opportunity for the quick passage of the reagent, and shortening the time required for absorption.

CHICAGO, October 18, 1900.