

A Cinderella of Metals

By STEPHEN BELL In Commerce and Finance

As a jewellers' metal platinum is quite modern. It is not its beauty that has created this demand for it, for silver is a handsomer metal. It is to its extreme rarity and consequent costliness that this demand is due.

It was not always thus. He who should now use this dull white metal to adulterate gold, to debase it, to counterfeit it, would be adjudged lunatic, yet this is what it has been used for, and because of the facility with which it lent itself to these uses it was placed under a ban which none of the baser metals have shared.

The early Spaniards noticed in the gold of Darien and Colombia, grains of a white metal. It was extremely heavy—heavier even than gold. It was quite impossible to melt it, though it was extremely ductile and could be hammered into shapes or drawn into wire as could gold and copper. It could readily be alloyed with other metals and its weight made it ideal for the debasing of gold without fear of detection save by the expert. For this reason its exportation to Europe was forbidden by the Spanish government. Thus it remained practically unknown until the middle of the eighteenth century, when it began to find its way across the water under its Spanish name of "Platina del Pinto," or "little silver of the River Pinto." It has also been known by the name of "white gold." Its chief value was as a curiosity. Its supply was too limited and its resistance to heat too great to arouse any particular interest save among chemical experimenters, and it was not an age of scientific investigation as we understand the term.

Its infusibility at any temperatures then possible to create by artificial means made it valuable in the laboratory as a crucible in which to melt other metals and ores, and its peculiar effect upon gases when heated was noticed, as well as the fact that acids produced no effect upon it. Its value to the chemist grew and broadened. It became par excellence the chemists' metal. His utensils and containers of platinum were esteemed above others, and by its use the chemical composition of many mineral compounds became known.

The world's richest deposit of platinum were discovered in the Ural Mountains between European and Asiatic Russia about 1823 and the Russian government operated them after 1828. With this accession to its supply the industrial use of platinum extended. It became possible to use it for the construction of stills for the concentration of sulphuric acid, but it now is used as a catalyst, or agent for producing chemical changes in other substances without itself undergoing change, in the manufacture of both sulphuric and nitric acids, so necessary in the making of explosives. This contact process of making sulphuric acid is a purely chemical one by which sulphur dioxide gas, obtained by burning sulphur or pyrites and water gas, is passed through contact chambers containing a platinum catalyst. This catalyst is prepared by coating asbestos, magnesia or similar material, in platinum chloride, drying and heating this mass, which results in the deposition of platinum in very minute subdivision throughout the material. The passage of the sulphur dioxide gas through this results in sulphur trioxide, which is mixed with water to form sulphuric acid. The platinum is not consumed or changed in this process, but is used again and again. We have not a sufficient quantity to use it on the scale desired.

Its use in high-grade magnetos in airplane and automobile engines is quite as vital as for making explosives. Telephone and telegraph instruments, the switchboards in telephone exchanges and relays in both telegraph and telephone lines have platinum contacts. Some electric light bulbs are still made with platinum "lead-in" wires, though most of them are now made with platinum-clad steel wires, almost as fine as a cobweb, but the millions made every year require a considerable amount of the metal. It is necessary, too, in making pyrometers, or instruments for measuring high temperatures, which in turn are essential in the manufacture of guns.

The melting point of platinum has been determined at about 3200° Fahrenheit, a temperature quite beyond attainment by ordinary means, but easily produced now by the oxyhydrogen blast or electric furnace. The metal welds easily at high temperatures, like iron, and its effects upon gases when heated are curious and varied, one of which we have seen utilized in the making of sulphuric acid. It resists all

ordinary single acids, even hydrofluoric, but aqua regia (a mixture of hydrochloric and nitric acids) dissolves it slowly as hydro-platinic acid. Alloyed with 30 per cent of rhodium, a kindred metal, it is proof even against aqua regia, but very expensive withal.

The ore in which platinum usually is found is called polyxene, and is, as its name indicates, a very complex mixture of mineral compounds, containing the whole platinum family of metals—palladium, iridium, rhodium, ruthenium and osmium—gold, chrome iron, magnetic oxide of iron, zircon, corundum and sometimes diamonds. Occasionally platinum nuggets of considerable size are found, one in the Demidoff museum weighing twenty-one pounds, Troy weight. (Paul Gregoryevitch Demidoff was a Russian scholar and patron of science, 1731-1781.)

The Russian government used this metal for a time in its coinage, but its violent fluctuations in value caused its abandonment for this purpose. Its recent fluctuations may be seen in these changes: In 1901 it was worth \$14.12 per Troy ounce; in 1905, \$17.00; in 1914, \$36.000; in 1918, \$105.00.

One of the most fascinating stories the war has given us was that of a civil engineer who after the breakdown of Russia as a belligerent succeeded in bringing out of the country some 25,000 ounces of this metal of great price, then worth about \$2,000,000, which was published several months ago. This was promptly commandeered by the Government, but fell far short of filling requirements, and the War Board has commandeered most of the metal in the hands of manufacturing jewellers. Why all of it was not taken is a mystery. We have been getting some small supplies from Colombia, but that country has not been on the best of terms with us since President Roosevelt "took Panama," and the future of this supply is dubious now that the Colombian government has taken over the platinum industry, for it is feared that Germany will utilize to the utmost Colombia's unfriendliness to us and so succeed in corraling the whole supply in order to keep it out of our hands. This would be little short of a calamity, for it would tie us down to our present supplies while Germany, presumably, can get all that she needs from Russia. The ratification of the Colombian treaty which has been reposing in its pigeon hole in the Capitol at Washington for the past two years would do much to avert this calamity, and this is now urged by Representative Rainey of Illinois. It is also proposed that the duty of 15 per cent upon the importation of platinum and its kindred metals be repealed.

