J. S. ROBINSON.

PROCESS OF ANNEALING CASTINGS.

No. 188,189. Patented March 6, 1877.

Fig. 1.

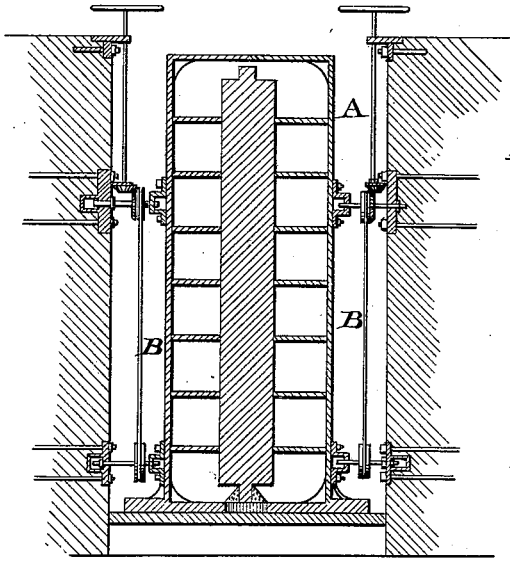


Fig. 2.

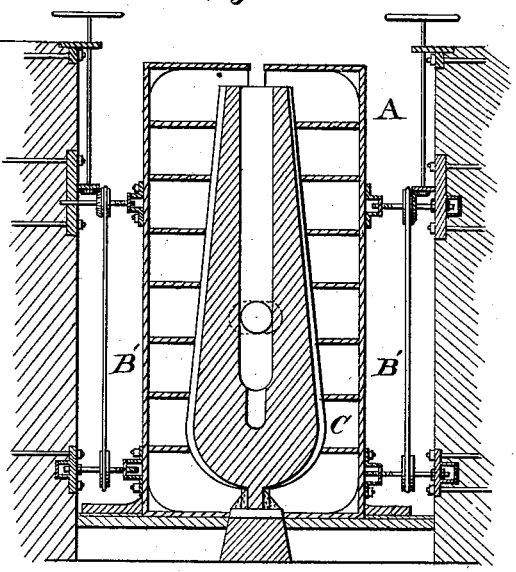


Fig. 3.

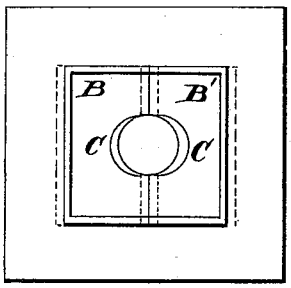


Fig. 4.

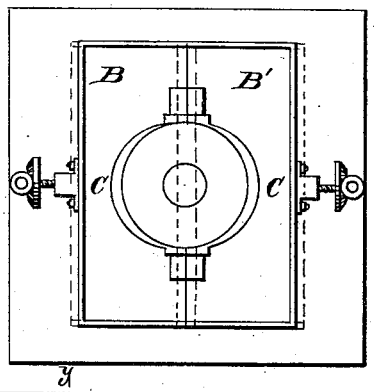


Fig. 5.

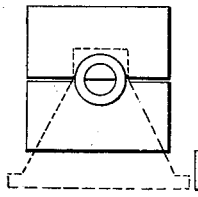


Fig. 6.

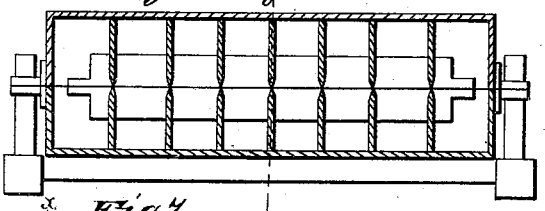
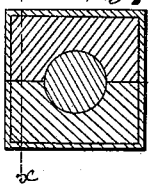


Fig. 7.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PROCESSES OF ANNEALING CASTINGS.

Specification forming part of Letters Patent No. **188,189**, dated March 6, 1877; application filed May 20, 1876.

