(No Model.)

S. T. WELLMAN.

MANUFACTURING WROUGHT STEEL.

No. 298,642. Patented May 13, 1884.

Fig. 1.

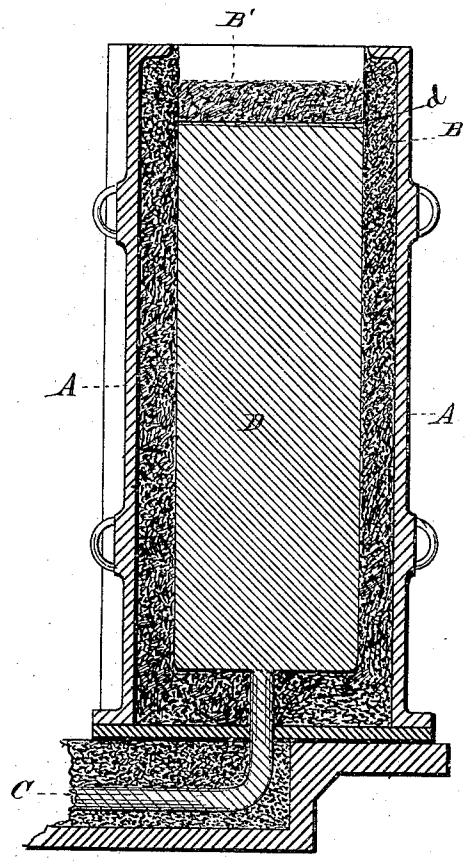
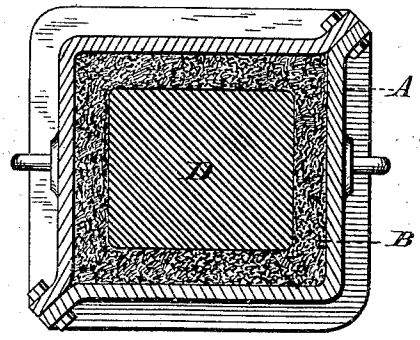


Fig. 2.



WITNESSES

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SAMUEL T. WELLMAN, OF CLEVELAND, OHIO.

MANUFACTURING WROUGHT-STEEL.

SPECIFICATION forming part of Letters Patent No. 298,642, dated May 13, 1884.

Application filed April 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. WELLMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Manufacturing Wrought-Steel; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in manufacturing wrought-steel; and it consists in an improved method of casting and treating the ingots, as will be hereinafter described, and pointed out in the claims.

In manufacturing this kind of steel the usual manner is to pour the molten steel into iron molds. The molds soon chill the outside of the steel, so that a crust or shell is formed, and when this becomes sufficiently hard the mold is withdrawn and the ingot left to cool. The ingot is then reheated and passed to the rolls or hammers.

The object of my invention is to save the time and expense of reheating the ingot, and also to save the wasting of the steel in reheating, caused by oxidation, and also to save the great cost of making and keeping in repair the iron molds. For this purpose, instead of employing the iron mold that chills steel so quickly, I cast the ingot in a mold made of some good non-conducting material, thereby insuring a slow radiation of heat and a homogeneous temperature to the ingot, and allowing the ingot to remain in the mold until it has been sufficiently reduced in temperature for rolling or hammering, and then removing the mold from the ingot. By cooling in this manner, when the ingot is reduced to the proper temperature, it may be taken direct to the hammer or rolls, thus using only the initial heat.

In the drawings, Figure 1 is a vertical sectional view of a mold suitable for use in carrying out my invention. Fig. 2 is a transverse section of the same mold.

A represents an outer casing or flask, preferably of iron, provided with handles and other suitable appliances; and B, the non-conducting lining or mold proper.

D represents the cavity of the mold in which the ingot is formed. The molten steel may be poured in at the top of the mold, if desired, or the molds may be filled from the bottom through the passage-way C, the latter being a preferable way, as there is less washing of the mold, and consequently cleaner steel. After the mold is nearly filled, dry sand or other similar material is thrown on the top of the steel, as at B′, and in this manner the ingot is left to cool down to a suitable temperature for rolling. Before applying this covering of sand, however, it would be better to first lay a thin piece of sheet-iron, *d*, on the top of the molten steel, to protect it from dirt and sand, as it is very important to keep the steel as pure as possible. As aforesaid, the cooling will be so slow and gradual that no crust will be formed, and the temperature of the mass will be very even, as much so as it is liable to be when reheated in a furnace; and therefore the after-treatment by rolls or hammers will be just the same as in the usual manner of reheating.

I do not confine myself to the use of silica in making these molds. Any good non-conducting material that will clean off freely from the ingot will answer the same purpose, although I prefer the silica mold made according to what is known as the Cowing patent, dated March 4, 1879, No. 212,902. When silica is used for the molds, it should be pure, or nearly pure. Some glutinous substance—as, for example, flour or molasses—is mixed with the silica, so that the mass will keep its desired shape in the mold, after which it may be packed in the flask or casing, and around a pattern that is afterward removed, very much as an ordinary mold is made of common molding-sand.

I am aware that others have attempted to attain the same result by inclosing metal molds in some non-conducting substance, so that the metal mold would be first heated with the steel, and the steel and molds allowed to cool together. This expedient, if it were successful in other respects, would be so destructive to the metal mold as to render it impracticable; or if the iron mold were made so thick as to protect it from cracking and consequent destruction, there would be so great a mass of metal, and it would absorb so much heat from

the ingot, that when the heat had become equalized the temperature of the ingot would be too low for rolling.

What I claim is—

1. As an improvement in the manufacture of wrought-steel, the method herein described, consisting in casting the ingot in a mold made of some good non-conducting material, thereby insuring a slow radiation of heat and a homogeneous temperature to the ingot, and allowing the ingot to remain in the mold until it has been sufficiently reduced in temperature for rolling or hammering, and then removing the mold from the ingot, substantially as set forth.

2. As an improvement in the manufacture of wrought-steel, the method herein described, consisting in casting the ingot in a mold made of some good non-conducting material—as silica, for instance—and covering the top of the metal of the ingot with non-conducting material, and allowing the ingot to remain in the mold until it has been sufficiently reduced in temperature for rolling or hammering, and then removing the mold from the ingot, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SAMUEL T. WELLMAN.

Witnesses:
C. H. DORER,
ALBERT E. LYNCH.