burner, but it has been found that by adding the hot liquid to the flask, or heating the contents of the flask before placing it in the machine, the same end is obtained.

The advantages of the machine over hand shaking are to the chemist only too obvious. During the time of shaking the operator can be doing other more profitable work, with the assurance that aside from being relieved from the fatigue of the operation, the machine is not striking the job—as is the natural disposition of mankind—resulting in false analysis, while with the machine the reverse is the case, it is always allowed to do its full quota of work. Then under its constant conditions, in phosphorus precipitation for instance, a precipitate of like crystallization is always obtained, aiding materially its estimation by judging its bulk, as is the practice in most busy open hearth steel work laboratories.

Too much can not be said in praise of the machine, its simplicity, ease of operation, quietness, and the readiness with which the flasks can be placed in and removed from the apparatus, and the fact that the flasks do not need to be corked will commend it to any one.

Application has been made and the claims granted for a patent covering the ideas embodied in this machine.

DUQUESNE, PA.

METHOD FOR THE ESTIMATION OF METALLIC IRON IN THE PRESENCE OF ITS OXIDES.

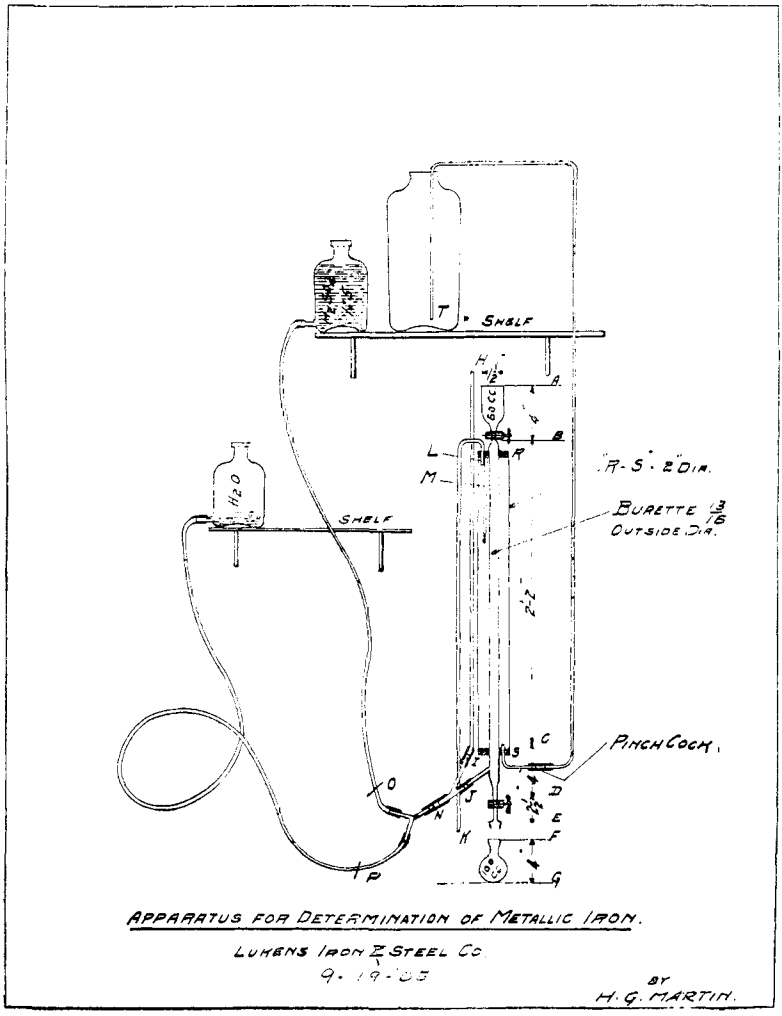
By HENRY G. MARTIN.

Received May 22, 1907.

For several years the writer has used the following method for the determination of the amounts of metallic iron, ferrous oxide and ferric oxide present in furnace products. The total iron is determined by solution, fusion of the insoluble residue, and titration. The sum of the ferrous iron and the metallic iron is determined by solution in dilute hydrochloric acid, with exclusion of the air and titration of the solution. And finally the metallic iron is determined by measuring the hydrogen evolved on dissolving the substance in dilute sulphuric acid. The method can not, of course, lay claim to strict accuracy, since it disregards the ferrous iron of the insoluble residue and also assumes that the ferric iron present is not acted upon by the hydrogen evolved during the solution of the metallic iron. If manganese is present, other errors may be introduced, and if the manganese content is high, the results are uncertain.

