

SCRAP SHEARING MACHINE AT THE VIENNA EXHIBITION.

We illustrate, on the first page of this number, a Shearing Machine of unusually large dimensions. Our illustration is from *Engineering*. The machine has been constructed in the shops belonging to the Iron and Mining Company, Friedrichs-Wilhelms-Hutte, at Muhlheim-on-the-Ruhr, in Rhenish Prussia, a firm which is best known on the Continent through its extensive foundry for water and gas pipes, some fine examples of which are exhibited at the Vienna Exhibition, in the pavilion for the iron and mining industry of Rhenish Prussia and Westphalia. This foundry of the Friedrichs-Wilhelms-Hutte turns out work to the amount of about 30 tons per day, and produces pipes up to 13 ft. long, and 3 ft. 6 in. diameter; the engineering works belonging to the same company supply chiefly machinery for iron works and mines.

The shearing machine we now illustrate consists, as will be seen from the engravings, of two strong hollow cast-iron uprights, connected by three box girders made of wrought-iron plates and angle iron, the two upper girders carrying the bearings of the engine shaft and of the main shearing shaft, as well as the guide for the shearing slide, whilst the block for the fixed shear is supported by the lower girder. The two uprights are curved as shown, and there is between them a clear space of 11 Rhenish feet (about 11½ ft. English), so that not only the edges of plates can be conveniently cut, but even the plates can be cut entirely through across their whole length. Plates as thick as 1½ in. can be sheared in this machine.

QUALITATIVE ANALYSIS FOR AMATEURS.—VI.

By E. J. HALLOCK, A.M., in the *Boston Journal of Chemistry*.

(Continued from page 204.)

GROUP THIRD, (continued.)

The separation of iron, chromium, and manganese involves a new operation, known as fluxing. The precipitate containing the hydrated oxides of these metals is mixed with several times its weight of pure potassic nitrate and sodic carbonate, and the mass fused on a piece of platinum foil. If the fused mass when cold has a green colour, manganese is present; yellow indicates chromium. Dissolve one half of the mass in water, and filter; if a residue remains, it is probably oxide of iron, which may be dissolved in hydrochloric acid and tested with ferrocyanide of potassium. The filtrate soluble in water contains the chromium in the form of potassic chromate; to this solution add enough acetic acid to drive out all the carbonic acid, and after effervescence ceases, add some plumbic nitrate (nitrate of lead), when a yellow precipitate of plumbic chromate proves the presence of chromium. If, however, the carbonic acid be not all expelled before adding the lead, there will be a white precipitate formed of plumbic carbonate (white lead), which conceals the chromium. The manganese is present in the green mass as the manganate of potash (K_2MnO_4), and by placing some of the mass in a test-tube with nitric acid and red lead, the manganate of potash is converted into the permanganate ($KMnO_4$), which has the well-known and characteristic violet or purple colour. If no manganese is present, the red lead gives to the solution only a dirty red, or brownish colour, and soon settles, leaving the liquid above almost colourless.

The process employed in separating the metals of Group Third is represented by the following table:—

EXAMPLE FOR PRACTICE.

Nickel coins. A small piece clipped from the side of a nickel five-cent piece will dissolve readily in nitric acid. A drop of muriatic acid may be added to ascertain if traces of lead or silver are present. Hydrosulphuric acid is then passed through the solution until all the copper is precipitated; a portion of the liquid may be filtered out occasionally and tested for copper.

When the filtrate no longer gives a precipitate with H_2S , it may be filtered, the sulphide of copper carefully and thoroughly washed, and then dissolved in nitric acid. In separate portions of this solution the presence of copper must

be proven by all the methods already given. The filtrate is nearly neutralized with ammoniac sulphide.

For the sake of practice the following mixture may be prepared for analysis, the metals only being present: dissolve a piece of fused iron, a piece of limestone and a strip of zinc in acid, and add to the solution some blue vitriol and common salt. This will require considerable patience and skill to separate, but furnishes plenty of variety. A mixture of the nitrates of lead, bismuth, iron and potassium is another good compound to practise upon.

Cobalt. Black. Residue.	Nickel. Black.	Iron. Black.	Chromium. Green. Treated with dilute HCl. Solution.	Manganese. Pink. Solution.	Uranium. Black.	Zinc. White.	Aluminum. White.												
								Cobalt. Fused with borax. Blue.	Nickel.	Iron.	Chromium. Residue.	Manganese. Solution.	Uranium. Solution.	Zinc. White.	Aluminum. White.				
																Iron.	Chromium. Fused with KNO_3 and Na_2CO_3 Dissolve in water.	Manganese. Solution.	Uranium. Acetic Acid + K_2FeCys Brown.

See methods of separating Ni and Co, p. 181.

GROUP FOURTH.

This group embraces the metals of the alkaline earths, whose carbonates are insoluble in water. They are three in number, barium, strontium, and calcium. The reagent of this group is ammoniac carbonate ($(NH_4)_2CO_3$), and its solution is prepared by dissolving 1 part, by weight, of the commercial salt in 4 parts of water, and adding to the mixture 1 part of strong ammonia water.

Chloride of barium, $BaCl_2$, gives with ammoniac carbonate a white precipitate which is readily soluble in acids. With sulphuric acid it yields a dense white precipitate insoluble in any acid, hence we shall hereafter use baric chloride as a delicate test for sulphuric acid. Hydrofluosilicic acid, H_2SiF_6 , which is formed on passing fluosilicic acid into water, forms a white precipitate, in baric salts, which is almost insoluble in water and perfectly so in alcohol. In using this test, therefore, it is well to add a little alcohol. Ammonic oxalate gives a white precipitate of baric oxalate, soluble in mineral acids. Aqueous solutions of the sulphates of strontium and calcium give white precipitates with baric chloride.

Chloride of strontium, $SrCl_2$, gives the same reactions as barium with ammoniac carbonate and oxalate. Hydrofluosilicic acid produces no precipitate, and the precipitate with sulphuric acid is very slightly soluble in water, so that its solution may be used as a test for barium. Strontium salts yield a white precipitate with calcic sulphate, or gypsum, but it falls slowly, and the solution should be left half an hour to precipitate. Sulphate of strontium solutions are not precipitated by ammoniac oxalate.

Chloride of calcium, $CaCl_2$, differs little from strontium in