On the other hand, it was announced on July 25 that an American chemist has discovered a substitute

for platinum that will eliminate the absolute necessity for that metal in handling sulphuric acid in steel mills and munitions factories. Whether it is equally useful in making sulphuric acid was not stated. Details of the discovery are closely guarded. The campaign for the collection of platinum will not be abandoned, however, until ample tests of the substitute have been made.

There are said to be rich deposits—a mother-lode, in fact—of platinum in Alaska in form different from those in which it has been hitherto found and requiring a different treatment for its extraction. Beyond the allegation that it is in a remote part of that vast territory, that it will require government assistance in its development, and that the government has the matter under investigation, nothing more has been heard of the matter. Should the report prove true it would put a very different face on the platinum situation, though it would be a long time before the metal reached the factory.

How much platinum exists in the country can only be guessed at, but those supposed to be best qualified to guess think the amount to be somewhere between 250,000 and 500,000 ounces. And it has been asserted that the known Russian deposits at the pre-war rate of production cannot last more than a dozen years. These have thus far produced more than 90 per cent of the world's output. Colombia possesses a considerable reserve, but a more scientific method of working it will be necessary if she is to add greatly to the world's supply. Mr. Joseph Griswold Deane, chairman of the W. S. S. Metal Market, which is co-operating with the National War Savings Committee, has issued an appeal to owners of platinum in any form to sell it to the government at \$105 an ounce, and the hope is held out that when the war is over they may replace their trinkets at a lower price. The dental profession is said to use some 27,000 ounces of platinum annually, while 30,000 ounces have been used by telephone manufacturers every year. The former are said to be prepared to use an alloy containing but 10 per cent of platinum, while the latter have cut down their use of it considerably.

George Otis Smith, Director of the United States Geological Survey, thinks the most unpatriotic use of money that can now be made is the purchase of platinum gewgaws. He believes that when the men and women of the country who have invested in these come to understand the vital role the metal plays in the manufacture of explosives and airplanes for our military forces the solicitude of the War Industries Board for the welfare of the platinum jewellery trade will appear very petty as compared with their own solicitude for the lives of our soldiers.

Thus this Cinderella of metals, once despised and denied association with the other noble metals, then relegated to be the drudge of the chemical laboratory and the slave in the manufacture of corrosive acids, has arrived at the dignity of a metal both noble and useful, whose work it may yet be to save a civilization that once despised it.

GENERAL FOCH—A PEN PORTRAIT.

Foch is the typical French soldier.

He was born on August 4th, 1851, at Tarbes, a little city in the Pyrenees, where his father held an administrative post.

His education was obtained in provincial cities and at the Ecole Polytechnique, which he entered in 1871. He passed through various garrisons as an artillery officer and in 1884 was admitted to the Ecole de Guerre as a student.

Twelve years later, ranking then as a Major, he returned to the Ecole de Guerre as an instructor. After five years in this professorship, in which he showed brilliant powers and exercised a great influence over the students, he was sent back to the line as a Lieutenant-Colonel. In 1907 he was transferred, as a Brigadier-General, to the post for which he was pre-eminently marked out, that of Commandant of the Ecole de Guerre, where for four years he worked to increase the efficiency of that institution. Later he was given the post of honor of the French Army, the 20th Corps, Headquarters, Nancy. There the war found him.

He was the great teacher who, more than any other man in the French Army, created the mode of thought under which its Generals and Staff entered the present war. Classes of young officers, selected from the whole of the army, sat at Foch's feet at the Ecole de Guerre, and carried away with them an

unbounded devotion to and faith in the man they had been privileged to listen to. He was an enthusiast, and his patriotism and his profession merged into a splendid effort of intellect in which his students delighted.

Later these young officers rapidly came to the front as commanders of French divisions, and this enabled Foch, in part, to realize one of his great ambitions, which was that the French Army should be permeated with the doctrine the Ecole de Guerre had taught of belief in the offensive, the offensive at all costs. General Foch will undoubtedly attempt to show us the working of this doctrine in its soundest aspects.

At the first battle of the Marne, afterward in joint control of the operations that saved the Channel ports, and during the following Winter, General Foch rendered the greatest services. From the first day of the invasion until the crisis of last Spring, when Foch was chosen Generalissimo of the Armies of Civilization, it stands out very clearly that, of all the subordinates of Joffre, Foch has had the most consistent record.

The American Army stands joyously under the orders of Ferdinand Foch. We know we shall find no better leader; whatever the issue, we shall cherish his long and proven record, as that of a great soldier and a great Frenchman. Our histories will record our pride at having fought under his orders.—(Extracts from "General Foch: An Appreciation," by Major Robert M. Johnson.)