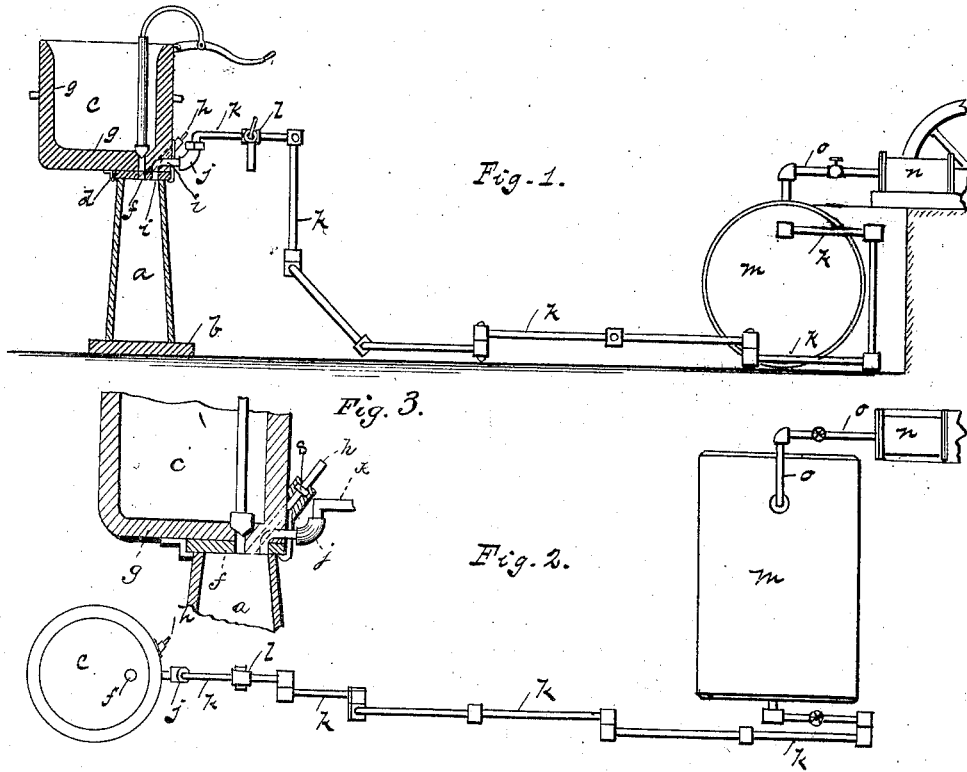


(No Model.)

W. M. COOPER.
APPARATUS FOR CASTING STEEL.

No. 423,375.

Patented Mar. 11, 1890.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CASTING STEEL.

SPECIFICATION forming part of Letters Patent No. 423,375, dated March 11, 1890.

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To all whom it may concern:

Be it known that I, WILLIAM M. COOPER, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Casting 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an apparatus for casting steel; and it consists of the novel combination and construction of devices, as will be hereinafter fully described and claimed.

In the present method of making steel castings air is absorbed into the molten mass, which by its oxygen, combined with the various other elements going to make the steel, causes an oxidation and a consequent formation of gas or blow holes, which tends to weaken the casting when the same solidifies. To obviate this is the object of my invention.

In the accompanying drawings, Figure 1 is a front elevation of my improved apparatus for casting ingots, partly shown in section the better to show the working parts. Fig. 2 is a plan view of the same. Fig. 3 is a detail sectional view taken through a part of the ladle and mold on the vertical plane of the eye-sight or peep-hole in the latter to more clearly show the same.

