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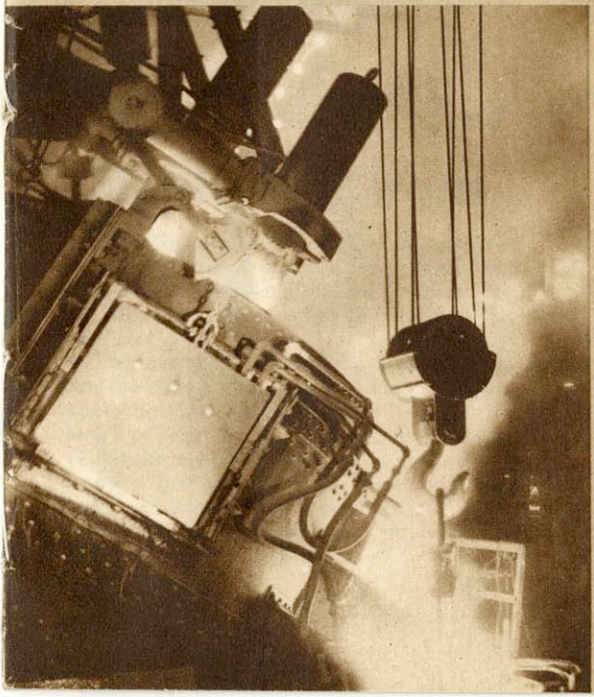
UNION CARBIDE AND CARBON CORPORATION

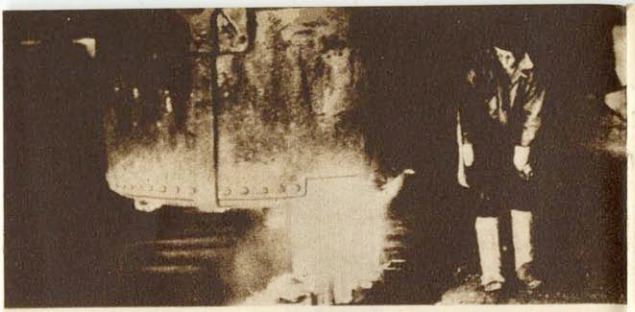
Products for ALLOY STEELS AND IRONS



Products for Alloy Steels and Irons

The Electro Metallurgical Company—which is a unit of Union Carbide and Carbon Corporation—makes Electromet ferro-alloys and metals for improving iron and steel.

The story of how these ferro-alloys improve iron and steel—making possible such things as the wonderful new "stainless" steels—is a fascinating one. To really understand it, however, you should know a few simple facts about ordinary iron and steel—the kind that you have used in your home and your business for years.



Iron

Your cast-iron stove, the sheet-iron roofs of buildings, and the steel pipes and rods and beams that you see every day—all are made from pig iron that has been refined into cast iron or steel. Pig iron is produced from iron ore taken from iron mines such as those near Lake Superior.

Removes Impurities

Pig iron alone is never used to make things, because it contains certain impurities, such as sulphur, phosphorus, and oxygen. In order to make cast iron or steel from pig iron, these impurities must be removed. Otherwise, the finished iron or steel would be too brittle, too soft, or unsatisfactory in other ways. These impurities are removed by adding silicon and manganese to the furnace. Silicon and manganese are semi-rare metals that have the power of drawing out the sulphur, phosphorus, and oxygen.

On the other hand, by using these and certain other semi-rare metals—such as chromium, molybdenum, tungsten, nickel, zirconium, aluminum, and vanadium—it is possible to give steel or iron useful properties that it could not otherwise have.

This process of adding special semi-rare metals is called "alloying", and steel or iron produced in this way is known as "alloy steel" or "alloy iron". These semi-rare metals are added in the form of "ferro-alloys", which are composed of

iron and one of the semi-rare metals. For example, a ferro-alloy composed of iron and manganese is known as ferro-manganese. The Electromet products include ferro-alloys of chromium, tungsten, manganese, silicon, vanadium, and zirconium. Electromet ferro-alloys are used by practically all the leading producers of iron and steel, and are recognized as the best obtainable.

