

A. S. LAVROFF.

Molds for Casting Copper and its Alloys.

No. 152,040.

Patented June 16, 1874.

Fig. 1.

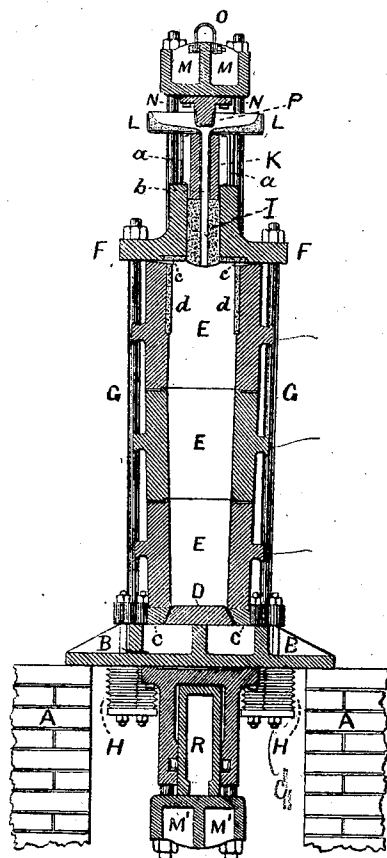
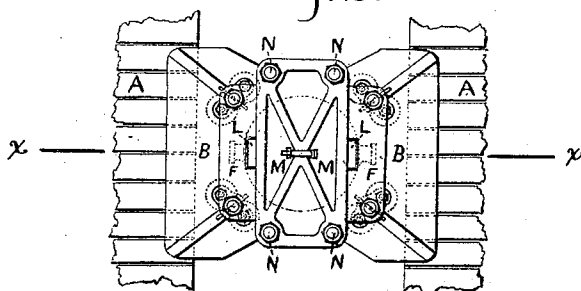


Fig. 2.



Witnesses :

C. H. Isham

Henry A. Daniels

Alexander S. Lavroff, Inventor, by
Chas. S. Whitman
Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER STEPHEN LAVROFF, OF ST. PETERSBURG, RUSSIA.

IMPROVEMENT IN MOLDS FOR CASTING COPPER AND ITS ALLOYS.

Specification forming part of Letters Patent No. 152,040, dated June 16, 1874; application filed September 15, 1873.

To all whom it may concern:

Be it known that I, ALEXANDER STEPHEN LAVROFF, of St. Petersburg, in the Empire of Russia, have invented an Apparatus for Casting Articles from Copper and its Alloys under Artificial Pressure.

The following description, taken in connection with the accompanying plate of drawings hereinafter referred to, forms a full and exact specification, wherein are set forth the nature and principles of the invention, by which the same may be distinguished from others of a similar class, together with such parts thereof as are claimed as new and are desired to be secured by Letters Patent of the United States.

The object of my invention is to cast articles from copper and its alloys with artificial pressure in a more efficacious and better way than has heretofore been employed.

One of the most important deficiencies in articles cast from copper or its alloys in general consists in their defective density, the articles being penetrated by cavities of greater or less extent, which cavities or porosity of the metal lessens the durability of the articles cast, especially if the mass of the metal is considerable. In this case the alloy of which the article is cast in cooling sometimes becomes distributed as follows: Either its various constituents separate, or alloys of various fusibility are formed, the most fusible of them filling the cavities and pores formed during such cooling. Thus, in the mass of metal, irregular amassments of this alloy appear, the texture of the metal becomes inhomogeneous, and the article indurable. To diminish these important deficiencies the articles are cast nearly always of a greater height than is required—*i. e.*, they are cast with a runner; but, in consequence of the expense and many other inconveniences, the height of the runner cannot exceed a certain limit, so that notwithstanding it the cast article remains porous, inhomogeneous, and, in consequence of this, indurable. To fully remove these deficiencies, I found it very useful to apply to the fluid metal in the mold a high artificial pressure immediately after the casting, and to continue this operation until the casting grows hard or even quite cool.

I wish it to be understood that I am aware

that the application of pressure to fluid metal in the mold is not new; but the means by which it has hitherto been accomplished, or has been proposed to be done, are quite different from the means employed by me, which is as follows:

To produce the pressure, I use the apparatus shown in the accompanying drawing, of which Figure 1 is a vertical section of the apparatus on line *x x* on Fig. 2, the latter figure being a plan view.

The construction and action of the apparatus are as follows:

On the walls of the foundation A rests a cast-iron beam, B, on which is placed, in the first instance, a cast-iron plate, C, with a conical stopper, D, this stopper forming the bottom of the mold, and the plate C supporting the strong metallic mold, consisting of the pieces E E E. The mold is closed by a solid cast-iron cover, F, which is drawn to the beam B by bolts G G, connected with buffers H H, of any suitable construction, which buffers allow the mold, after having been filled with metal, to expand by heat without damaging the parts of the apparatus. Into the middle of the cover F, I cement a cylinder, I, of clay or some other material, which should be a bad conductor of heat, leaving in the axis of it, which axis is in a line with the axis of the apparatus, a runner. On this cylinder I place a cast-iron piston, K, provided likewise with a runner, *b*, and cup L, the whole being supported by thin and flexible stays *a a*. The cup L and runner *b* are also lined with clay. To delay the cooling of the top part of the cast article, the upper portion of the widest part of the mold E and the lower surface of the cover F are also lined with clay, as shown at *d d*. *c c* are conical escape-holes for air and gases. The pressure is produced by means of a separate frame, which frame consists of two cast-iron beams, M M', united with each other by bolts N N. This frame surrounds the mold, and hangs freely on a crane (not shown in the drawing) by a chain attached to the brace O. To the beam M is attached a plug, P, by means of which, after the mold having been filled with metal and the frame M M' lowered, the runner *b* is closed and the pressure transmitted to the piston K. To increase this press-

ure, I attach to the lower surface of the beam B a hydraulic press, R, of ordinary construction, the piston of which in descending transmits the pressure to the lower beam, M', of the frame.

By pressing the liquid metal in the mold according to my method above described, the following conditions, on which the success of the casting and nature of the metal depend, must be observed: (a) Any section at a lower level of the mold may be equal or less, but must never be greater, than a section taken at a higher level. (b) The upper portion of the article cast must be protected from cooling, as much as possible, by providing corresponding part of the mold with a layer of clay or other material, which should be a bad conductor of heat. (c) The pressing-piston, which acts immediately on the metal, should be made of some bad conductor of heat, and should

press not on the whole surface, but only on the central portion of the column of metal contained in the mold.

I claim as my invention—

1. The buffers H H, when combined with the sectional mold E, as described.

2. The combination of the frame M M' N, plug P, piston K, and clay cylinder I, as and for the purposes described.

3. The piston K, runner b, cup L, and cylinder I, when combined together and with the mold, as described.

In testimony that I claim the foregoing I have hereunto set my hand this 5th day of June, 1873.

ALEXANDER STEPHEN LAVROFF.

Witnesses:

NICHOLAS CHEVALOFF,

ALEXANDER MICHELSSOHN.