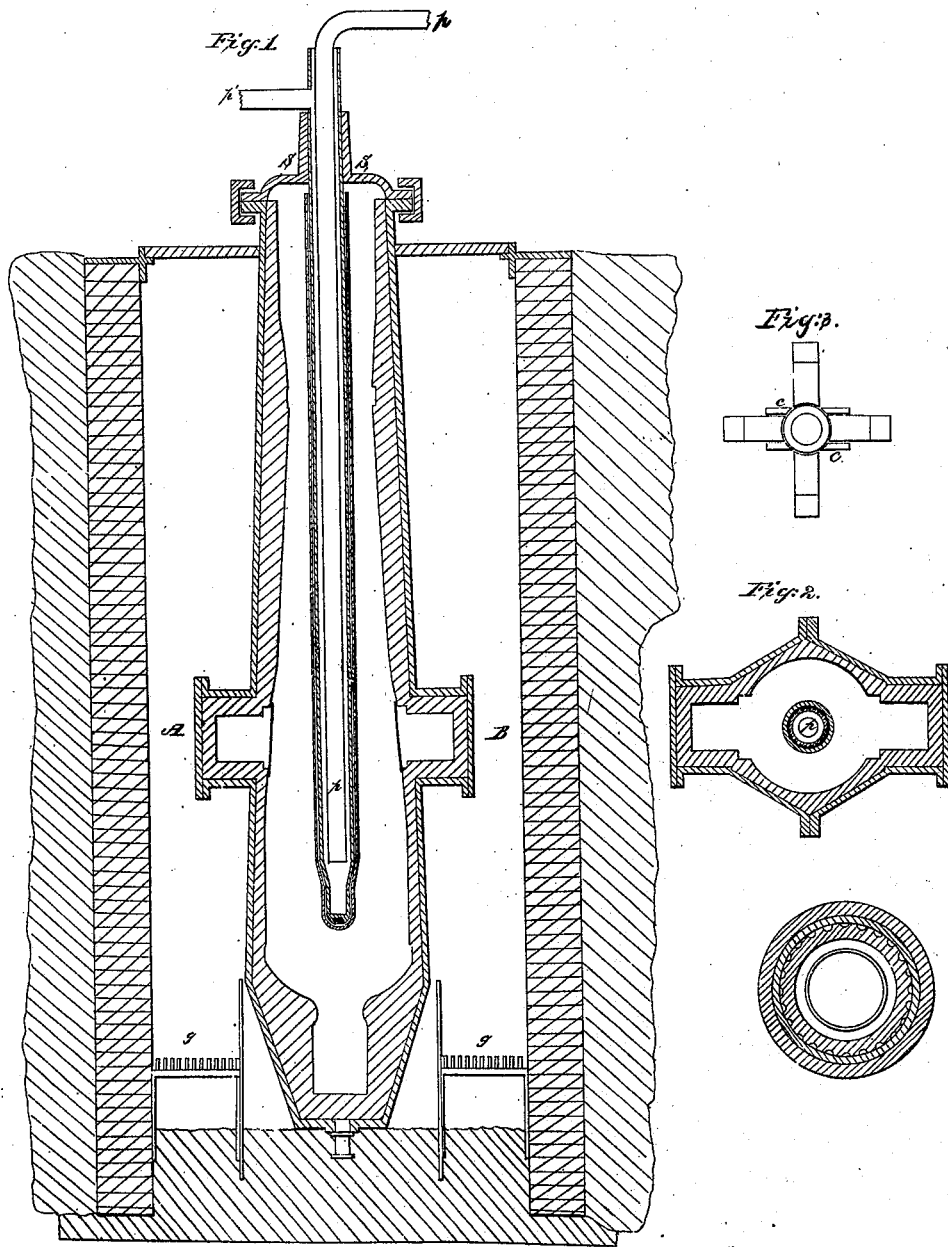


*T. J. Rodman,*  
*Casting Ordnance.*

*N<sup>o</sup> 5,236.*

*Patented Aug. 14, 1847.*



# UNITED STATES PATENT OFFICE.

THOS. J. RODMAN, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN CASTING ORDNANCE, &c.

Specification forming part of Letters Patent No. 5,236, dated August 14, 1847.

*To all whom it may concern:*

Be it known that I, THOMAS J. RODMAN, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and improved mode of cooling guns and other heavy hollow castings—such as hydraulic presses—intended to resist a central force; and I do hereby declare that the following is a full and exact description of the same.

