(No Model.)

J. L. SEBENIUS.

METHOD OF CASTING.

No. 444,162. Patented Jan. 6, 1891.

Fig. 1.

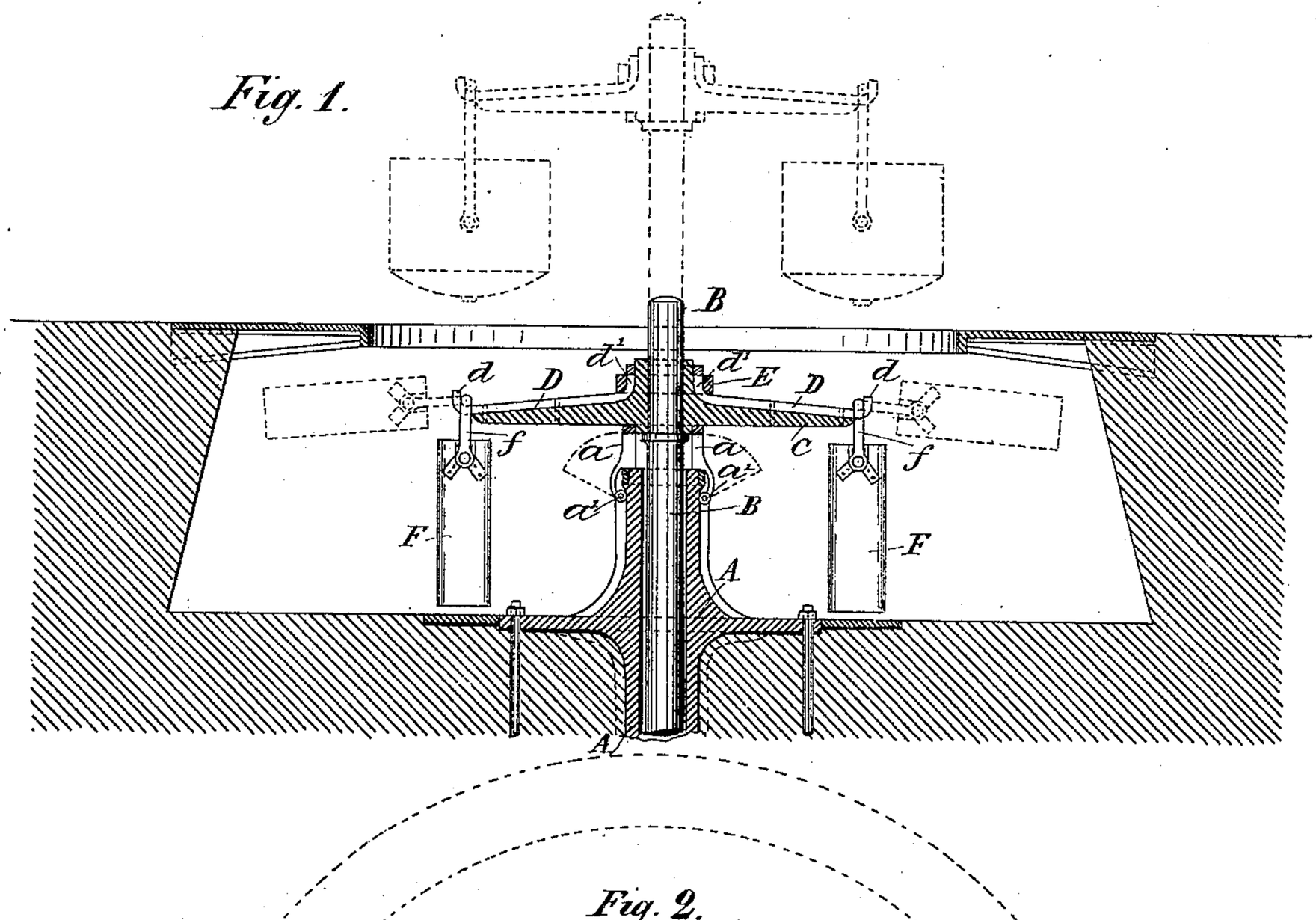
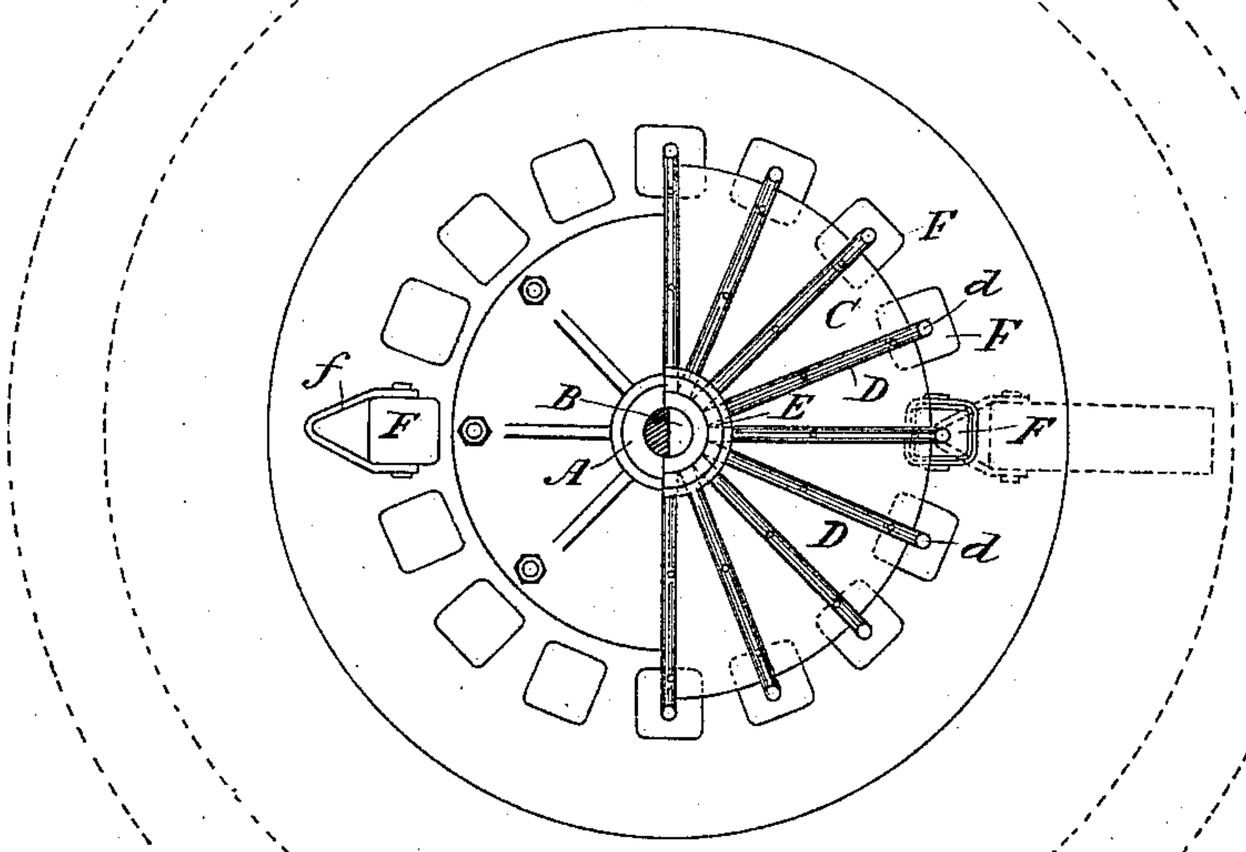


