(No Model.) 2 Sheets—Sheet 1.

W. S. SIMPSON.

APPARATUS FOR CASTING METALS.

No. 493,047. Patented Mar. 7, 1893.

Fig. I.

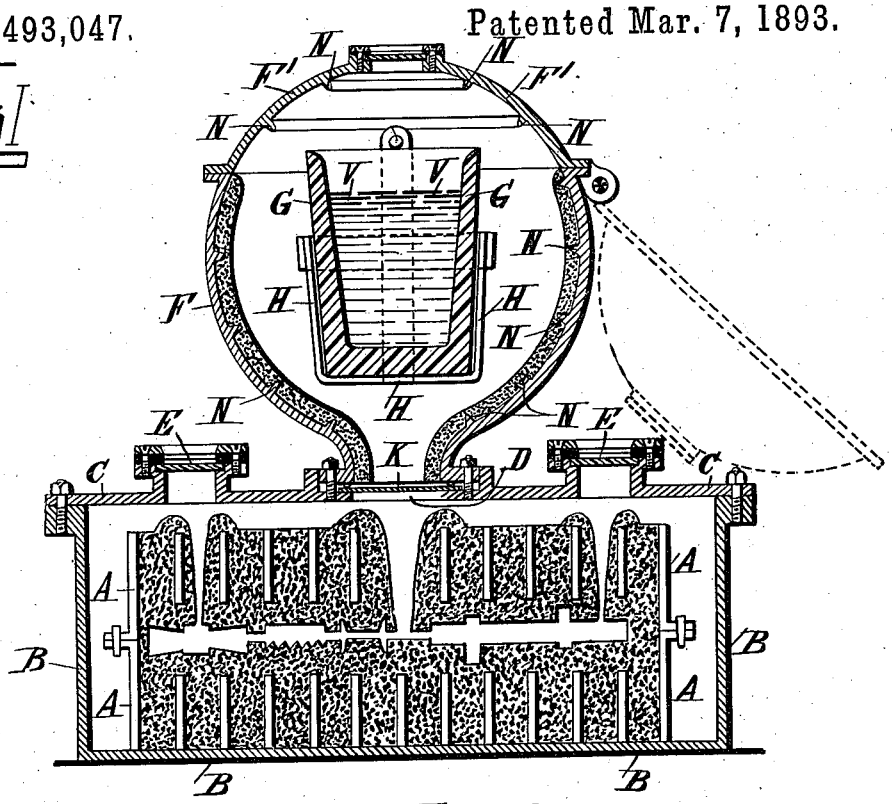
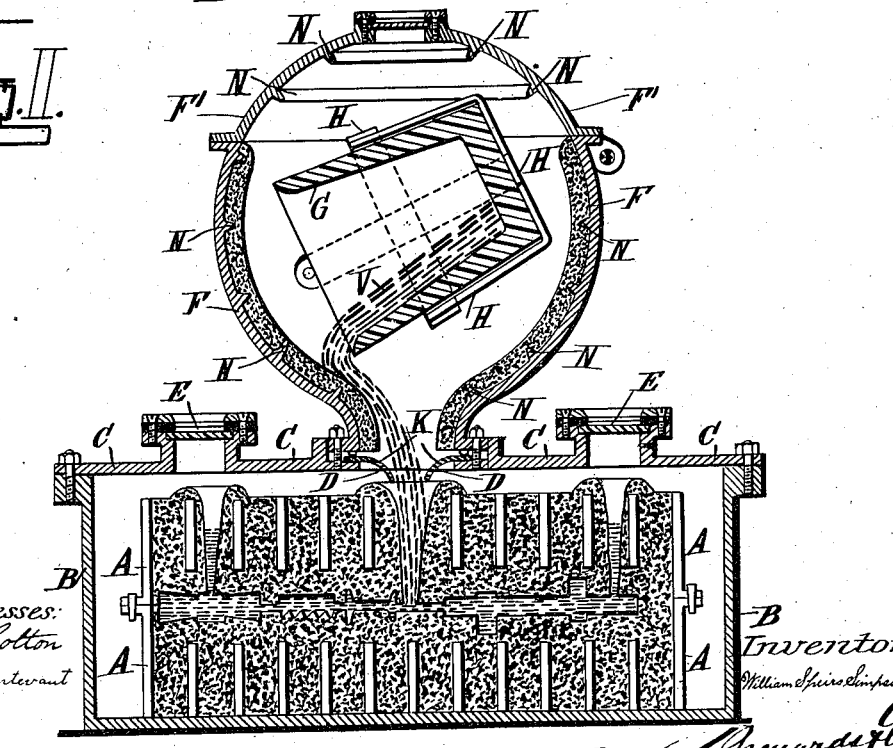


Fig. II.



