(No Model.)

D. C. STOVER.

PROCESS OF CASTING METALS.

No. 381,655. Patented Apr. 24, 1888.

Fig. 1.

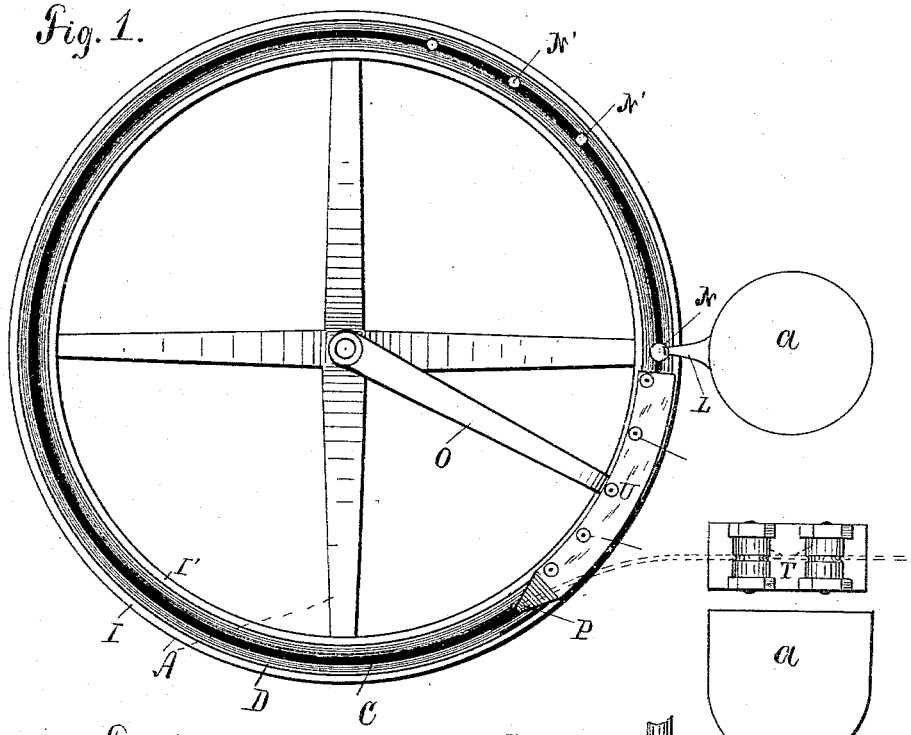


Fig. 2.

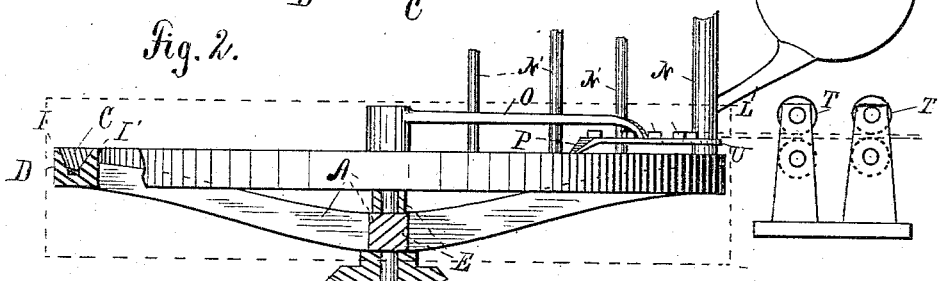
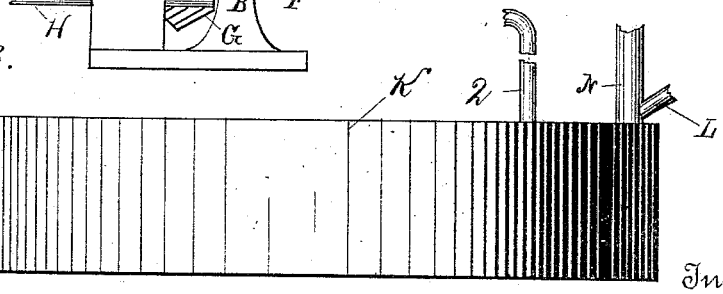


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

DANIEL C. STOVER, OF FREEPORT, ILLINOIS, ASSIGNOR OF ONE HALF TO THE WASHBURN & MOEN MANUFACTURING COMPANY, OF WORCESTER, MASSACHUSETTS.

PROCESS OF CASTING METAL.

SPECIFICATION forming part of Letters Patent No. 381,655, dated April 24, 1888.

Application filed January 23, 1888. Serial No. 261,603. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. STOVER, a resident of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Processes of Casting Metals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention involves the application of a cooling-liquid directly to molten iron or other metal, and is fully set forth in this specification, and shown in the accompanying drawings, wherein—

Figure 1 shows in plan a device for forming continuous rods from molten metal. Fig. 2 is a view, partly in elevation partly in vertical section, looking in the direction of the arrow of Fig. 1. Fig. 3 illustrates a means of applying pressure to the liquid and metal during the cooling of the latter to the solidifying-point.

