

No. 735,596.

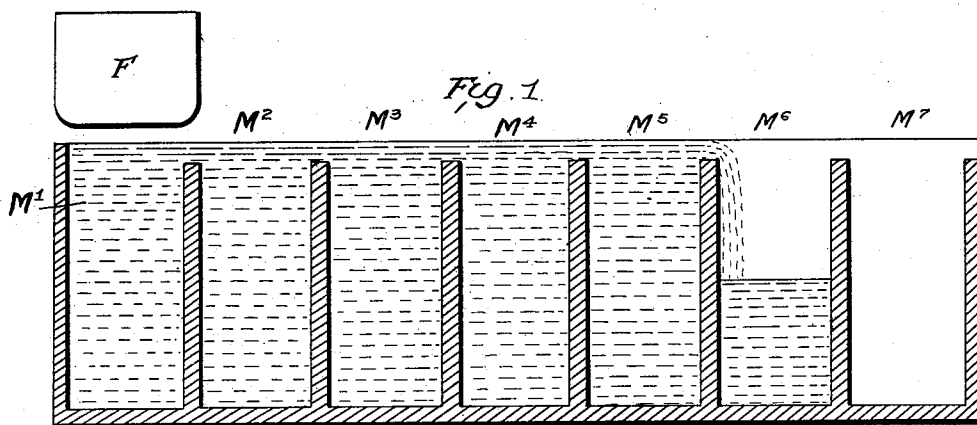
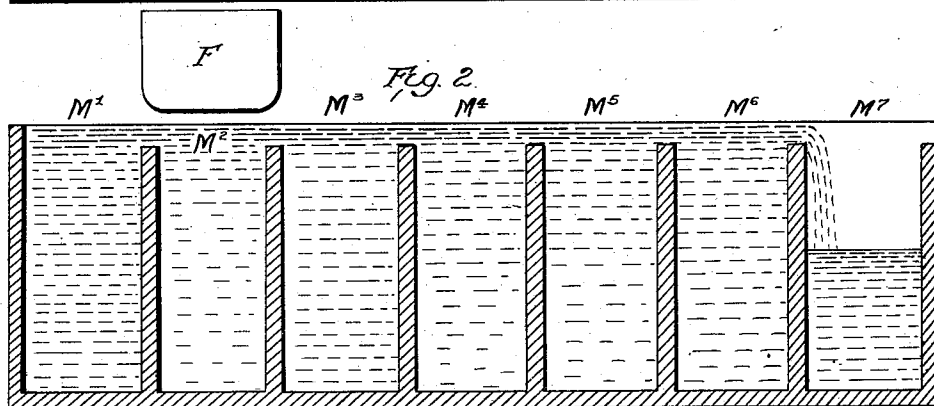
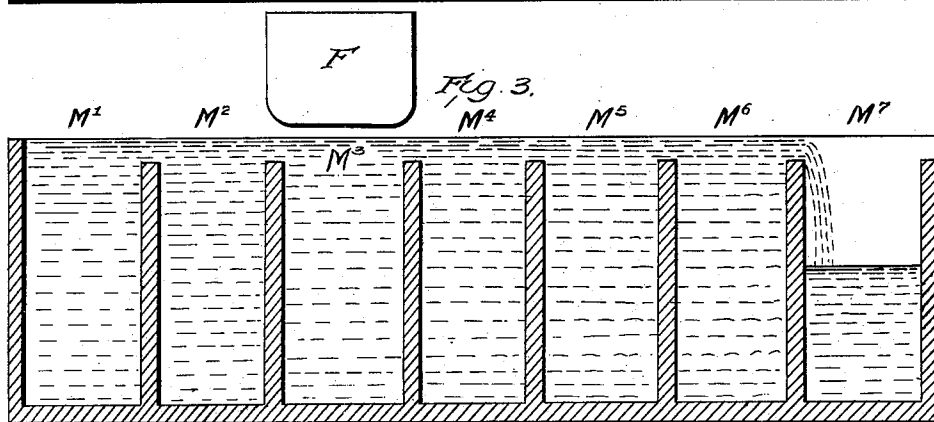
PATENTED AUG. 4, 1903.

A. SAUVEUR & J. WHITING.
METHOD OF CASTING INGOTS.

APPLICATION FILED JUNE 6, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses

James M. [unclear]

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No. 735,596.

