MAKING CAST IRON FIRE MARKS

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the Fire Mark Circle of the Americas

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September 2013

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Over forty different fire insurance companies throughout the United States issued cast iron fire marks from 1804 to 1904. These cast iron fire marks are more than insurance collectibles; some are works of art in their own right and representative of 19th century technology. While much has been written about fire insurance and the early insurance companies, very little has been written about the production of the fire marks themselves. It is the purpose of this article to give the reader an understanding of the craftsmanship involved in their production and, hopefully, a deeper appreciation of the mark itself.

The Basics

Cast iron fire marks were made by a method called sand casting. In sand casting, a "mold" is made by first mixing moist sand and clay into a moist semi-permanent state. Then a hardwood model of the fire mark, called a "pattern," is embedded in the moist sand. When the pattern is removed, it leaves a hollow space or void, called a mold, in the shape of the desired mark. The pattern is made slightly larger than the actual fire mark because the molten iron will contract when cooled. Molten iron is poured into the mold and allowed to cool and solidify. To retrieve the finished mark, the mold is broken. Therefore, a new mold must be made for each fire mark.

All fire marks have a "casting mark," which is the rough area where the molten iron was either poured directly into the mold cavity or flowed, through channels in the sand, into the mold cavity. In casting, the "sprue" refers to the hole and passage through which the molten iron, or "meld," is poured into the mold. Where the sprue pours directly into the mold cavity, the casting mark on the reverse of the fire mark is called a "sprue mark." That sprue mark is either a circle, called a "circle mark," or a thin line, called a "wedge mark." Where the sprue leads into a channel in the sand and then into the mold cavity, the casting mark on the edge is called a "gate mark."

The above is a general description of sand casting. The following describes the various methods.

Open Mold Casting

The simplest casting method is the open mold process which uses a sand mold that is open on the back and the molten iron is poured directly into the mold or void. Fire marks made using this process will have a flat back and a casting/gate mark on the edge.

The process is as follows:

- The pattern is placed face up on a flat "follow board," also called a pattern board. A "flask," which is a four sided wood frame without a bottom or lid, is placed on the board surrounding the pattern.
- The pattern is covered with "parting dust" to keep the sand from sticking.
- The flask is then filled, beginning with fine sand, then course sand, and packed down. It is important that sand fills the mounting holes in the pattern so as to leave small columns of sand in the mold cavity. These columns are known as "cores." The molten iron will flow around them to create hollow areas (mounting holes) in the casting.
- Once the flask is filled, it is covered with a second follow board, also called a bottom board. and the flask is flipped over bringing the first follow board to the top.
- The follow board and pattern are then removed.
- You now have a mold, which is a negative image of the fire mark in the sand.
- A small depression, or gate, is cut into the sand on the side of the mold cavity to allow excess molten iron to overflow when the mold is full.
- Molten iron is poured into the open mold cavity. When the molten iron cools, the fire mark is removed from the sand and the overflow iron, or gate mark, is removed from the edge. In many instances, the gate mark is worked off so smoothly by the craftsman that it cannot be seen.

Closed Mold Casting

In closed mold casting, the steps for open mold casting are followed until the flask has been flipped. At this point the pattern remains in the flask when the follow board is removed. The flask, where the reverse of the pattern is exposed, is now called the "drag." Marks made

in a closed mold can have either a flat or hollow back. This means that the reverse side of the wood pattern has a completely flat surface or has a hollow area.
To continue:

● "Parting dust" is applied to the reverse of the exposed pattern and surrounding sand.

● A second wood frame, called a "cope," is placed on top of the drag. Pins and sockets at the edges of the cope and drag ensure proper alignment for this two part flask.

● The empty cope is completely filled and packed with sand. The parting dust will keep the newly pack sand in the cope from sticking to the sand and pattern which is in the drag.

● The sand packed cope is then removed and turned on its side.

[Note, where the wood pattern is hollow in the back, the sand in the cope that went into the pattern's hollow area will have a positive image of the hollow area and is called a core. Sand cores form the internal features of the fire mark, i. e. the negative image of a tree on the reverse of the Mutual Assurance's B38 and the hollow hands of the Baltimore Equitable Society's B57-59.]

The next phase of the casting process depends on whether the mold has been designed to have molten iron flow through the sprue directly into the mold cavity or into a channel that leads to the mold cavity.

Casting Fire Marks Where the <u>Sprue Pours Directly</u> Into the Mold Cavity

● The pattern is removed from the drag exposing the mold cavity.

●With the cope on its side a ½" hollow pipe is aligned with the cavity and pushed all the way through the cope sand and the core removed. The hole in the sand is the sprue that allows the molten iron will flow through the sand in the cope, directly into the mold cavity.

● The two flasks are secured tightly together aligning the negative mold cavity in the drag and the positive sand mold image in the cope.