In the practical use of this process it is found that the nature and temperature of the cooling-liquid employed are important; but water at the normal temperature of city mains has produced excellent results. It is further found that subjecting the cooling-liquid and the molten metal to pressure is important both in its effect upon the cooling and upon the perfection of the product.

In the drawings, A is a horizontal wheel mounted upon a stationary vertical shaft, and provided with an annular groove, C, in the upper surface of its rim D. Upon the lower end of its elongated hub E is mounted a miter gear, F, which meshes with a corresponding gear, G, upon a driving-shaft, H. Flanges I I' extend upward from the inner and outer edges, respectively, of the rim D, and form therewith a complete annular trough. Above the plane of the wheel, and at any convenient location with reference thereto, is a receptacle, *a*, for the molten metal. A spout, closed at will by the usual plug of refractory material, serves to conduct the metal to the groove C, which it enters with a cooling-liquid discharged continuously through the pipe N. Other pipes, N', as numerous as may be desired, also pour liquid into the trough at various points, insuring a constant and rapid change of the liquid in contact with the metal. Now, if a suitable stream of metal be discharged through the spout L, and if at the same time the wheel rotate at a suitable rate of speed, moving from right to left, the groove, as it passes beneath the spout, will be partially filled with metal, and if the diameter and speed of the wheel be adapted to the character of the metal the latter will become solidified before it is again beneath the spout, and may, while still at a high heat, be removed from the liquid and subjected to the action of rollers or other mechanical formers.

The shaft B extends above the plane of the wheel, and upon it is mounted an arm, O, whose outer end bears a curved horizontal plate, U, from which projects a downwardly-inclined finger, P, adapted to slide beneath the partially-cooled metal in the groove and raise it to the surface of the plate. From the plate U the bar of metal, still at a high heat, may pass between ordinary rollers, T, or may be hammered or pressed into any desired form, as though it were reheated in the usual way for forming into any desired shape.

The spout L is shown as entering the pipe N above the wheel, in order that the metal and cooling-liquid may enter the mold together; but while this construction is preferred, it is not in all cases indispensable.

If the wheel be completely incased in a box, K, Fig. 3, filled with the cooling-liquid, metal being admitted through the spout L and liquid through the pipe N, as before, and if the liquid be discharged through an upwardly-extending pipe, Q, instead of by direct overflow, any desired pressure may be maintained within the box, for the pipe Q may be carried to such a height as to produce the required pressure if the pipe N be carried to a still greater height, and evidently, while the pressure depends upon the height of the pipe Q, the rapidity of the change of the liquid within the box will depend only upon the excess of height of the pipe N over the height of the pipe L.

The partially-cooled metal in the apparatus above described issues from an aperture in the

ide of the box, and the various shafts and pipes that may be employed may reach the interior in the same manner, and it is not necessary that they closely fit the apertures, since the escape of water is not important. Still, to avoid an undesirable jet of water, fibrous packing—like asbestus—may be used. When the articles to be formed do not require rolling or other forming operations after removal from the liquid, the apparatus may be much simpler, and it is evident that my method does not depend upon the employment of the precise means shown and described—*e. g.*, any other means of applying pressure may accomplish the same results in substantially the same way, the liquid compressing the metal and being forced into the same intimate contact with it in spite of any layer of vapor, however the pressure be produced.

What I claim is—

1. The process of casting metals, which consists in submerging a mold in and filling it with a rapidly-changing body of cooling-liquid under pressure, and then pouring cooling-liquid and the molten metal together into said mold, filling the mold to the desired extent with metal and displacing the cooling-liquid to a corresponding extent.

2. In forming articles from molten metal, the method which consists in subjecting the molten metal while in a suitable mold to the compressive and cooling action of a body of liquid in direct contact with the molten metal and itself under pressure during such contact.

3. The process of casting metal, which consists in covering the molten metal while in a suitable mold with a body of cooling-liquid in direct contact with the metal and rapidly changing said liquid during the process of solidification, whereby the metal is protected from air and injurious gases, while its heat is quickly transferred to the liquid without causing material vaporization thereof.

4. In forming articles from molten metal, the method which consists in submerging a mold in and filling it with a cooling-liquid, and then pouring a cooling-liquid and the molten metal together into the mold, filling the mold and displacing the cooling-liquid, whereby the heat of the metal is quickly removed without causing injurious vaporization of said cooling-liquid.

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

DANIEL C. STOVER.

Witnesses:

JAMES I. HEFF,

J. H. STEARNS.