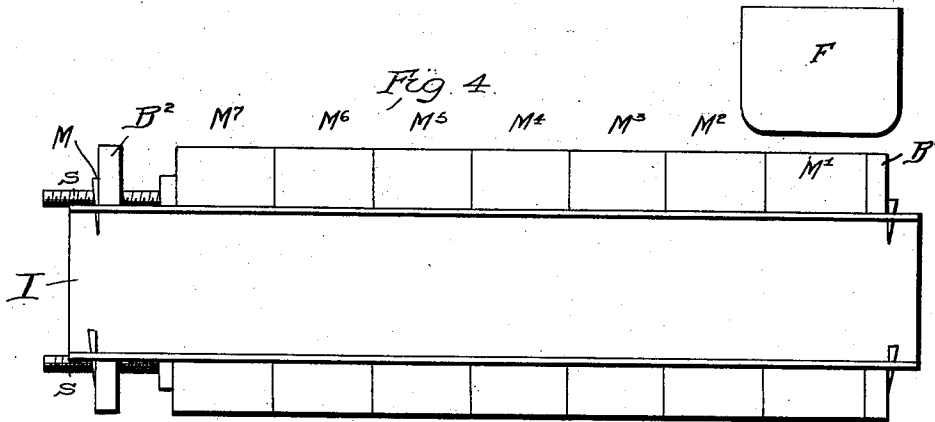
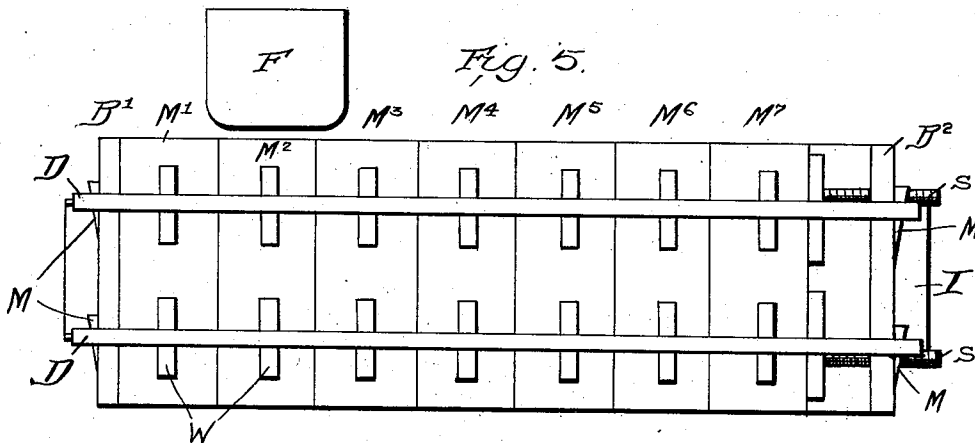
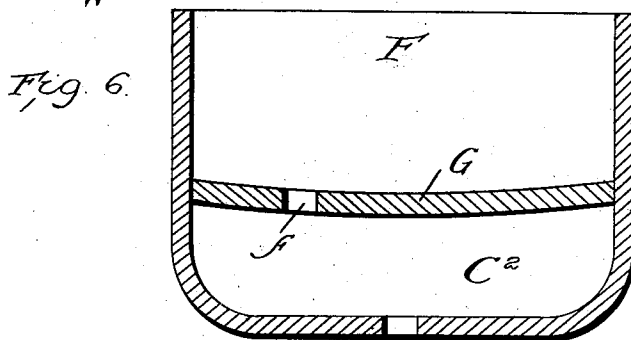
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3 SHEETS—SHEET 2.



Witnesses

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3 SHEETS—SHEET 3.

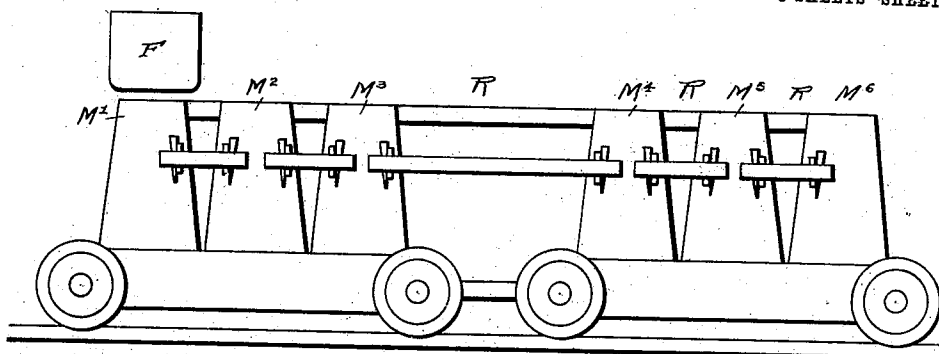


Fig. 7.