Ferro-Alloys Important

From the above, we have seen that ferro-alloys do two things:

1. They remove impurities from iron or steel; and

2. They give iron or steel certain useful properties—such as toughness, hardness, and stainlessness.

Today, the use of Electromet ferro-alloys is standard practice in foundries and steel plants, because Electromet's staff of metallurgists has developed sure and economical methods of producing almost any desired property in steel or iron by the scientific use of ferro-alloys.

The effects of any alloy or combination

of alloys can be varied in many ways, so that it is possible to produce strength, hardness, toughness, wear-resistance, heat-resistance, corrosion-resistance, and many other properties that make steel or iron last longer, look better, or perform more efficiently. For example:

Stainless Steel

By adding chromium and small amounts of other alloys to steel, it is possible to make a metal that will not rust or corrode. Such stainless steel is a familiar sight on the Chrysler and Empire State towers in New York, where—after years of exposure to rain and dirt and all the gases in the air—it shines as brightly as on the day it was new.

Cooking Utensils

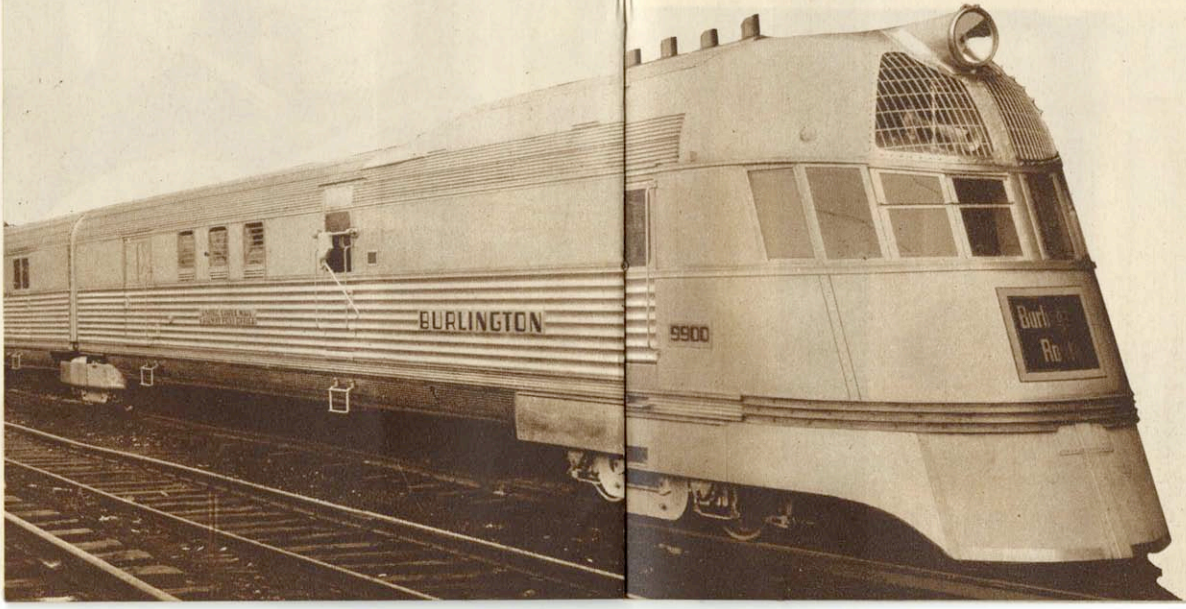
Stainless steels also are used for cooking utensils in the home, in restaurants, in dairies, in canneries, and in breweries. Most utensils are exposed directly to heat and to the acids in foods, which quickly stain and eat away ordinary metals. Stainless steel vessels and containers, however, resist these attacks and stay clean and strong many times longer.

Transportation

The metal in automobile engines is exposed to many kinds of attack: heat, corrosion, wear, and shock. Motor-car makers have found that there are special alloy steels that make these parts last longer and perform better.

Furthermore, they have found that certain alloy steels are much stronger than ordinary steels. In other words, they can use fewer pounds of metal and get as much, or greater, strength. Therefore, alloy steels are being used to make cars lighter and stronger. Builders of railway cars, ships, and airplanes have discovered the same thing. Today, almost every known vehicle is built with one or more kinds of alloy steel.