To all whom it may concern:

Be it known that I, JOHN S. ROBINSON, of the town of Canandaigua, in the county of Ontario and State of New York, have invented a new and Improved Process of Annealing Castings, of which the following is a specification:

This invention relates to a process for the treatment of cannon, shafts, rollers, and other castings before removing them from the flasks or molds in which they are cast, such treatment consisting in applying pulverized charcoal, or coal of any other kind, which will be ignited by the heat contained in the casting when such coal is reduced to the requisite degree of fineness, the material to be applied while the casting is at as high a degree of heat as is practicable, or as soon as the sand can be removed from its surface without causing a change of form, the object being to prevent the too rapid cooling of their surfaces and the consequent crystallization and weakening of the metal upon such surfaces. It is a well-known fact that when heavy castings, such as ordnance, shafts, or rollers, are made in the usual way, their outer surfaces cool first, and frequently become quite solid in their character while the metal at their centers is still in a plastic or semi-liquid state, and hence it follows that when the central portion cools the tendency is to cause such portions to shrink away from the outer portions, thus causing upon the intermediate portions an undue strain, the result of which is an elongation and consequent weakening of the crystals of said intermediate portions.

By my improved process the surfaces of such castings are kept at a high degree of heat until the radiation from the central parts has been such as to reduce the crystals thereof to nearly or quite the same state as those at or near the surface, thus allowing all parts to shrink or contract alike from that point, and thus insure a compression of the crystals at all parts instead of elongating or straining them.

For the purpose of enabling the public to use my improved process, I have shown one method of applying the material, it being illustrated in the accompanying drawing, in which—

Figure 1 represents a vertical section of a flask suitable for containing the mold for a shaft to be cast in a vertical position, and Fig. 3 a cross-section of said flask. Fig. 2 shows a vertical section of a flask adapted for the reception of a mold in which to cast a cannon, and Fig. 4 a cross-section thereof—the flasks in all of the above-referred-to figures being shown in pits formed for their reception. Fig. 5 is an end view of a flask in which the casting may be cast in a horizontal position, Fig. 6 being a longitudinal section thereof on line *x x* of Fig. 7, which is a transverse section on line *y y* of Fig. 6.

A A, Figs. 1 and 2, refer to the pit in which the flasks may be placed, they being of such dimensions as may be required for the kind of work to be done. B B′ are the flasks, which are to be made in sections so as to allow them to be parted at their centers. The sections of these flasks may be provided with mechanism, as shown, or with any other that will serve the purpose required, which is the withdrawal thereof from the surfaces of the castings to such a distance—when the same has become so far cooled as to permit it to be done without a change of form thereof—as to leave a space, C, between it and the inner surfaces of the mold, into which the pulverized coal is to be put, in which position the whole is to remain until the casting is so far cold as to justify its removal. The machinery shown for removing the flasks and the molds from the castings consists of a shaft, 1, the upper end of which is secured to the upper surface of the pit, and is furnished with a crank or wheel for turning it, while upon its lower end there is placed a beveled wheel, which meshes into a similar wheel placed upon a horizontal screw, which passes through a nut secured to the flask. This vertical shaft may be extended down so as to carry upon its lower end another wheel similar to the one above described, which shall mesh into a wheel upon a screw placed near the lower end of the flask, or motion may be communicated to the lower screw by means of pulleys and a belt, as shown. The flange upon the lower ends of the sections of the flask may be made to run upon rollers, or they made to slide upon the bottom plates of the pit. For supporting the pattern while in

the mold, and the casting after it is formed, it is proposed to place a block of metal in the bottom of the pit, or to place there plates of metal of such dimensions as to answer the purpose, their upper surfaces being large enough to allow a sufficient amount of the mold to rest thereon to prevent the metal from flowing out when the casting is made.

When the articles are cast in a horizontal position the flask will be constructed as shown in Figs. 5, 6, and 7, where it is represented in Figs. 5 and 6 as parting at its center, and as having upon its ends trunnions one-half of which is upon each of the parts of the flask resting in boxes formed in suitable stands, so that it may be turned over, the object being to provide for the removal of one part of the mold or the sand in the same, and the supplying of its place with coal, and then to turn it upon its bearings, and repeat the process, the partitions in the flask forming supports for the casting after the mold or the material constituting it has been removed.

I prefer, in making castings to be treated by my process, to form them in what are termed dry sand molds, but I do not limit said process to castings thus made, as the molds and the material used in forming them relate rather to convenience in casting than to my invention.

The above description of the flasks and molds is regarded as sufficient, as they form no part of my present invention, but are given for the purpose of showing one method of putting in practice my improved process.

Having thus described my invention and one method of putting it in practice, what I claim is—

The herein-described process for treating cannon, shafts, rollers, and other castings, it consisting in the application thereto of pulverized coal before removing them from the positions in which they are cast, and while they are at a red heat, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

JOHN S. ROBINSON.

Witnesses:

JOHN P. SPEAR,

W. L. HICKS.