S. T. WELLMAN.

Improvement in Stoppers for Steel Ingot-Molds.

No. 129,699. Patented July 23, 1872.

Fig 1

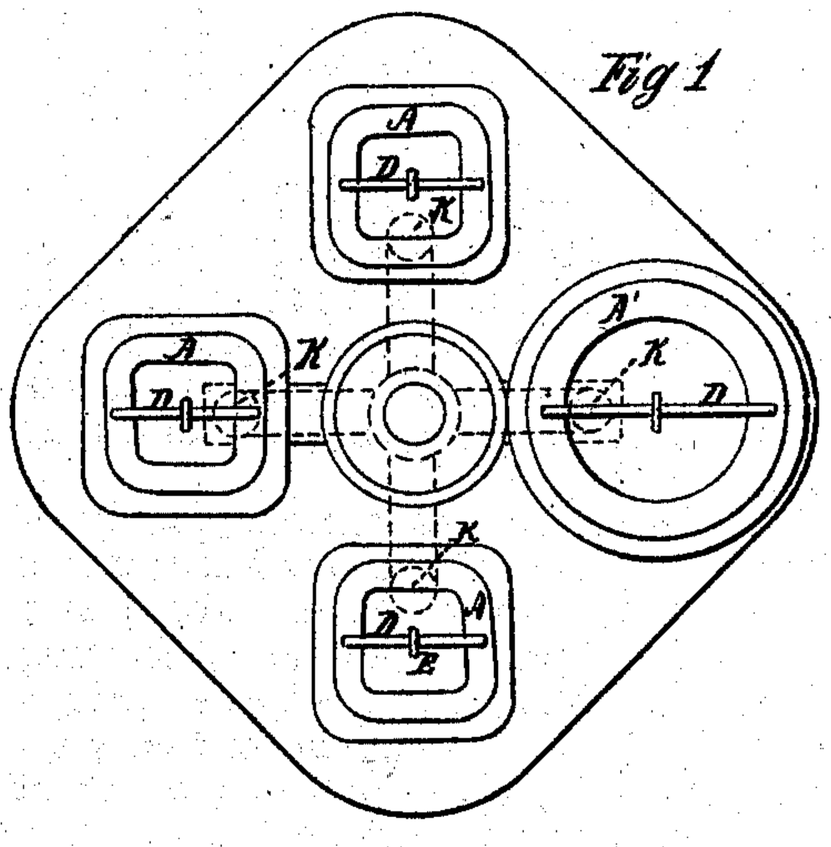


Fig 2.