For example, the Burlington "Zephyr" train, which is on display at *A Century of Progress*, is built almost entirely of stainless and other alloy steels made with ferro-alloys. These alloy steels have made the "Zephyr" so light that ten men can pull it with a rope. Yet in strength and safety, the "Zephyr" equals or surpasses the cumbersome trains made of ordinary steel. By thus combining strength and lightness, the train can run faster on less fuel—there being less dead weight for the engines to propel. Furthermore, by making the engine parts more compact, alloy steels permit the train to be streamlined, which increases its speed still more.

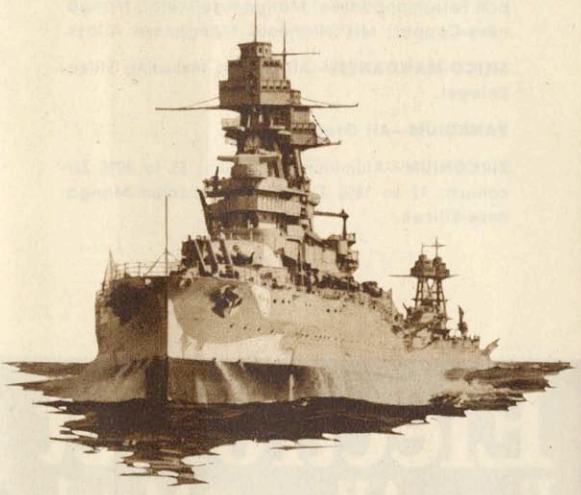


Used Everywhere

In fact, the present century has become the Age of Alloys. Tools, machines, buildings, architectural ornaments, motor vehicles, railway supplies, instruments, bridges, jewelry, vessels, piping, containers, furniture—all are being made lighter or stronger or cheaper with alloy steels or alloy irons.

Electromet's part in this great movement is to develop the materials and methods that make such alloys possible. By constant research, it discovers new or better methods of using ferro-alloys in the production of alloy steels and irons. By an aggressive program of education, it teaches people what the advantages of these alloys are. And by maintaining a staff of metallurgists and engineers to assist iron- and steel-makers in all problems connected with the use of ferro-alloys, it enables its customers to produce alloy steels and irons of the best quality at the lowest possible cost.

If, in your business, there appears to be some tool or machine-part or product that would wear better, work better, or look better if it were made of alloy steel or alloy iron, do not hesitate to call upon Electromet's engineers for advice or assistance in selecting the best type of material for the job. Or, if you would like to have further technical data on ferro-alloys, send for some of the Electromet literature listed.



ELECTROMET PRODUCTS

CHROMIUM — High-Carbon Ferrochrome (maximum 6% carbon); Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon); Chromium Metal; Chromium-Copper; Miscellaneous Chromium Alloys.

SILICON—Ferrosilicon 15%; Ferrosilicon 50%; Ferrosilicon 75%; Ferrosilicon 80 to 85%; Ferrosilicon 90 to 95%; Refined Silicon (minimum 97% Silicon) Calcium Silicon; Calcium-Aluminum-Silicon; Calcium-Manganese-Silicon; Silicon-Copper; Miscellaneous Silicon Alloys.

BRIQUETS (Patented)—Chrome Briquets; Silicon Briquets; Manganese Briquets.

TUNGSTEN

MANGANESE — Standard Ferromanganese 78 to 82%; Low-Carbon Ferromanganese; Medium-Carbon Ferromanganese; Manganese Metal; Manganese-Copper; Miscellaneous Manganese Alloys.

SILICO-MANGANESE—All grades including Silico-Spiegel.

VANADIUM—All Grades.

ZIRCONIUM—Aluminum-Zirconium; 35 to 40% Zirconium; 12 to 15% Zirconium; Zirconium-Manganese-Silicon.

Electromet
Ferro-Alloys & Metals

ELECTROMET TECHNICAL LITERATURE
on Metals and Ferro-Alloys

Available without cost by writing to Union Carbide and Carbon Corporation, 30 East 42nd Street, New York, N. Y.

E-100—Silicon-Manganese Alloys for the Deoxidation of Steel
E-101—Stainless Steels and Their Uses
E-103—The Use of Silicon and Manganese Briquets in the Cupola
E-104—Effect of Vanadium in High-Speed Steel
E-105—Steels Suitable for Shipbuilding
E-106—Alloy Steels and Their Uses in the Mining Industry
E-107—Cromansil Steels
E-108—Briquet Iron Means High Quality Iron
E-109—Metals and Ferro-Alloys Used in the Manufacture of Steel

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