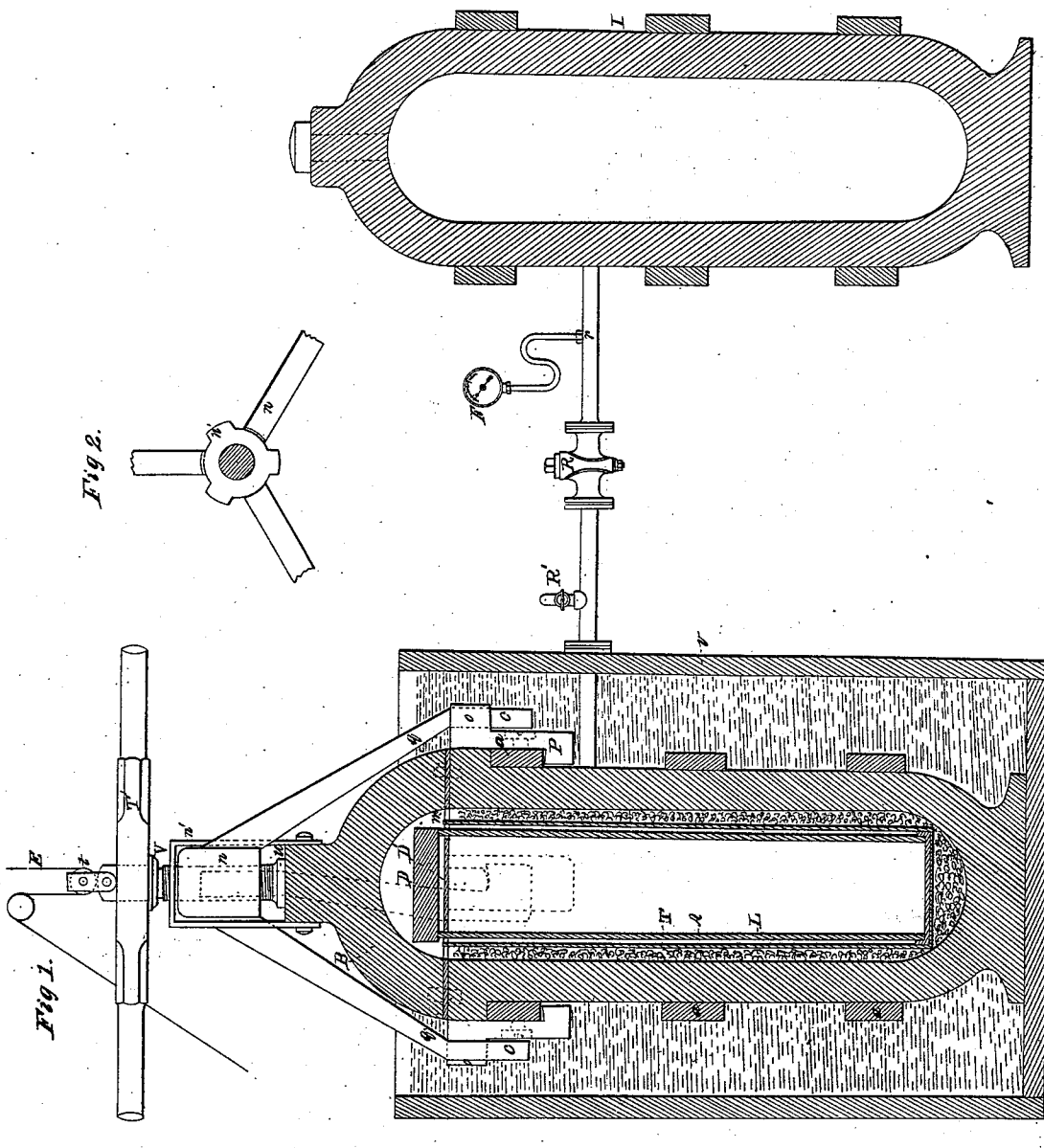


*J. Fires,*

*Casting Apparatus.*

*No 82,642.*

*Patented Sep. 29, 1868.*



*Witnesses.*

*A. S. Miller.*  
*J. H. McLean.*

*Inventor.*

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*By his Attorney*  
*W. H. Mason.*

# UNITED STATES PATENT OFFICE.

JACQUES RIVES, OF PARIS, FRANCE.

## IMPROVEMENT IN METHODS OF CASTING METALS.

Specification forming part of Letters Patent No. 82,642, dated September 29, 1868.