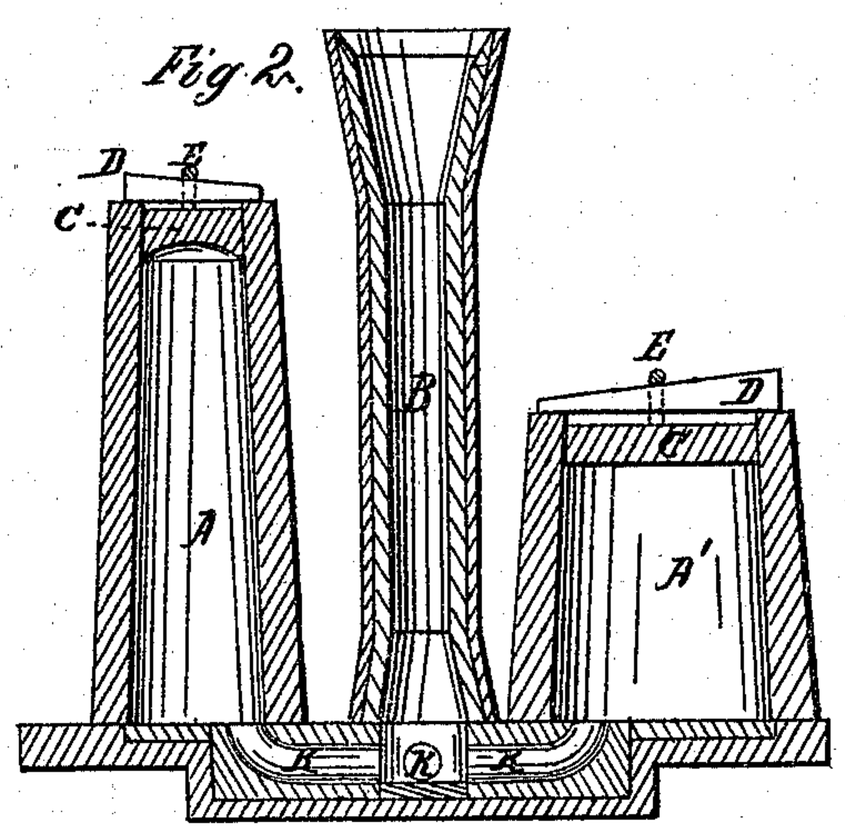


Fig 3

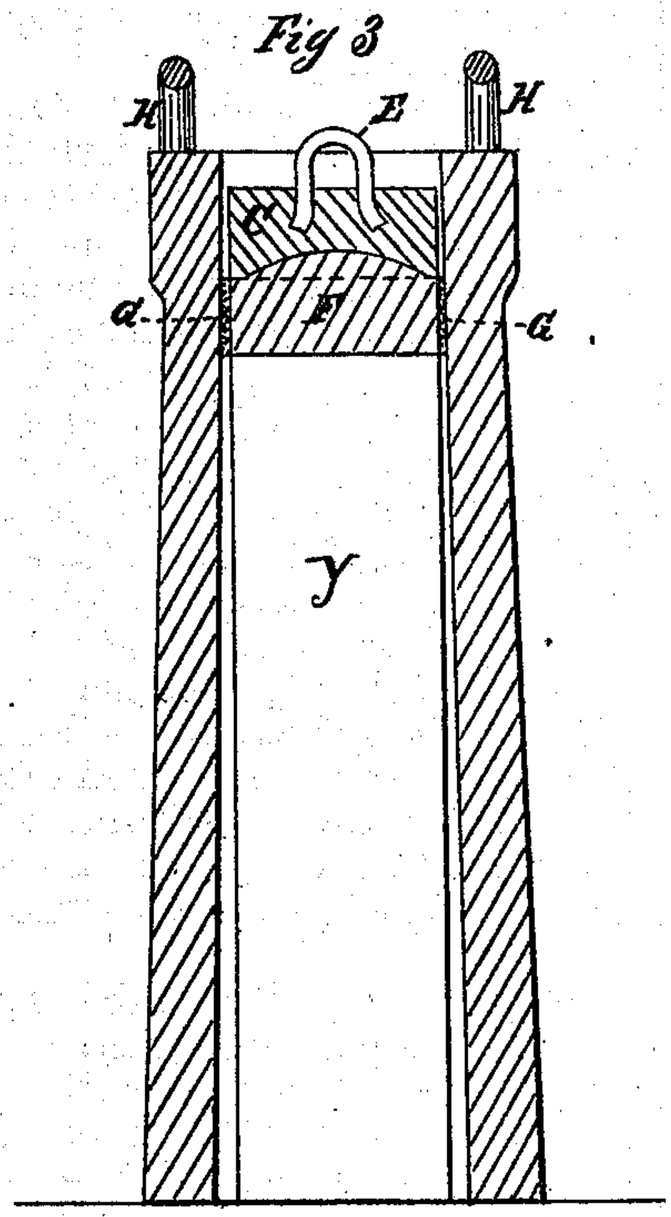
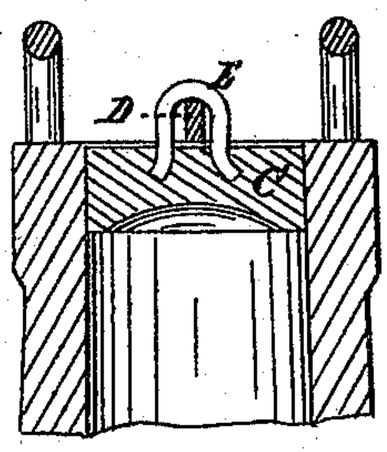


Fig 4



Witnesses.

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UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, OF NASHUA, NEW HAMPSHIRE.

IMPROVEMENT IN STOPPERS FOR STEEL-INGOT MOLDS.

Specification forming part of Letters Patent No. **129,699**, dated July 23, 1872.

Specification describing certain Improvements in Stoppers for Steel-Ingot Molds, invented by SAMUEL T. WELLMAN, of the city of Nashua, in the county of Hillsborough and State of New Hampshire.