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHAN LEONHARD SEBENIUS, OF STOCKHOLM, SWEDEN.

METHOD OF CASTING.

SPECIFICATION forming part of Letters Patent No. 444,162, dated January 6, 1891.

Application filed March 20, 1890. Serial No. 344,683. (No model.)

To all whom it may concern:

Be it known that I, JOHAN LEONHARD SEBENIUS, a subject of the King of Sweden, residing at Stockholm, Sweden, have invented certain Improvements in Methods of Compacting and Purifying Metals, of which the following is a specification.

My invention relates to improvements in the art of casting ingots and like articles from metals, such as iron, steel, &c.; and the object of my invention is to provide a new and improved method whereby the articles to be cast may be produced free from flaws, pores, and foreign impurities, such as quartz, clay, oxides, &c., whereby an augmented strength is imparted to the metal of the casting.

In carrying my invention into practice I employ a rotating table or frame, upon which the molds or flasks employed for the casting are suspended, which molds may be of the ordinary or any description employed for this purpose, but will be preferably provided with a tight metal jacket. Into these molds or flasks the metal, in a molten condition, is poured, and while the metal is still in a liquid or pasty state the flasks are set or suspended on the rotative frame or table, which is then set in motion, sufficient speed being imparted to it to cause the lighter impurities to become separated from the heavier metallic particles, which latter are forced together and compacted in the outer portion of the chill or flask, while the former collect in the inner part of the same. In this manner likewise any gases which may form in the chill will also be forced inward and escape at the geats or vent-holes in the top of the mold or chill, where such are provided. By this mode of procedure it will be apparent that the metal will be not only freed from its lighter impurities, but, being compacted while in a molten or soft state, will be freed from flaws, pores, &c., and will consequently be much improved in quality and strength over metal cast in the ordinary manner. In cases where geats or vents are formed in the upper face of the chill it will be seen that it is impossible for the molten metal to flow out at these, for, whatever be the speed of rotation, the metal will always be thrown away from these vents by the centrifugal force, and the chill will of course be mounted right side up on the table and will be free to swing outward when the centrifugal force acts upon it. After the centrifugal operation has been completed, which will usually be when the metal has hardened and set in the chills, the table is stopped, and the chills or molds are removed therefrom and opened, when the metal casting within will be found to be composed of comparatively pure metal, the impurities having collected at or near the geats, where they may be broken away.

In treating different metals by my improved process it will be necessary to some extent to employ different apparatus, and in the accompanying drawings I have shown that form of apparatus which is specially well adapted for treating iron and steel, but which embodies all the essential principles which will enter into apparatuses for treating different metals.

In the drawings, Figure 1 is a vertical mid-section of the apparatus on a small scale, and Fig. 2 is a plan view of the same, one half of the rotating table being shown in elevation and the other half being broken away.

A in the drawings is a heavy vertical pillar which is securely anchored in the earth or floor of the building, in which is rotatively mounted a vertical shaft B, to which rotary motion is imparted in any manner. This shaft B is also capable of being raised and lowered, preferably by means of a hydraulic ram or lifting apparatus, for purposes which will be hereinafter explained. Upon the upper end of this shaft B is secured the circular rotating table C, about the upper surface of which are arranged at suitable distances apart strong arms D in the form of iron bars radiating from the shaft B as a center, the ends of which arms are curved or turned upward to form hooks *d d'*. The ends of the arms D forming the hooks *d* project or extend over the edge of the table C and are adapted to receive and support the flasks F, which are provided with bails *f* to take over said hooks *d*, as seen in the drawings, while the inner ends of said arms D, forming the hooks *d'*, are ranged in a circle about the shaft B and are held in place on the table by means of a stout iron ring E, fitted about them.

In order to support the shaft B and table C in an elevated position during the centrifugal operation, I prefer to employ some such

device as that seen in Fig. 1, wherein are shown arms *a*, hinged at *a'* to the sides of the pillar A and adapted to be raised and set under the lower face of the table C in order to support it, as will be readily understood. By means of these hinged supports the table may be maintained at a uniform elevation during the whole of the centrifugal operation.