In order more fully to show the object of the improvement, I shall first notice some of the evils which it is intended to correct, which are as follows, viz:

First. It is known that by the ordinary mode of cooling, the exterior of the casting is the first to crystallize, and that crystallization goes on successively from the exterior toward the center, the interior being at a temperature considerably higher than the exterior, from which it results that when the casting is cold it is on a strain, the interior portions being prevented from contracting into their natural volume by their attachment to the exterior, and thereby subjected to a force of elongation, while the exterior portions are subjected to a force of compression.

Second. It is known that the strain produced on any material (not on a strain at the time of its application) by a force acting from the center outward is inversely as the square of the distance from the center. This principle, acting jointly with the one above, renders the metal very rapidly less effective as it is farther from the center; so much so, indeed, that all over one-caliber in thickness is in a manner useless, for the interior portions, already under a force of elongation, are broken before the exterior portions are brought into action, the particles being necessarily torn asunder, instead of being all broken at the same instant.

Third. By the ordinary mode of cooling, the interior is the softest portion of the gun, whereas it is highly desirable that it should be as hard as possible, in order to resist the balloting of the ball in firing.

Fourth. When the gun is cooled from the exterior, the trunnions are the first parts cooled, and as the gun contracts, in cooling, the part below the trunnions becomes suspended by them, while the metal is still so weak as to be rendered porous and permanently injured thereby.

All of the above evils are remedied by cooling from the interior, for, by this mode of cooling the metal is thrown on a strain just the reverse of that produced by the old method, which, in combination with the second principle above named, will render effective all the metal which may be placed in the thickness of a gun, which is the main object of this invention. The interior, being cooled most rapidly, will of course be the hardest portion of the gun, and the trunnions being the last parts cooled, the gun cannot be suspended by them while cooling.

The improvement is intended to apply more particularly to guns of large caliber.

To enable others skilled in the art to use my invention, I will proceed to describe the means and manner of its application. I make a hollow iron-core barrel closed at the lower end and open at the other, and of sufficient length to extend down to within a few inches of the bottom of the bore when finished and about two feet above the top of the flask. This barrel is made water-tight, (when water is used for cooling,) and fluted or grooved longitudinally on the exterior, for the purpose of venting the casting. The upper end of the barrel is turned slightly conical, so as to fit snugly into a socket, of which Figure 3 is a ground view, and S, Fig. 1, a vertical section. In that portion of the barrel which passes through and projects above the socket is inserted (water-tight) an induction-pipe, *p*, Fig. 1. In the lower end of the barrel is a female screw cut in far enough to receive a journal, on which the barrel turns while being coated with clay, but not entirely through the bottom of the barrel. Having completed the barrel, I cover it with a coating of hemp rope (or other suitable material) tightly lapped on from the lower end up as high as the metal is intended to rise. The barrel is then covered with a coating of clay and horse-dung intimately mixed, then baked and prepared in the same manner as the gun-mold. The barrel thus finished is about an inch less in diameter than the bore of the gun. For casting, the core is held in its proper position by having its upper end inserted into the socket above named, where it is firmly secured by keys, as seen at *c*, Fig. 3, the socket being firmly secured to the head of the flask by clamps or other suitable means. The sock-

et is accurately reamed out at the same time the portions of its cams which rest upon the flask are turned, the head of the flask being also turned. Having secured the core in position, (the mold being in the pit,) I insert a pipe, of which *p*, Fig. 1, is a longitudinal section, and *p*, Fig. 2, a cross-section. This pipe is prevented from sinking below its proper position in the barrel by means of a collar or studs attached to it and resting on the upper end of the barrel. Having secured the pipe in position and brought the pit to the proper temperature; (which should never be so high as to impair the strength of the flask,) I let on the water and fill the core-barrel up until it begins to run out at the eduction-pipe *p'*, Fig. 1. I then let on the metal and regulate the temperature of the discharged water by letting on a greater or less quantity. The water descends through the pipe *p*, Fig. 1, to the bot-

tom of the barrel, and rises up between the pipe and the interior of the core-barrel, escaping at the pipe *p'*, Fig. 1. The flask is kept heated by a fire on the grates *g*, Fig. 1, until the heat is extracted from the casting by the water circulating within it.

Now, what I claim as my invention, and desire to secure by Letters Patent of the United States, is—

The cooling from the interior of guns or other heavy hollow castings intended to resist a central force by circulating within the core a cooling fluid or gas, in combination with the application of artificial heat at the exterior of the flask to prevent cooling from without.

THOMAS J. RODMAN.

Witnesses:

CHARLES KNAP, Jr.,  
JNO. M. O'RELY.