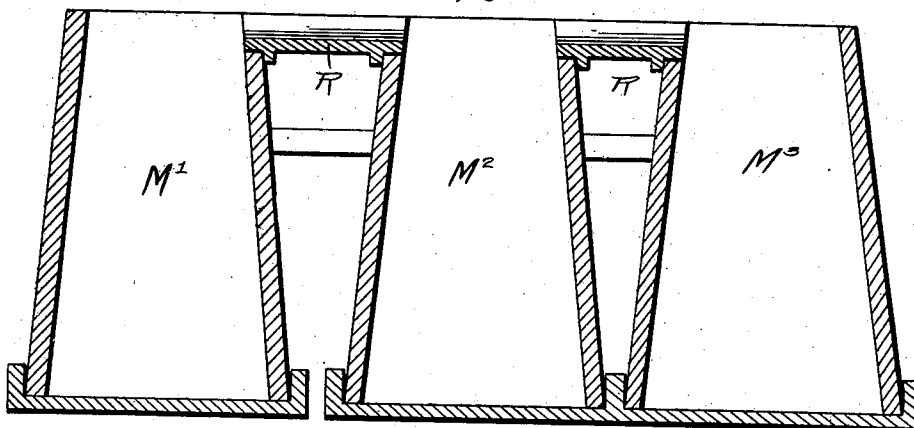


Fig. 8.

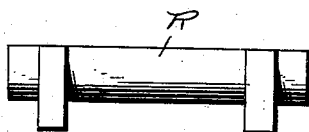


Fig. 9.

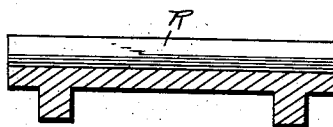


Fig. 10.

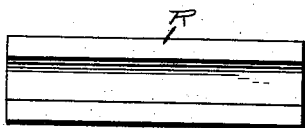


Fig. 11.



Fig. 12.

Witnesses

Commissioner
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UNITED STATES PATENT OFFICE.

ALBERT SAUVEUR, OF CAMBRIDGE, AND JASPER WHITING, OF LEXINGTON,
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METHOD OF CASTING INGOTS.

SPECIFICATION forming part of Letters Patent No. 735,596, dated August 4, 1903.

Application filed June 6, 1903. Serial No. 160,348. (No specimens.)

To all whom it may concern:

Be it known that we, ALBERT SAUVEUR, residing at Cambridge, and JASPER WHITING, residing at Lexington, Middlesex county, Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Methods of Casting Ingots, of which the following is a specification.

This invention relates to a method of filling molds, and particularly to the casting of steel ingots, it having for its purpose the elimination of the defect known as the "pipe" in the ingot-top, as explained in application, Serial No. 115,035, allowed to Albert Sauveur, on which the present method is an improvement.

It has been found that in casting ingots in communicating molds when the metal is allowed to overflow the tops of a number of succeeding molds to that which is being filled the ingots in some of the molds are solid, while the others have pipes varying in size according to their distance from the mold into which the metal is poured. Therefore to produce solid ingots it is necessary to maintain hot the surface of each ingot-top during a certain time.

To this end the present invention consists in a method of pouring whereby the surface of each one of a series of molds is successively maintained in a molten condition while a certain predetermined number of molds beyond are filled. This is accomplished by running the molten metal on or over each succeeding mold after it is filled and while one or more molds beyond it are filling.

In the drawings, in which like letters of reference indicate corresponding parts throughout, Figure 1 is a diagrammatic representation of the first step in the method. Fig. 2 is a similar showing of the second step. Fig. 3 indicates a modification of the second step. Figs. 4 and 5 show the molds in series. Fig. 6 is a detail of the pouring-funnel, and Figs. 7 to 12 are details of the arrangement when the molds are mounted on cars.

M^1 M^2 M^3 , &c., represent the members of a series of communicating molds which are to be filled with molten steel.

F is a funnel containing the molten steel from which the ingots are to be formed. If

now, referring to Figs. 1, 2, and 3, the metal be poured into M^1 , filling it, overflowing its top, and filling each succeeding mold in turn until M^6 is full, M^1 will in most cases be found to contain a solid ingot with no pipe at all in its top. If the operation be stopped at this point, M^2 will have a pipe of perhaps one inch, M^3 one of two inches, M^4 one of three inches, &c., in the case of crucible-steel ingots of about one hundred pounds. The ladle, however, is now shifted to M^7 and the pouring continued in it until M^7 has been filled, when the metal in M^2 will have been maintained with its surface molten until properly cooled below, as was M^1 , and when cooled will now be found similarly free from pipe. When M^7 has been completely filled, the pouring is shifted to M^8 , and so on throughout the operation. In this way after filling the first six molds by pouring into the first mold and shifting the pouring to each succeeding mold until the mold beyond that last filled is filled each ingot will have the benefit of the heat of the overflowing metal for the time it takes to traverse the intervening molds and fill the mold beyond, and so each mold will be cooled from the bottom up properly and produced without pipe.