In the drawings I have shown the apparatus surrounded by a heavy shield of masonry or metal plate to protect the workmen employed in the foundry from accident due to the bursting or leakage of the molten metal from the flasks during the centrifugal operation.

In carrying out my invention in the preferred manner the flasks or molds F are first ranged about the pillar A inside the shield in position to be suspended on the hooks *d*. The shaft B, with table C, is then elevated to the position seen in dotted lines in Fig. 1, and the ladles, of which I prefer to employ two, filled with the molten metal sufficient to fill all the flasks, are hooked on the hooked ends of arms D and the table slowly turned by manual or other power. As the ladles pass each chill successively the table is stopped and the chill filled from the ladle. When all the chills have been filled, which will be, where two ladles are employed, when the table shall have made a half-revolution, the ladles are disconnected and the table C lowered sufficiently to permit the bails *f* on the molds or chills F to be passed over the hooks *d*, the arms *a* being withdrawn, as seen in dotted lines in Fig. 1. The table is now elevated, carrying up with it the flasks F, filled with the molten metal, to the position seen in full lines in Fig. 1 or a little higher, and the hinged supports *a* are pressed in under said table, which is then incapable of being lowered until said arms shall have been withdrawn. The table is now set in rapid rotary motion, the flasks being thrown outward as the centrifugal force increases in power and gradually assuming a more nearly horizontal position, as seen in dotted lines in Fig. 1. This rotary motion is continued until the metal within the molds has become set or hardened, when the table is stopped, lowered, and the chills removed and opened. In cases where the metal employed for the casting parts readily with its gases it is desirable to centrifugate the molten metal in the ladles before it is introduced into the chills; but in the case of other metals which part less readily with their gases it is best to perform the centrifugation after the chills or flasks have been filled.

It is evident that in cases where a cheaper apparatus is desirable the hydraulic lifting apparatus may be dispensed with, and, if the casting is performed directly from the furnace into the molds, these may, by means of trucks or cranes, be quickly transported to the position for suspension on the rotative table, or, if the suspending device be of a character such as not to interfere with the pouring of the molten metal into the chills while suspended, this may be done. It will also be seen that in lieu of employing the table C, as shown, this table may be replaced by a series of radial arms or hooks fixed directly on the shaft B or otherwise attached, and it will also be apparent that the hinged support *a* may be dispensed with, although it is more convenient to employ some such supporting device for the table.

I do not claim in this application the apparatus shown and described. I may say that I am fully aware that it is not broadly new to submit molten metal while in the mold to the action of centrifugal force by rotating the article while being cast about its own axis, and this I do not claim. By my method the article revolves about a center outside of itself or itself or its own mass, and consequently it has an open surface next to the axis of rotation which is not closed by contact with the chill. This permits the gases and impurities to free themselves at this point, which they cannot do where the article is rotated about its own axis while in the flask or chill.

Having thus described my invention, I claim—

1. The herein-described improvement in the art of casting metals under the influence of centrifugal force, which consists in first pouring the metal into an open mold or chill having its axis upright and then subjecting said chill or flask while in this position to centrifugal action about an upright axis outside of the mass of said chill or flask, the axis of the latter being gradually brought into a position radial to the axis of rotation as the metal in the flask cools, as set forth.

2. The herein-described method of removing gas-bubbles and impurities from cast-metal articles by centrifugal force, which consists in rotating the article while in a molten state and contained within its chill or flask about a vertical axis situated outside of the mass of the article, whereby the article treated, partly owing to the lines of centrifugal force occupying a different angle with said axis after the rotation has begun from that which they had when the rotation began and partly owing to the article itself having an open surface of metal in a molten state facing the axis, will be gradually freed from gases and lighter impurities at the said open surface as the metal sets in cooling, said impurities being forced out by the heavier metal under the action of the centrifugal force, as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHAN LEONHARD SEBENIUS.

Witnesses:
NERE A. ELFWING,
ERNST SVANQVIST.