Witnesses:
E. B. Bolton
E. K. Sturtevant

Inventor:
William Spires Simpson
By Howard & Howard
his Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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Fig III

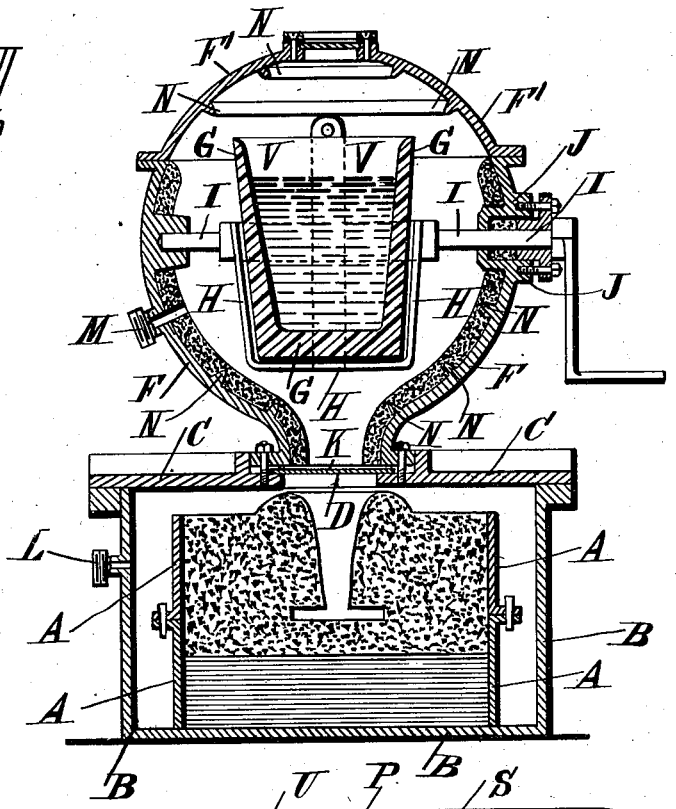
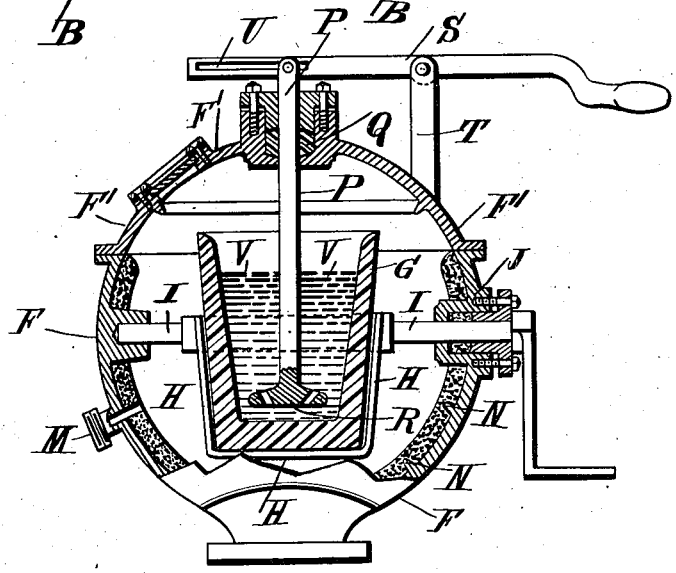


Fig IV



Witnesses:
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E. K. Stuntevant.

Inventor:
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By Howard & Howard
his Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM SPEIRS SIMPSON, OF LONDON, ENGLAND.

APPARATUS FOR CASTING METALS.

SPECIFICATION forming part of Letters Patent No. 493,047, dated March 7, 1893.

Application filed September 15, 1892. Serial No. 445,992. (No model.) Patented in England July 20, 1892, No. 13,298; in France July 25, 1892, No. 209,991; in Germany July 26, 1892, No. 13,702, and in Belgium July 28, 1892, No. 76,207.

To all whom it may concern:

Be it known that I, WILLIAM SPEIRS SIMPSON, a subject of the Queen of Great Britain, and a resident of 49 Battersea Park Road, London, England, have invented certain new and useful Improved Apparatus for Effecting the Casting of Metals in Vacuo, (patented in Great Britain, No. 13,298, dated July 20, 1892; in France, No. 209,991, dated July 25, 1892; in Belgium, No. 76,207, dated July 28, 1892, and in Germany, No. 13,702, dated July 26, 1892,) of which the following is a specification.