● Molten iron is then poured into the cope's sprue hole and flows through the sand directly into the mold cavity. In this case, the casting mark on the fire mark is a circle sprue mark because the end of the sprue was a ½" circle. Examples of circle sprue marks may be found on the reverse of B83 of the Fire Association.

● When the 1/2” tube used to make the sprue is tapered at the bottom, the molten iron will form a casting mark that is a line or wedge. A wedge sprue mark is the most common casting mark found on the reverse of fire marks.

● After cooling, the casting is removed from the sand and the sprue and any excess iron is removed from the fire mark.

Casting Fire Marks Where the <u>Sprue Pours Into a Channel</u> That Lead Into the Mold Cavity

● After flipping the drag , a slight dent is made in the sand beyond the pattern to mark where the sprue will come through the sand in the cope.

● A ¾” deep and ¾” wide channel is cut in the sand from the dent up to the pattern. This horizontal channel is where the molten iron will flow from the end of the sprue into the mold cavity.

● The pattern is removed from the drag exposing the mold cavity.

● A gate is cut where the channel meets the pattern to allow the molten iron to flow smoothly from the channel into the mold cavity.

● With the cope on its side a ½” hollow pipe is pushed all the way through the cope sand and the core removed. The hole in the sand is the sprue that allows the molten iron to flow through the sand and into the channel.

● The two flasks are secured tightly together aligning the mold cavity in the drag and the positive sand mold image in the cope.

● Molten iron is then poured into the cope’s sprue hole, flowing through the sand into the channel, through the gate and into the mold cavity.

● After cooling, the sprue and any excess iron is removed.

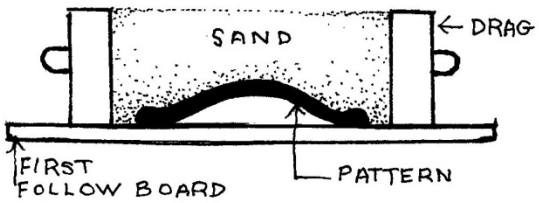
● Note that in this process, the casting or “gate” mark will be on the edge of the fire mark.

The next time you hold your cast iron fire mark, look it over carefully. You should have a deeper appreciation of how it was made along with its place in the country’s insurance and economic history.

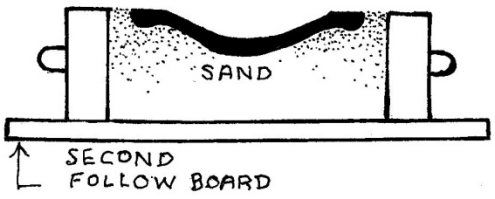
R. Shea, Sept. 2013

FIRE MARK CASTING
ILLUSTRATED BY FRED COWDEN

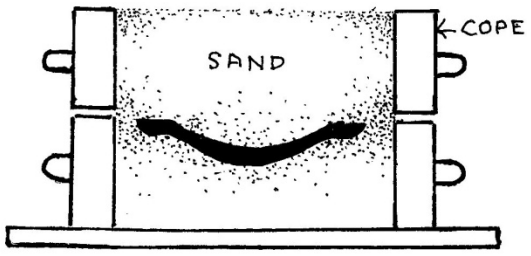
1 THE PATTERN IS LAID ON THE FIRST FOLLOW BOARD.
A FOUR SIDED DRAG IS PLACED AROUND THE PATTERN.
THE DRAG IS FILLED WITH DAMP SAND.



2 A SECOND FOLLOW BOARD IS PLACED ON TOP OF THE DRAG.
THE DRAG AND FOLLOW BOARDS ARE TURNED OVER.
THE FIRST FOLLOW BOARD IS REMOVED.

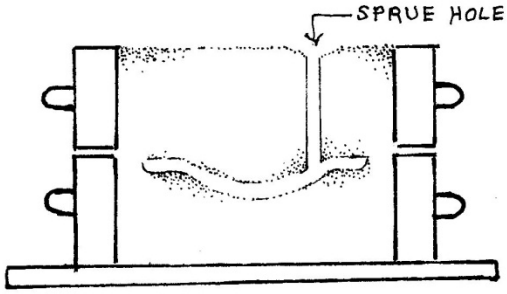


3 A COPE IS PLACED ON TOP OF THE DRAG AND FILLED WITH DAMP SAND.



4 THE COPE AND THE DRAG ARE SEPARATED.
THE PATTERN IS CAREFULLY REMOVED WITH A PAIR OF LIFTERS.

5 A SPRUE HOLE (OR SPRUE HOLE AND CHANNEL) ARE CUT THROUGH THE DAMP SAND.
THE COPE AND THE DRAG ARE REJOINED.



6 MOLTEN IRON IS POURED INTO THE SPRUE HOLE.