The hydrogen evolved by the solution of the metallic iron is determined as follows:

The burette A-E is arranged according to G. Neumann and graduated in 1/5 cc. beginning at the stop-cock B. R-S is a water jacket supplied from a bottle on the upper shelf or from the hydrant. M is a small thermometer. R and S are secured by split wooden corks sealed with



cement made of litharge and glycerol. I, J, N, O and P are pinch-cocks. The burette at E is ground into the flask F-G. The bottom of the flask is about 8 inches from the table top and when in position under E is supported by wire gauze and an iron ring. D is a cock of quite large

bore. The burette A-E together with three of the flasks, made interchangeable, were furnished by Geo. D. Feidt & Co. The remainder of the apparatus is home-made. S-T and L-K are of small bore; H-I should approximate the burette in bore.

Have the tube leading from the sulphuric acid bottle filled with the acid to its connection with the Y, then, with J and O closed, raise the water bottle until all the tubes are filled and the water has risen in the level tube H-I to near the top; close P, N and I, and open J, and set the water bottle on the lower shelf or on the table.

Weigh from 0.2 to 10 g., or more, of the material, according to the quantity of metal supposed to be present, into the flask F-G and fill to the neck with water and place in position on E; support it properly and place an argand burner under it with sufficient flame to boil the water, D and B both being open. Open I just enough to let a few cubic centimeters of water run into the burette. This will serve to completely fill the flask and tube D-E to above the cock D. When the water has boiled remove the flame for a moment. Open N and O until the sulphuric acid has filled the burette to B. Close B, then close O and open P simultaneously. As the action becomes less replace the flame and when all evolution has ceased, boil as at first, keeping the water bottle always lower than the surface of the liquid in the burette. Allow sufficient water to flow through the jacket to prevent any undue rise in temperature. Finally close D and remove the flask. Fill the funnel A-B with a moderately strong solution of potassium hydroxide and a few cubic centimeters of litmus solution. With the water bottle on the table, open B so as to allow the potassium hydroxide to flow into the burette very slowly. Allow it to run in until the liquid in the tube remains blue. This will remove any hydrogen sulphide or carbon dioxide. Most of the acid may be displaced with water before using the potassium hydroxide. Allow the apparatus to stand with the cooling water circulating until the temperature is the same as shown by the thermometer in the barometer near by. Open I, and with the thumb and finger on N, manipulate the water bottle until the liquid in the burette and that in the level-tube are at the same level. Observe reading. This reading is corrected from Liebermann's table to what it should be at 0°, dry, and 760 mm. pressure, equivalent to 1 g. of material, and multiplied by 0.002495 to find the value in terms of iron; $H = 1.008$; $Fe = 55.9$, one liter of hydrogen weighs 0.08987 g. The only error is due to absorbtion of hydrogen by the water and solutions used, and the apparatus may be standardized for this by making a determination with standard iron wire.

This apparatus could also be used for making a determination of carbon dioxide from a carbonate.

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FURTHER OBSERVATIONS ON THE NATURE OF FECES FAT.[1]

BY J. H. LONG AND W. A. JOHNSON.

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In two earlier papers[2] figures were presented showing the amount of phophorus contained in the normal feces fat of a number of individuals. From the conditions of the experiments this phosphorus content, and the nitrogen found at the same time in one set of examinations, suggested the presence of a body or bodies of the "lecithin" type, using this term in the broader sense as describing the fat like "phosphatides" or "lecithans." Inasmuch as a lecithin content in feces fat has been frequently denied[3], while other authorities have maintained the reverse to be true[4], and have spoken of a high percentage amount of these bodies, it appeared that further work in this direction was desirable. In the following pages some observations on these and other points will be given.

For our experiments the mixed feces from a number of men in normal health were collected, dried and extracted with absolute ether, after rubbing up with fine ignited quartz. In the drying of feces in the ordinary way on the water-bath it is not possible to avoid the loss of some nitrogen, in non-protein combination, but the loss may be reduced somewhat by keeping the temperature low. On the other hand, the slow drying, with long contact with the air, occasions some change through oxidation processes. The loss of nitrogen from the fat-like bodies is the most serious of the objections to the water-bath method of drying, but in the working up of large quantities of feces it is practically the only method available and was followed, therefore, in our work.

By extraction in the Soxhlet apparatus we secured two lots of "fat" of about 40 grams each, which will be referred to as samples A and B. These crude fats were purified by solution in absolute ether, filtering and

[1] Presented at the New York meeting of the Am. Chem. Soc. Dec. 31st, 1906.

[2] Long, this Journal, **28**, 704. Long and Johnson, this Journal, **28**, 1499.

[3] Hoppe-Seyler, Physiolosische Chemie, p. 337. Hoppe-Seyler, Chemische Analyse für Aerzte, 6th Ed. p. 480. Bokay, Z. physiol. Chem., **1**, 157.

[4] For example, Deucher, Maly's Jahresber., 1898, p. 606. Also, F. Oefele, Maly's, Jahresber., 1904, p. 457.