To put my invention into practice, I provide a suitable ingot-mold *a*, open at the top and base, and place the same on a substantial base *b*. Attached to the base of an ordinary steel ladle *c* is a sheet of asbestos *d*, or a like indestructible material, having an opening immediately beneath the port or discharge-point *f* of the ladle *c*. This ladle *c*, containing the molten steel, is placed on the top of the mold *a* at the proper time, the asbestos packing *d* forming an air-tight connection between the two. Extending diagonally through the bottom and side walls *g* of the ladle *c* is an eye-sight *h*, consisting of a tapering circular or cone-shaped opening having fitted at the top, by attachment to the casing of the ladle *c*, a suitably-constructed frame, containing a lens or piece of heavy glass *s*,

enabling the operator to see the interior of the mold *a* and determine when a sufficient quantity of metal has been let into the same. To one side of the port *f* of the ladle *c* is a passage or channel *i*, to which is attached a short section of pipe having attached thereto a coupling *j* of any desired construction, which will enable the operator to easily and quickly attach a long flexible jointed metallic tubing. This tubing consists of a number of short sections *k* of tubing attached together by couplings, which will admit of each section *k* being bent or revolved in any desired position. To the end section *k* of this tubing next the ladle *c* is attached a cock *l*, which may be set to form a passage from the interior of the mold *a* to the exterior of the same, or by a quarter-turn of this cock *l* a continuous passage is formed from the interior of the mold *a* to the other extremity of the tubing *k*. I now provide a tank or receiver *m* and attach the same to the sectional tubing *k*, which establishes a communication between the mold *a* and receiver *m*. An air-pump *n*, connected by a suitable tube *o* to this receiver *m*, affords a means for exhausting the air from the same.

In operation the ladle *c* is filled with molten metal and conveyed by suitable means to the mold *a* and placed on the top of the same, the asbestos packing *d* rendering the connection between the two air-tight. The sectional tubing *k* is attached by means of the coupling *j* to the ladle *c*, and the cock *l* is set to form a passage from the mold *a* to the exterior of the same. While these arrangements are being quickly made the air-pump *n* is exhausting the air from the receiver *m* until a complete or partial vacuum is obtained. The discharge-port *f* of the ladle *c* is opened, which allows the molten metal to enter the mold *a*, and at the same time the cock *l* is adjusted to form a passage from the mold *a* to the receiver *m*. The air rushing into the vacuum in the receiver *m* is rapidly exhausted from the mold *a*, and the metal falling to the bottom and rolling or flowing toward the sides of the mold loses its gases. The operation of exhausting the air from the receiver *m* is continued throughout the entire process of casting. The operator, by means of the eye-sight *h*, is enabled to know at what time the mold *a* is full, at which time the valve *l* is closed,

and the ladle conveyed to another mold and the same operation continued.

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

1. In an apparatus such as described, the combination consisting of the mold *a* and a means for making an air-tight connection with the bottom of the ladle *c*, the sectional tubing *k*, connected to the receiver *m* and the ladle and having communication with the interior of the mold *a*, the cock *l*, the receiver *m*, and air-pump *n*, as and for the purpose set forth.

2. In an apparatus for casting steel, a ladle *c*, having an eye-sight *k* formed diagonally through the base thereof, one end of said eye-sight opening through the bottom of the ladle and the other end opening exteriorly through one of the sides of the ladle and having a lens therein, substantially as and for the purpose described.

3. In an apparatus for casting steel, the combination, with a mold, of a superimposed ladle *c*, having an egress-opening in its bottom and a transverse exhaustion-passage *i*, also opening at one end through the bottom thereof, a sectional flexibly-jointed tubing *k*,

a receiver to which one end of the tubing is connected, and an air-pump for exhausting the receiver, substantially as and for the purpose described.

4. In an apparatus for casting steel, the combination, with a mold and a superimposed ladle, of a sectional flexibly-jointed pipe *k*, coupled with the ladle and communicating with the mold by intermediate passages formed in the ladle, a receiver to which the opposite end of the tubing is connected, and an air-pump for exhausting the receiver, substantially as and for the purpose described.

5. In an apparatus for casting steel, the combination of a mold, a ladle resting on the mold and forming an air-tight space therebetween, a sectional flexibly-jointed pipe coupled to the ladle and communicating with the interior of the mold, a receiver to which the opposite end of the pipe is connected, and an air-pump connected to the receiver, substantially as described.

In testimony that I claim the foregoing I hereunto affix my signature.

WILLIAM M. COOPER.

In presence of—

FRANK W. SMITH,
J. A. HERRON.