CORROSION: THE CAUSE, THE EFFECT, THE REMEDY; THE CIVILIZATION OF FERRIC SHEET METAL

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Trieste

Corrosion---

The Cause--The Effect--The Remedy

This entire topic is embodied
in a treatise herein entitled

The Civilization of Ferric Sheet Metal

The Stark Rolling Mill Company
Canton, Ohio

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We are indebted to the authors of the following works for the assistance derived from their books in writing "The Civilization of Ferric Sheet Metal"— "Metallurgy of Iron and Steel," Bradley Stoughton; "The Corrosion of Iron and Steel," J Newton Friend, and "The Story of Iron and Steel," J Russell Smith, Ph. D.

THE STARK ROLLING MILL CO.

THE "CIVILIZATION" OF FERRIC SHEET METAL

A treatise which embodies the entire topic—
Corrosion—The Cause—The Effect—The Remedy

"FROM DUST THOU ART"

A HANDFUL of clay—man.

A shovelfull of iron ore—a metal sheet.

Clay and Iron Ore are both earthy substances. And the law of nature requires that both man and iron ore products return from whence they came.

"TO DUST RETURNETH"

Man dies. Sheet metal corrodes.

The weaker man succumbs first. And the "weaker" sheet metal disintegrates first.

Let us carry this simile a step further.

Primitive man required civilization—a long and tedious process covering a period of over five thousand years, and which is not even now completed.

The first metal sheet was crude. It needed development, or "civilization."

All men today are made from the same "raw material"—clay, but they do not all possess the same degree of intellect, refinement or civilization.

All ferric sheets are made from the same raw material—iron ore, but they all do not, by any means, possess the same properties, the same degree of development—or "civilization."

The advent of the modern commercial sheet metal is only a matter of a little more than a half century, but the iron industry is as old as the world itself.

IRON

Iron is found and seen everywhere—in the most unsuspected forms.

The complexion of rosy youth (natural or artificial), red paint, red brick and even the rosy apple derive their hue from iron.

It has been estimated that as much as a fifth of the entire content of the globe is iron. Yet man cannot delve further than about five thousand feet—the mere surface of the earth.

If someone could manage to go a few thousand miles beneath the surface of the earth, he would undoubtedly come to gigantic mountains of iron ore.

When, where or how the first iron was found will remain a mystery forever. Its discovery may have been accidental, like that of the great silver mines of Potosi in South America.

We are told that a camp fire melted a lump of silver and revealed one of the richest silver mines in the world.

A lightning bolt, a forest fire or another camp fire may have unfolded iron ore deposits to mankind.

"NOTHING NEW UNDER THE SUN"

In the fifteenth century (B. C.) a forest fire revealed to the natives of Crete that the ores of their island would make iron.

The Bible, histories and ancient literature all contain evidence that iron was made and used thousands of years ago.

The fourth chapter of Genesis tells us that Tubal Cain, born in the seventh generation from Adam was an "instructor of every artificer in brass and iron."

The natives of Canaan fought the Israelites from iron chariots, we are told. The terrible Og, King of Bashan, had an iron bed and the spearhead of Goliath weighed six hundred shekels of iron.

Extensive research discloses the fact that iron was made by the Egyptians, Assyrians, Chaldeans and Babylonians four thousand years ago, and somewhat later by the Greeks, Romans, Spaniards and Vikings.

And though the use of iron was widespread, it was costly and could almost be ranked as a precious metal.

Primitive methods of manufacture was the reason for the costliness of iron.

ONE THOUSAND DOLLARS A TON

Recent experiments in iron making by the old Roman methods showed that iron could not be made in the same way now for less than a thousand dollars a ton.

Perhaps this explains why the small iron clasps which held together the stones in the Roman Coliseum disappeared so mysteriously.

CRUDE METHODS

Crude methods of manufacture, however, did not mean inferior quality of iron. To the contrary, iron of those days was of a wonderfully superior quality.

The primitive forges produced the iron in the form of a lump; not in a molten form like the iron and steel of today. This lump of hot iron was kneaded, hammered and reheated. Then refined in refinery forges until it was pure and homogeneous.

Two men produced about a dozen pounds of malleable iron in a day by this method. Is it any wonder then that it was durable, highly efficient and costly?

EXCELLENT QUALITY

The far famed swords of Toledo, Bilboa and Damascus, which have never been excelled, are excellent specimens of the old time irons' superiority.

William the Conqueror attributed his victory at Hastings in 1066 to the superior swords of his men.

A monument for the durability of the old time irons is the iron pillar at Delhi, India, weighing about seventeen tons, of which we nearly all have heard.

For twenty-eight centuries this pillar has resisted the weather and today it seems hardly affected.

Explorations beneath the great pyramid of Gizeh in 1837 disclosed a small piece of a wrought iron tool, which was used in the construction of that monument about five thousand years ago. It may be seen at the British Museum—more evidence of the durability of the ancient irons.

A LOST ART

Iron making in those days was indeed an art. What caused its decline during the middle ages, we do not know, but this decline was accompanied by a general lapse of knowledge of iron making until it was revived by the Germans during the latter part of the mediaeval period.

Although the industry was revived, the knack of making the same high quality of iron seemed to be lost.

THE FIRST BLAST FURNACE

To the Germans, however, goes the credit for producing the first iron that could be melted to a liquid state. Up to then iron could not be poured. The Germans really produced the first form of the modern blast furnace, which they called the "stuckofen." This "stuckofen," or blast furnace, produced cast iron.

This was the beginning of modern iron making. From now on the manufacture of iron made great strides. Everyone took a hand in improving the blast furnace, including the Belgians, French and English.

The great demand, however, was for a method for producing steel in large quan-

tities cheaply. And finally this want was filled.

TWO MINDS WITH BUT A SINGLE THOUGHT

It has always been a question as to whether the credit for the invention of the "convertor" process of making steel is due to William Kelly or Sir Henry Bessemer. Both inventions appeared almost simultaneously, and both were practically identical.

In any event, William Kelly received about a half-million dollars from his invention and ended his days in Louisville, Ky., an unknown genius, but respected citizen, while Bessemer secured about eight million dollars and knighthood for his invention.

Besides, the process was named after Sir Henry Bessemer, and the resulting product was named Bessemer Steel.

Kelly and Bessemer, both, realized that to produce an iron ore product suitable for commercial purposes, certain impurities must be eliminated.

THE "BIG FIVE" IMPURITIES

Iron ore is rarely found in a pure state. It is nearly always combined with dirt and impurities. The impurities found in the largest quantities are sulphur, carbon, manganese, phosphorous and silicon. These are the most common impurities and are recognized by all prominent metallurgists as the most dangerous to the finished material. They are known as the "Big Five."

A SIXTH HARMFUL IMPURITY

Copper is also found in iron ore—usually only a trace but frequently in large quantities. When the quantity is more than merely a trace copper is as dangerous to the finished material as any of the "Big Five" impurities.

Iron ore containing copper is undesirable and cheap because the copper is almost impossible to extract.