My invention relates to an improved method of casting metals under a vacuum, and has for its object the production of castings which are sharper and cleaner and are more homogeneous, soft, and ductile than those made in the ordinary manner of casting under atmospheric pressure.

In carrying out my invention, I inclose an ordinary box or flask in which the mold is formed in an air tight chamber in which a vacuum is produced by any suitable means, so that when the metal is poured it fills all the cavities and interstices of the mold undisturbed by the generation of any vapor or gas. In connection with the chamber inclosing the molding box, I use a subsidiary chamber (air tight) containing a ladle or a crucible in which is placed the metal previous to its being poured into the mold, a vacuum is formed in this subsidiary chamber, and thus the molten metal is exposed to an exhausting action which has the effect of taking off all the gases and vapors contained in the fluid and rendering the metal dead as far as any tendency to ebullition is concerned.

Figures 1 and 2 of the annexed drawings are longitudinal sections of the apparatus. Fig. 3 a transverse section. Fig. 4 a similar section with stirrer.

An ordinary molding box A is placed in the chamber B which has a removable cover C making an air tight joint with the top of the chamber and allowing the molding box to be placed in position and removed, this lid has a hole D in it over the part of the box where the metal is poured, and also two spy holes E, E, arranged to give a view of the "risers" in the molding box. A subsidiary chamber F with a movable lid or cover F′ is arranged so as to fit over the hole D, and the ladle or crucible G is placed in a suitable cradle or frame H which is hung on a spindle I passing through a stuffing box J in the side of the chamber F, the end of the spindle I being fitted with a handle or wheel I to control the tilting of the ladle.

A plate of metal K sufficiently strong to resist the pressure of the atmosphere but of a nature to be easily fused by the impact of the melted metal is placed between the chamber B and the subsidiary chamber F, and an air tight joint is made at this point by means of packing rings kept in place by the chamber F. The object of this fusible plate is to separate the two chambers until the metal is poured, so that the lower chamber B can be exhausted by means of the pipe connections L while the subsidiary chamber F is exhausted by means of a pipe connection M and when any gases cease to be given off the ladle is tilted over, the metal melts the fusible plate and flows into the molding box and completely fills the mold, the molding box being also in a vacuum.

The interior of the subsidiary chamber is provided with ribs N, N, N, N, which serve to strengthen it against the pressure of the atmosphere and also to retain the lining in position. The cover F′ of the subsidiary chamber F is secured by bolts or clay and may be loosely hinged for the convenience of turning back. A spy hole is provided on top of the chamber F to enable the progress of the metal to be observed, and this spy hole like the others is of course air tight. When the process of exhaustion is sufficiently rapid, the fusible plate R may be dispensed with and both the main and subsidiary chambers exhausted at the same time.

The lower chamber B may be made to open on the top, or at the end, or at the side or sides, the most convenient for the class of work being molded, and any suitable means of exhausting may be used. It is obvious that one or more subsidiary chambers F may be employed in connection with the lower chamber B.

One method I employ to stir the molten metal is as follows;—A rod P entering the chamber at the top through a stuffing box Q

and having at the end of the rod inside the crucible or ladle C a knob or bell R. The stirrer is connected to a lever S outside the chamber, the lever being pivoted to an arm T cast in the chamber itself. A slot U is made in the lever to enable the striker to move up and down.

The method of working is exactly the same as an ordinary hand pump the downward movement of the handle S raising the stirrer P out of the molten metal V in the crucible at the same time of course displacing the metal, on moving the handle or lever up again it causes the stirrer to strike the molten metal, if this be done two or three times it has the effect on the molten metal as though it were being knocked with a hammer or violently stirred thus imparting a fibrous nature to the molten metal.

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

1. In combination, the mold chamber, the subsidiary chamber above the same, the fusible diaphragm between the chambers normally separating the same, the independent suction pipe connections to the two chambers whereby each may be exhausted of air and gases independently of the other and the tilting ladle arranged in the subsidiary chamber, substantially as described.

2. In combination, the mold chamber, the subsidiary chamber, communicating therewith, the suction pipe connections, the tilting ladle in the subsidiary chamber with means for operating the same extending through an air tight bearing to the outside, and the vertically reciprocating stirrer extending into the tilting ladle and having an outside connection for operating the same, substantially as described.

In witness whereof I have hereto signed my name this 28th day of July, 1892.

WILLIAM SPEIRS SIMPSON.

In presence of—
HENRY GARDNER,
CHARLES ALFRED GROSSETETE,
Both of 166 *Fleet Street, London, England.*