*To all whom it may concern:*

Be it known that I, J. RIVES, of Paris, France, have invented an Improvement in Casting Metals, Glass, &c.; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists, first, of apparatus for subjecting a body of metal or other material while in a state of fusion and during the process of cooling to the action of a gas under pressure, as fully described hereinafter, an ingot or casting of uniform density being thus produced.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe the manner of carrying it into effect, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a sectional elevation of my improved apparatus; Fig. 2, a detached view of part of the apparatus.

A is a strong metal vessel, on which are metal bands *a a*, and which is arranged within a larger vessel or tank, *v*, containing water, the vessel A communicating through a pipe, *r*, (having cocks R R' and a pressure-gage, F,) with a reservoir, I, containing air or other suitable gas under pressure.

To the vessel A is fitted a cap, B, between which and the vessel is a soft-metal washer, *m*, the cap being secured in its place by a screw, V, which passes through a yoke, *n*, and bears with its lower end upon the cap, the yoke having arms with projections *c* at their lower ends, which projections catch beneath lugs *o* on blocks P, bolted to the upper band *a*. A second yoke, *n'*, the arms of which are bolted to the cap B, extends over the yoke *n*, and connects the latter to the cap without preventing the yoke from being turned slightly, independently of the cap, to move the projections *c* from beneath the lugs *o*.

To the upper end of the screw V are secured a handle, T', and a pulley, *t*, and round the latter passes a chain, E, by which the cap can be raised and lowered.

Within the vessel A is a mold, L, for the reception of molten metal, the mold being placed within a perforated casing, T, which is slightly greater in diameter than the mold, so that there is an annular space between the two. To the

mold is fitted a cap, D, of earthenware or other refractory material, and the space between the casing T and the inner side of the vessel A is filled with wood-charcoal in lumps of such a size as to permit the free passage of air between them.

It is well known that when any material is cast the upper portions are less dense than the lower, the same quality belonging to all fluids, whether liquid or gaseous, and consequently to solid bodies in a state of fusion; but the latter retain after fusion the density which was theirs in a liquid state, and consequently the mass is not homogeneous. When, however, the fused material is subjected to a uniform pressure, it will on cooling be of an equal density throughout. This fact is well known to founders, who apply it in using what they call the "lump." Thus, when they wish to have a dense, homogeneous, and flawless casting, they surcharge the mold with matter to compress the molten contents; but the utility of this method is very limited, the pressure, though varying with the importance of the casting, being seldom very great. By the improved process, which I will now proceed to describe, homogeneous castings of any desired degree of density may be obtained.

Let it be supposed that the air or gas reservoir I is filled to a pressure of ten atmospheres, that the vessel A is open, and that steel, glass, or other material is to be cast. The molten material is poured into the mold L, a small iron disk, D', is placed over the fused matter, and the mold L is covered by the cap D. As soon as the vessel has acquired the temperature of the molten material the radiating heat traverses the thin stratum of air between the mold and the casing T, heats the latter, and renders incandescent the charcoal surrounding it. The cap is then lowered and tightly secured, closing the apparatus air-tight, after which the cock R is opened, and compressed air is admitted among the interstices of the charcoal. At first there is an equilibrium of pressure; but soon the air in the vessel A becomes dilated, a portion returns to the reservoir, and the equilibrium is again established. If the cock is closed when the air has entered the vessel A, the pressure in the latter will be greater than in the reservoir. The pressure can thus by means of the cock be regulated

at will. The quantity of air which penetrates the apparatus is relatively small, since the vessel A is almost entirely filled by the mold, its contents, and the charcoal, the air used is thus economized, and the heat is concentrated in a small space. The cooling should be effected slowly and as regularly as possible, this result being obtained by the water surrounding the vessel A, which concentrates the heat, so that sufficient time is afforded for the molecules of matter to approach each other, and a dense ingot is obtained, because the pressure which operated upon the fused matter operates upon it during all the degrees of cooling.

The material cast in this apparatus is subjected to a considerable pressure, ten atmospheres corresponding to a column of cast-steel

thirteen or fourteen meters high; but this pressure may, if necessary, be increased to twenty, thirty, or forty atmospheres without difficulty or danger.

\*I claim as my invention and desire to secure by Letters Patent—

The mold L, arranged within a vessel, A, having a detachable top, B, and between which and the mold is a body of charcoal, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

J. RIVES.

Witnesses:

E. RICHARD,  
JAMES HAND.