In Fig. 3 a modification is suggested involving the same principle. In some cases where the rate of pouring differs from that supposed above or the molds differ in size or other elements vary to make different the rate of cooling of the ingots it is sometimes desirable to move the ladle to another than the second mold after the first step has been completed, skipping one or more of the molds, as the case may require. In the case here supposed in Fig. 3 one mold has been skipped, so that after M^5 has been filled, M^2 having been maintained hot long enough, the ladle can be shifted to M^3 while M^7 is filled. The next step in this modification after No. 7 has been filled would be to shift again, and so on, or the pouring might be continued at mold No. 3, while both molds Nos. 7 and 8 were filled—that is, the ladle may be shifted at uneven intervals or held for a longer period than that required to fill one mold, as the case may require. By thus using a number of molds in a series and by shifting the pouring to dif-

ferent points all of the ingots will be allowed to cool at nearly the same rate and in nearly the same manner, so that all will be produced as perfect as the best produced by a single pouring.

In Figs. 4 and 5 the molds are shown as clamped in a series by a frame over which is shifted the funnel F, containing the metal. The frame consists of a back plate B', longitudinal members on either side clamped thereto. On one side the member is formed by an I-beam I, which bears with its upper and lower flanges against the molds, and on the other side of two small I-beams D, which act to hold the molds thereagainst. The plate B² carries compressing means, as a screw s, and wedge-blocks M are introduced between the molds and the I-beams D to tighten and align the molds in series. The beams D are removable laterally from the openings in which they rest and are held tight by wedge-blocks w, acting through slots in the I-beams against the plates B' B². By knocking out these wedges and removing the beams D the molds, which in this form are made in two sections, are readily stripped from the ingots and allowed to fall to one side.

The ladle has been referred to as shifted from mold to mold, but obviously it might be held stationary and the molds shifted by mounting them on cars or in any other way. Such an arrangement is indicated in Figs. 7 to 12, in which a series of molds are shown mounted upon cars. Each car may carry a single mold, or the molds may be arranged in groups on them. The molds here shown are slightly flaring toward their bottom, which is open, and the tops are connected by removable runners R, the same consisting merely of flanged channels which furnish means of communication from mold to mold and from car to car. The track on which these cars are mounted may be slightly inclined to facilitate the flow of metal from mold to mold; but this is not usually necessary, as the runners R are arranged to allow the mold to overflow before it is quite full. When the ingots are sufficiently cooled, the runners are knocked out and the molds lifted off from the ingots.

In pouring the metal into a mold which has been previously filled it is necessary to so introduce it that it will not cause undue agitation in the partially-cooled ingot, and to provide for this the method includes the following step in the procedure: The metal is poured into a funnel F, (shown in Fig. 6,) which has a false bottom G spaced slightly above its own bottom and forming therein an auxiliary bottom chamber C², into which it passes through the outlet f without head or momentum. In this way the pouring can be accomplished without stirring the partially-cooled metal contained in the molds.

The arrangement of molds, the intervals of

pouring, the number of molds filled, and the manner of communication between molds, as well as various other details, may obviously be varied and modified without departing from the spirit of our invention.

What we therefore claim, and desire to secure by Letters Patent, is—

1. The method of casting ingots consisting in pouring into the first of a series of molds, allowing it to overflow into a predetermined number of succeeding molds, then pouring into another previously-filled mold and allowing the metal to continue to overflow the molds before filled, until the next mold beyond them is filled, and so on.

2. The method of casting metal consisting in successively filling a series of communicating molds so that the metal poured into the first mold of the series, will fill and overflow a predetermined number of molds, then shifting the pouring to another mold of the series while the next mold or molds beyond are being filled.

3. The method of casting metal consisting in successively maintaining hot the tops of a predetermined number of previously-filled molds in a series, by running molten metal over them while the molds beyond are successively filling.

4. The method of casting ingots consisting in successively filling a series of molds by running metal over the tops of a predetermined number of previously-filled molds.

5. The method of casting ingots consisting in running metal into an auxiliary chamber, allowing it to flow therefrom into the first of a series of molds from which it overflows into a predetermined number of succeeding molds, then allowing it to flow from said auxiliary chamber into one of the molds previously filled by the overflow, until one or more molds beyond them is filled, and so on.

6. The method of casting metal consisting in running it into an auxiliary chamber to break the force of its flow, and in filling a series of communicating molds therefrom, so that the metal poured into the first mold of the series, will fill and overflow a predetermined number of molds, then allowing the metal to flow from said auxiliary chamber into another mold of the series while one or more molds beyond are being filled.

7. The method of casting ingots consisting in running metal into an auxiliary chamber to break the force of its flow, and successively filling therefrom a series of molds by running the molten metal over the tops of a predetermined number of previously-filled molds.

In testimony whereof we affix our signatures in presence of two witnesses.

ALBERT SAUVEUR.
JASPER WHITING.

Witnesses:

ELLIS SPEAR, Jr.,
GEORGE B. SEARS.