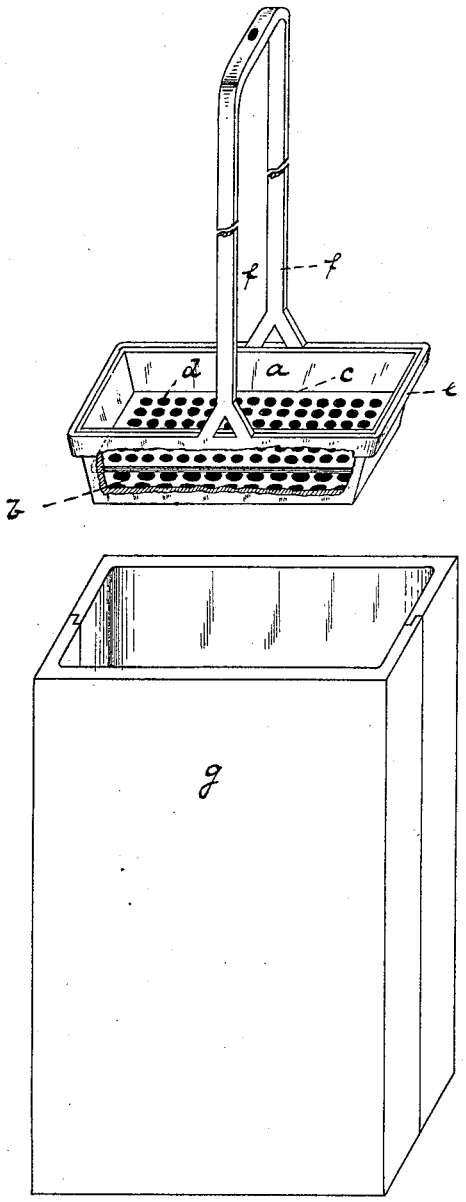
(No Model.)

F. K. HAFFEY.

METHOD OF CASTING STEEL.

No. 304,314. Patented Sept. 2, 1884.



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FRANCIS K. HAFFEY, OF ALLEGHENY, PENNSYLVANIA.

METHOD OF CASTING STEEL.

SPECIFICATION forming part of Letters Patent No. 304,314, dated September 2, 1884.

Application filed January 12, 1884. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS K. HAFFEY, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Casting Steel; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improved method of casting steel and other metals, whereby ingots are produced free from pipes, honey-comb, or like imperfections, which are commonly due to the presence of air-bubbles and foreign matter in the molten metal in the mold, and also whereby cutting of the mold in casting is prevented.

In casting steel into ingot-molds as commonly practiced, the steel, being conveyed from the furnace or crucible in ladles, is poured therefrom directly into the mold. As the stream of molten metal falling from the top of the mold strikes the bottom thereof bubbles of air are carried below the surface of the metal in the mold, and air-spaces, or, as it is called, "honey-comb," formed in the ingots. Pipes are also formed in the ingot from the same cause and by the currents caused by the stream of metal, and other imperfections are caused from dirt and foreign matter entering the mold with the molten steel. Another difficulty encountered in the present method of casting steel ingots is the cutting of the mold by the stream of metal striking at one point on the bottom, and also when the metal strikes the side of the mold. From this cause the molds are soon rendered worthless, involving great expense and trouble. By my improved method the steel is cast into the mold without producing honey-comb, pipes, or other imperfection in the ingot, and at the same time injury to the mold by cutting is prevented.

I will now describe my invention so that others skilled in the art may employ the same, reference being had to the accompanying drawing, forming part of this specification, which is a side elevation, partly in section, of the apparatus employed by me.

Instead of casting the metal directly from the ladle into the bottom of the mold, I employ an intervening strainer, formed of plumbago or other heat-resisting material, which separates pieces of foreign matter from the metal, prevents the metal from striking the mold in solid streams, and distributes it evenly in the mold, so that air-bubbles are not carried beneath the surface of the metal, said perforated receptacle being gradually raised as the molten metal rises in the mold, whereby the splash of the metal, cutting of the mold, and formation of blow-holes in the casting are avoided.

The form of strainer or receiving dish which I prefer to use is that shown in the drawing, it being a rectangular vessel formed of plumbago or other heat-resisting material, the rim of which corresponds in shape to the mouth of the mold, while the sides are sloping, so as to leave a space between the bottom of the dish and the sides of the mold. In the bottom of this dish are rows of holes or perforations *b*, sufficiently large to allow the free passage of the molten metal. Inside of the dish *a*, a little above and removed from the bottom thereof, is a false bottom, *c*, having rows of openings or perforations *d*, which are more numerous and smaller in size than the perforations in the bottom of the dish. Around the rim of the dish *a* is a band of metal, *e*, from which extend the rods *f*, which serve as handles, by means of which the dish may be lowered into the mold and raised therefrom; or other suitable devices may be employed for the same purpose.

The operation of casting ingots by my improved method is as follows: The mold having been prepared in the usual manner for the reception of the molten steel, the vessel *a* is lowered to the bottom of the mold. The molten steel is then poured from the ladle into the dish, where, striking the false bottom *c*, it covers the same and flows through the perforations *d* to the bottom of the dish, and thence through the perforations *b*, so that it is evenly distributed over the bottom of the mold in finely-divided streams. As the metal fills the mold *g* the dish is gradually raised, so as to keep the bottom thereof even with the surface of the metal. As the metal passes through the perforations in the dish any foreign matter or dirt is deposited and prevented from entering

the mold; also, as the metal is divided into numerous small streams, and as the bottom of the vessel *a* is kept on or below the surface of the metal during the casting operation, cutting of the mold is prevented, and as the metal is evenly distributed without agitation and boiling, air-bubbles and pipes are prevented.

Although I have described my invention as adapted for the purpose of casting steel ingots, it may be employed in forming other castings in a like manner and for a like purpose.

I am aware that it is not new in casting ingots to pour the molten metal through a perforated strainer which is situate at the top or mouth of the mold, and also that it is not new to introduce the metal in a single stream at the surface of the metal in the mold, and I do not desire to claim the same.

The advantages of my invention are that the boiling occasioned by a large single stream of molten metal entering the molten metal in the mold, (whether the stream be introduced at the surface of the metal or not,) and the agitation caused by the penetration of numerous small streams falling from the top of the mold, are prevented, producing ingots free from air-bubbles or honey-comb and pipes, and without injury to the mold.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described method of casting metals, which consists in pouring the molten metal in a mass of fine streams delivered near the bottom of the mold and keeping the point of their formation near the surface of the metal during the casting operation, substantially as described.

2. The herein-described method of casting metals, which consists in passing the molten metal through two screening devices of different mesh, the perforations in the first screen being smaller and more numerous than those in the final screen, keeping the vessel in or immediately over the surface of the metal during the casting operation, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 3d day of January, A. D. 1884.

FRANCIS K. HAFFEY.

Witnesses:
W. B. CORWIN,
JAMES K. BAKEWELL.