# USES OF VANADIUM STEEL tion. Crucible steel, for example, when

Will Work Great Changes, Say the Modern to the square inch and an elongation of Metaliurgists.

HOW CHEMISTRY AIDS METAL WORKERS

New Alloy Possesses Greater Ductility and Tensile Strength-Once Rare Metal Found in Great Quantities.

The steel trade has taken up vanadium, a rare element, as an alloy, and it has found that its use in small quantities makes a steel that increases tensile strength and elongation about 30 per cent. There is no question as to these results. The one enough.

The problem used to be to get enough of the metal itself. It was supposed to be one of those rare things like radium and of a lower melting point, and soon the other elusive metals, but all that has been overcome and it can be found in great quantities in this country and is no harder that the proportion of vanadium could be to mine than copper.

prepare it for alloy purposes, is the only mixture is the best, expensive feature. The steel trade has practically overcome that now and those who are expert in such matters declare that the period of vandium steel has come and that it will occupy a more important place in the world than did nickel steel.

#### Curiosity for Years.

eighty years it was looked upon as a chem- Tools, vehicles, bridges, in fact, all kinds feal curiosity. Humboldt mentions it in of structures and utensils, will be transhis "Cosmos." In the early nineties it was formed. It will also mean a great change used for dyeing purposes, in making antiline in ship construction. It will change armor black, and to form enamels on glass, pot- plate. Indeed, that is already under way. tery and porcelain, cuteffy in greenish With vanadium the face of armor plates gold colors. Since 188 the steel trade has will be hardened a great deal more than waked up to its possibilities as an alloy, at present. The plate itself will be more Sir Thomas Lipton made use of it for the ductile and in a general way softer. The spars of Shamrock III and it was also result will be that if a projectile pierces used for the spars of the German em- the plate it will be buried in the softer maperor's American made yacht Meteor. Just terial on the back and will not splinter now the automobile men have taken up the plate to the extent that piercing shots the metal and the auto makers say it is do now. It will probably mean a lessening bound to bring about a revolution in the of weight in armor plates, and any one manufacture of their vehicles. Tougher, who knows about warship construction will stronger steel can be used in the machines realize what that will mean to the navies than formerly, with even some lessening of the world. Vanadium will also improve

100 per cent more ductile and thus lessen change in that industry. All this means a the breaking quality is bound to receive great change commercially in the world, consideration from the makers of rolling stock, whether it be rallway cars or autos. States has extensive deposits of this metal. or bleycles. The makers of bridges also Why should the country go to Peru or welcome any alloy that will increase the Mexico or to Europe when it has an unstrain capacity, while the manufacturers limited supply at home? I have spent a of tools of all kinds say that vanadium lifetime practically in making researches offers a great superjority over all other that will make this possible. I have no steel hardening metals.

#### Its Use in Naval Warfare.

The use of this alloy, the experts declare, is bound to have an important influthan commercial ways. It will mean a tent." new kind of armor plate and will be used extensively in guns, increasing their clastic qualities and preventing that most dangerous form of wear and tear on guns known as erosion. Indeed, it is already being used by the Vickers-Maxim people, it is declared. Togo had Vickers-Maxim guns on his ships and vanadium had been were largely incapacitated because of is doing good service. erosion. The Japanese guns were not af-

fected in this way. found that there is practically no limit to states. It can now be produced at about \$2.50 a pound, but it is declared that it soon cents a pound, and when that day comes vanadium steel will rule the metal world. The quality of brittleness will then be removed from steel.

## Compared With Nickel.

It has already been found that I per cent of vanadium is equal to 10 per cent of nickel, in adding ductility and tensile strength to steel. Already several mines are being operated in this country. There is one seam of sandatone in Colorado that Mr. Emil Pouresy, who is a good and faithhas from 4 to 5 per cent of vanadium, ful man, and the miners say it is as easy to mine as

Although the metal was discovered in only in the last decade, it was known as an alloy in 1850, and then was allowed to drop out of sight. This came about in a peculiar way. It was discovered in 1830 do. in Sweden were producing a metal that ore known.

that a rare metal known as vanadium had afforded me a greater opportunity to see been discovered in 1801 it was then redis- the city of Marseilles. covered through Seftrom. Large deposits I arrived in Paris from Marseilles at 19 on the shelf again.

tradition. The elder Baxeres owned the fully their methods of work. the erection of a plant for the manufacture headquarters of the national committee.

tained copper, carbon, silicates, siliminum district and provide for the support. There and elastic limit showed decreasing due- association must first become a membe tility and were regarded as fatheres. Dr. of the national alliance and is then assigned cause of its great expense. The acid sui- belonging to the alliance. There are eight phate process was cheaper and more prac- college associations. Five cities with paid

method, and work has gone on along that National Secretary Emil Sautter and two line until now Dr. Haxeres says it will be assistants, Mr. Ch. Schneider and Mr. S. possible to produce the alloy as cheap as Williamson, also Mr. Chr. Grauss, the 5 per cent a pound instead of at \$2.50, a student secretary.

good commercial rate at prosent. The effect of vanadium as an alloy is On Board the Baltic, Atlantic Ocean, Febshown in numerous tables that the experts | runry 6, 1907.

mixed with vanadium, has produced metal with a breaking strain of 61.57 tons El per cent. Before vanadium was added the steel broke under a load of 31.14 tens to the square inch and the elongation was nly 16 per cent. Cast Iron, with a break-

ing strain of seven and one-half tons to the square inch, was treated with 5 per cent of vanadium and the breaking strain rose to thirteen tops. Ingots of Iron with an ultimate stress of Siglis pounds have been raised to an ultimate stress of \$4.024 pounds by introducing 6.5 per cent of vanadium. The increased elongation is about 10 per cent. Steel containing about 1.15 per cent of carbon, with an elastic limit of about thirty tons and an ultimate stress of about stxty tons, has been raised seven tons in ultimate stress through the introduction of 15 per cent of vanadium,

