

what is believed to be the hardening or hardenite form of carbon, that is, the alloy elements which enable the hardening carbon—or call it what you will—to retain its hard cutting properties in the steel. Whilst a similar change occurs by heat treating any low carbon steel, that is to say, carbon steel without other modifying elements present, or present in very small percentages only, the chromium and tungsten in high-speed alloy steel maintain, or assist in maintaining, the hardenite present in that form, so that the cutting edge, does not lose its hardness even when quite a considerable degree of heat caused by frictional contact is reached, which would entirely soften ordinary carbon steel.

Field for Research.

It will be seen that even to-day the field for research has been and still is an immense one; it is full of difficulties and perplexities. Contradictions often seem to present themselves. Nevertheless, the advance made in this branch of alloy steels since the date of my first researches in 1882 and onwards, also my paper on "Manganese Steel" in 1888, has been of a startling nature.

Whilst it is true there may not be at the present time room for such abnormal discoveries in ferrous metallurgy as in the past, yet workers all over the world are quietly and steadily adding to our stock of knowledge on points, some of which may not seem so important at the time, but all of which tend to enable us to better understand and therefore control the desired qualities of iron and its alloys.

VANADIUM IN STEEL.

Vanadium is a metal, which in late years, has been applied with remarkable results in the steel industry. The reason it was not used sooner in the manufacturing arts was because of its scarcity. Large and exceptionally rich deposits of vanadium ore were discovered in the Peruvian Andes several years ago. It is to this source that vanadium steel owe their present commercial status. Scientists in the employ of the French Government first settled the question "Does vanadium improve the quality of steel?" They proved that the addition of a small percentage of vanadium, never above $\frac{3}{4}$ per cent., gives to steel a remarkable increase in strength without impairing its ductility. This result cannot be secured from any other element used in the composition of steel. Carbon, for example, increases the strength up to a certain point, but causes the brittleness and even fails to strengthen when employed in large amounts, the result of further additions producing ordinary pig-iron.—M. M. Campbell.

U. S. SILVER PRODUCTION, 1914.

United States production of silver again reached a high mark in 1914. Preliminary estimates of the Geological Survey and the Bureau of the Mint indicate 67,929,700 fine ounces, valued at \$37,225,000. Final figures may be somewhat lower.

Increases were notable in Idaho, California and Arizona, and large decreases were recorded in Montana, Utah, Nevada and Colorado. Montana output fell off more than 1,500,000 ounces, owing chiefly to curtailed copper yield resulting mainly from European war, but also in part from labor conditions at Butte.

Demand for silver from India and China was disappointingly light in 1914, and London stocks accumulated, resulting in a poor market. Average price for the year was about 54.8 cents, or the lowest since 1911.

CAPITAL AND LABOR.

That the U. S. Steel Corporation has paid \$2,564,000 to workmen injured or to families of those killed was stated by Geo. W. Perkins, formerly of J. P. Morgan & Co., before the U. S. Federal Commission on Industrial Relations. "There were 2,092 men on our pension list at the end of 1913," said Mr. Perkins, "and the annual outlay is \$422,000."

Witness said that total wages paid by the corporation in 1913 were \$207,000,000. This averaged \$2.85 a day for all workers except executives. Mr. Perkins admitted that 22.5 per cent. of the men work 12 hours a day, but they do not labor continuously, resting every 30 minutes. In 1913, said the witness, the corporation paid \$660,000 for safety appliances.

Mr. Perkins advocated national control, through federal charter of corporations operating in more than one state.

"The profit-sharing plan is the missing link between labor and capital," he said. "Profit-sharing would go far to abolish industrial unrest."

Mr. Perkins defended combinations of capital and believed labor should organize for its own protection. "Labor should organize in keeping with all the laws," said he, "and business should organize in such a way that it cannot be made the target of legislation. The weak spot in labor unions is the same as in business, namely, a disregard of rights of others. Conditions are bad now because of the war, but when the war is over, conditions will be worse unless the tariff is changed."

COPPER.

Charles Hayden, who is in Boston, speaking of the present highly interesting situation in copper, says:

"The foreign demand for copper is enormous, and spot cash is being paid for it. Whether it goes to France, Russia, England or Japan we know not. Millions of pounds are being taken by the foreigners for quick delivery.

"The American demand is relatively light. The manufacturers are in a better position than are the producers to predict when this American demand will start up. If the American buyers should come into the market for large quantities of copper, it would compel an increase in production to 100 per cent. of capacity in order to prevent a runaway market.

"We do not know when the war will end, but we do know that the Government has commandeered all the copper in Germany, and all factories there have been practically closed down, running less than 5 per cent. of normal capacity. There were a lot of contracts made last May and June on which the copper is still undelivered. Under the present agreement this copper will have to be shipped immediately as soon as the war is over.

"There is no desire on the part of the producer, and the same is true of the consumer, to have a wild, runaway market, and production will undoubtedly gradually increase to the point of supplying consumers on a 14 to 15 cent basis with all the copper desired.

"Speaking for our own companies we prefer to produce at the present rate and get 14 cents for our copper than to increase production faster than the consumptive demand calls for and sell the larger output at a lesser price."—Boston News Bureau.