My invention consists of a new and improved method of constructing stoppers for molds in which to cast Bessemer, Siemens-Martin, or other cast-steel, when it is cast by the method known as bottom-casting, whereby sound and smooth ingots are cast with both ends clean and smooth and free from fins and cracks, and whereby the ingot can be made nearer to the finished weight of the rail or forging for which it is designed, and the proportion of scrap very much lessened. In the ordinary way of making bottom cast-steel ingots, when the outside molds of the group are filled to the desired height, the ladle is moved along to the next group, and the outside molds of the group just cast are filled with moist sand or loam thrown into the mold on top of the molten steel until the mold is full, when a plate is placed on top of the mold and fastened down, or else a cast-iron stopper somewhat smaller than the mold is held in contact with the top of the liquid steel until the latter is chilled, when moist sand is tamped down around the stopper to chill the steel around the edge. Various methods of hanging the stoppers in the mold have been devised, but all leave the end of the ingot ragged and uneven, or else the steel runs up over the stopper, on account of their not fitting the mold accurately, and the ingot is thus held at the top and by the runner at the bottom, and the ingot is either pulled in two as it shrinks in cooling, or else badly cracked. When cast-steel low in carbon is cooling in the molds, if the top of the molds are left open to the air, the steel rises in the molds, forming large cavities and blow-holes in the ingots, rendering them unfit for use; and the object of the sand and stoppers is to chill the top of the molten steel and keep it from rising in the molds. But if the stopper does not fit the mold exactly the steel is sure to run up in the joint, and thus hold the end of the ingot, so that it will pull in cooling, and it is impossible to cast a stopper from a pattern so that it will fit the mold exactly without much trouble and labor in fitting and chipping. My invention consists in making the stopper by casting it in its place in the ingot-mold, thereby obtaining a perfect fit, so that not a particle of steel will run into the joint, but at the same time it cannot be driven up so tight but what the gas and air will pass through the joint and vent the mold.

Having reference to the accompanying drawing, Figure 1 is a plan of a group of four molds as arranged for bottom-casting. Fig. 2 is a vertical section through the same, showing two molds of different shape and size. Fig. 3 is a vertical section through an ordinary tapering ingot-mold, showing the manner of casting in the stopper; and Fig. 4 is a section through the mold with the stopper driven up and keyed ready for use.

In Fig. 3, Y is a block of wood placed in the mold to hold up the cast-iron chill F, (the top of which is made the shape that the top of the ingot is wanted.) The joint G is then filled with sand or clay well rammed in and smoothed over to get a clean sharp corner. The molten cast-iron is then poured in on the chill to form the stopper C, the staple E being held in place by a pair of tongs or other convenient means until the iron is set around it. The stopper in cooling shrinks and leaves a narrow space between it and the mold all around. After the iron is cold the stopper C is lifted up until it exactly fills the mold all around. The key D is then driven hard in, as shown in Fig. 4. The mold is then lifted off from the block Y and the chill F and is ready for use, and when taken to the melting-shop is placed upon the group-plate, as shown in Figs. 1 and 2.

Another method, and the one first used by me for molding the stopper, is to fill the ingot-mold with molding-sand well rammed in to the required height, the top of the sand being shaped as the ingot is wanted and the stopper cast in in the same manner as when the chill is used. But the stopper cast in this manner does not resist the action of the molten steel as well as the chilled stopper, besides being more expensive in making.

In Figs. 1 and 2, A A A are common square tapering ingot-molds, while A′ is a short round mold designed for a locomotive-tire ingot. The steel is run from the ladle into the center mold or runner B, and out at the bottom

through the runners K K K K to the molds A A A A′, (which are thus filled from the bottom,) until the top of the liquid steel strikes the stoppers C C C C, when the runner B is filled and the ladle run along to the next group. It will easily be known when the outside molds are full by the rising of the steel to the top of the runner B. It is one advantage of the cast in stoppers that various lengths of ingots can be cast in the same group, while any length of center runner or mold can be used, and a head of several feet obtained, if desired, whereby the steel will be compressed into the outside molds and the ingots made much sounder than when no pressure is brought to bear upon them.

I wish it understood that I make no claim to the process or system of casting in groups, that being old and well known; but

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. The stopper C cast in its place in the ingot-mold, substantially as described.

2. The method of casting in the stopper C in its place by the use of the chill F, substantially as described.

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Witnesses:
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