At first the pure vanadium was introproblem is to get the vanadium sheap duced in the moiten steel. It was soon found that owing to its high melting point was not dissolved. Then it became ressary to make ferro-vanadium alloys first ferro-vanadium alloy of 10 per cent was made. Since then it has been shown increased to as high as 30 per cent, but The treatment of the metal, so as to Dr. Baxeres has said that the 10 per cent

### Another Revolution Impends.

In speaking of vanadium the other day, Dr. Baxeres said: "I veritably believe another revolution in the steel industry is at hand. The fact that the automobile men have taken up the use of this alloy is sufficient to establish its worth. It is Vanadium has been known since 1801. For only a step to bring it into general use. gun manufacture and bring a great change Any process that will make steel nearly in that industry. All this means a great "The best part of it all is that the United direct interest now in the production of the metal. If, when the revolution that I predict comes about, my name shall be remembered as a benefactor in the transence on national development in other the world has ever known, I shall be con-

#### Weidensall's Letter

(Continued from Page One.)

ing was held. It was well attended. I was asked to address it, which I did for a short time. I had frequent interviews with Mr. used in them as an alloy. The Russian M. Rideout upon his work and upon the guns were not made of vanadium steel. association work in Europe in many par-Those guns on ships taken by the Japanese | tleulars. He is a choice man and true, and

I reached Bordeaux, France, on December 12, 1906, and spent two days there. On It used to be thought that the only place my arrival I met the general secretary of where vanadium could be secured in mar- the association, Mr. Emil Pouresy, who katable quantities was high up in the heartly welcomed me. I had an interview mountains of Peru. The cost of getting it with him on things pertaining to the work out and preparing it as an alloy ran to of the secretary and other association matters, in which he had more or less Freight to England or the United States difficulty. At a meeting of representatives was also another tremendous handleap, of the association called to meet me I Within ten years, however, it has been presented greetings I had with me from different parts of the world, then spoke to the amount of the metal in the I'nited them of the great importance of the as-States. Great deposits have been found in sociation work and that true association Colorado. Utah, New Mexico and Califor- Work could not be over estimated. I spoke nia, and it also exists picutifully in other particularly of their part in the work, Many questions were asked me, which I answered the best I could. All my sugcan be made fit for use as cheap as 25 Restions were very kindly received. I think I made clear some things that were not as well understood as they should be. National Secretary Sautter was present and emphasized what I had said and thanked me for it. I appreciated this very much, for he is very clear in his association knowledge. I met also the national student secretary, Mr. Chr. Grauss, who was in Bordeaux at this time, and had different personal interviews with him. I had other

I arrived at Marseilles, France, in the night of December 28, 1906, and spent two 1801 and its use as an alloy for steel has the association. The general secretary was come before the steel world prominently not in. He left a note for me that he was to leave Marseilles for Cannes to attend a convention and his president was to leave also, and nothing was appointed for me to This made it impossible for me to do that the iron ore from the Taberg mines anything for the association. This was about the only real miss I had made in my had greater ductility than any other iron world trip, where I had expected to do something. The general secretary after-The Swedish scientist Seftrom started an wards wrote me a letter and gave satisfacinvestigation, and sithough it was known tory reasons for what he had done. This

were found in the lead ores of Zimapan. p. m. December 31, 1968. I had calculated Mexico, by Del Rio. Once more vanadium to do many things during this visit in secured a new lease of life, but the great Paris, but the weather was so wretched difficulty of extracting the metal and of that I was caught by the grippe or inmaking its use practical served to put it fluenza, which prevented me from doing much of anything I had intended to do-The revival of the use of vanadium has However, I had frequent interviews with been due to thirty yours of research and National Secretary Sautter, Special Secreat a cost of fully \$150,000 of his private for- tary Ridcout, with the president of the tune on the part of Dr. J. Baxeres de Al- French association and with others. But sugaray, a native of Argentina, and now a I had to take care of myself. All in all, I resident of New York City. Dr. Haxeren's had a good time in France. I was sure I father experimented with the metal years had afforded the French association real before the son tok hold of it. Working help, which was appreciated and so exover the metal became a matter of family prossed in word and letter. I learned more

Santa Marta mines, which had the largest. The national committee and secretary are ode of lead vandate, as the compound was doing a noble work upon the true associaknown in its original state, then brown. Uon basis, winning young men to Jesus The younger Baxeres worked for nearly a Christ as their personal Saviour. The naquarter of a century and his efforts led to tional work is well organized. Paris is the of vanadium products in Llanelly, South which consists of nineteen persons, nine on Wales, in 1898, where ferro-vacuatium and the executive headquarters committee in Paris, nine others representing different parts of France and one representing the In the early days of experimenting with student work. The country is divided into vanadium as a steel alloy unsatisfactory line districts, not political divisions; each results were obtained in many cases by- district has its own committee of from five cause the vanadium was not pure. It can- to seven members to plan the work for the and other metals obmoximus to the produc. are now three paid district secretaries and of good steel. These experiments, more will be added as fast as good men while showing increased tensile strength and their support can be secured. Every Bayeres kept on with his studies. He tried to a district. A formal adherence to the o fuse the ore with soda carbonate and Paris basis is essential to entering the coal, but that process was abandoned be- alliance. There are now 120 associations tical and has since been improved greatly general secretaries, some of them with Electrolysis was found to be the best assistants. The national force consists of

ROBERT WEIDENSALL

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