No. 779,192. PATENTED JAN. 3, 1905.

C. VELLINO.

MACHINE FOR CASTING METAL.

APPLICATION FILED APR. 13, 1904.

2 SHEETS—SHEET 1.

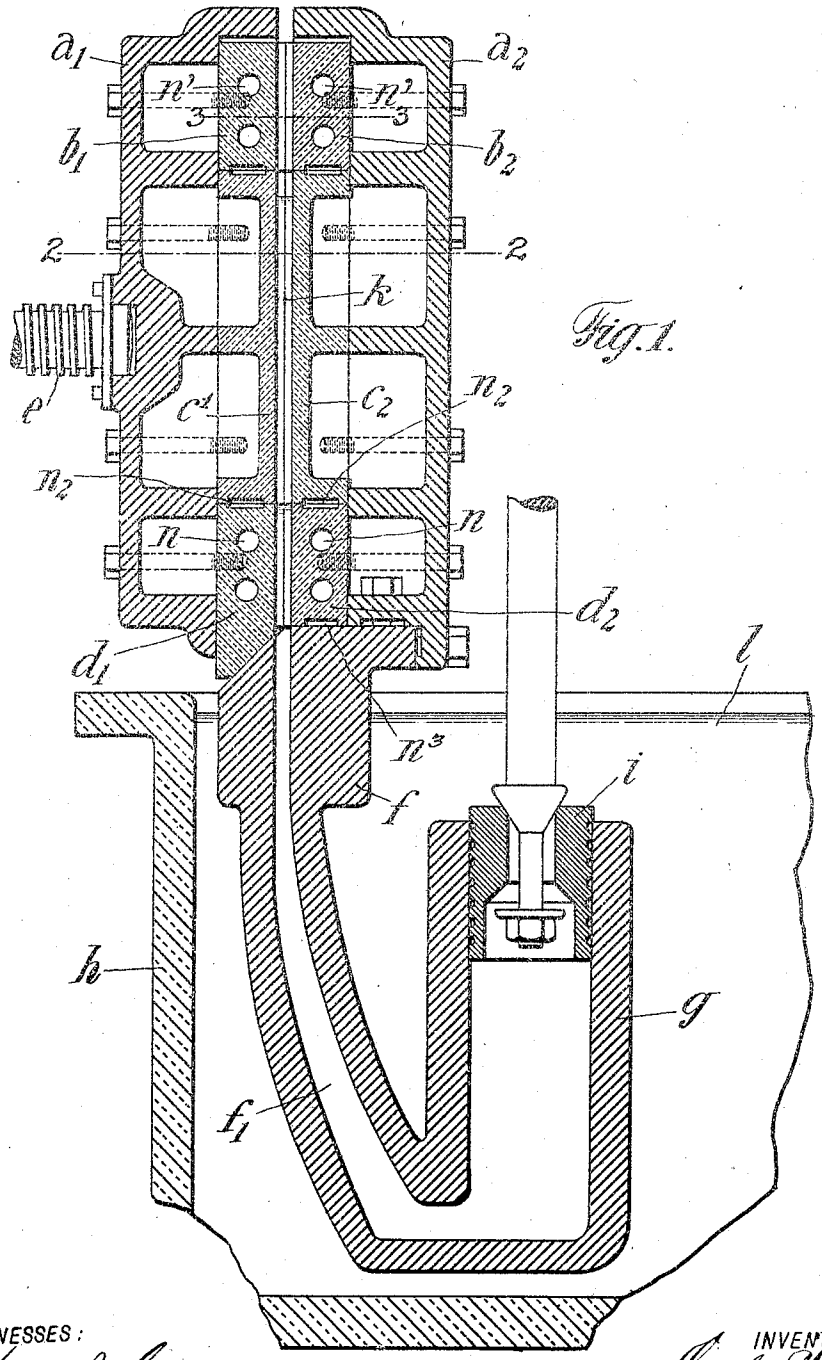


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

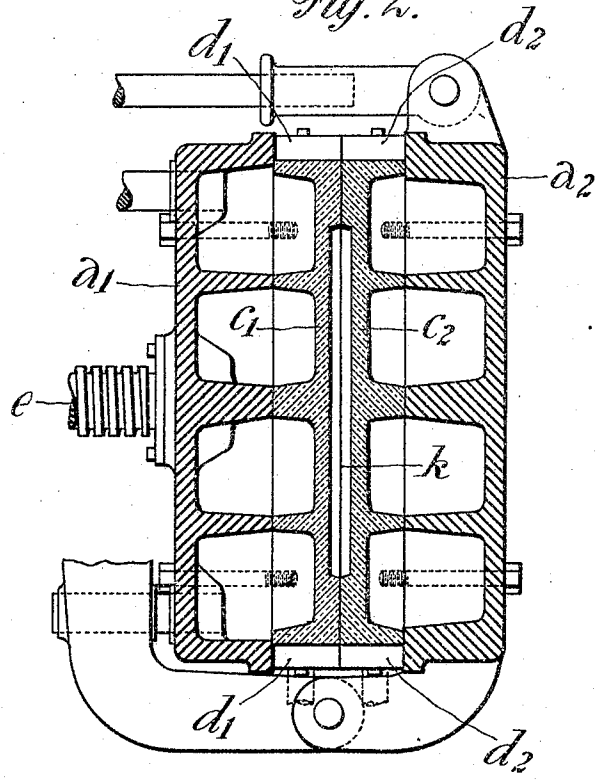


Fig. 3.

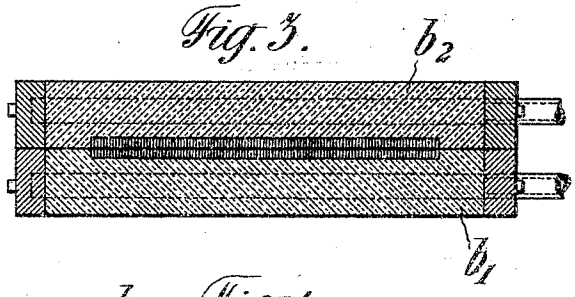
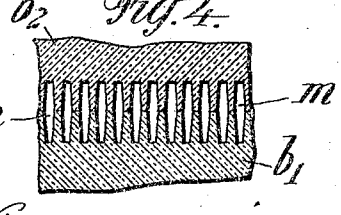


Fig. 4.



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PHOTO-LITHOGRAPHED BY JACKLYN & WILHELMS' LITHO. & PTG. CO. NEW YORK.

No. 779,192. Patented January 3, 1905

UNITED STATES PATENT OFFICE.

CARLOS VELLINO, OF BARCELONA, SPAIN.

MACHINE FOR CASTING METAL.

SPECIFICATION forming part of Letters Patent No. 779,192, dated January 3, 1905.

Application filed April 13, 1904. Serial No. 202,891.

To all whom it may concern:

Be it known that I, CARLOS VELLINO, engineer, a citizen of Switzerland, and a resident of 121 Calle Bruch, Barcelona, Spain, have invented certain new and useful Improvements in and Relating to Machines for Casting Metal, of which the following is a specification.

The invention consists of a machine for casting metal under pressure in suitable molds, and is especially intended to be used for the manufacture of electrodes of electric accumulators or batteries; but it may also be used for the manufacture of other similar articles.

When there are pieces to be cast having very fine and long parts—as, for instance, the winglets of certain plates for accumulators—a very high pressure is necessary because of the rapid flowing of the liquid metal and of the air being prevented from escaping out of the mold, and the articles obtained by these means are full of bubbles. There have been made many attempts in trying to avoid this drawback by causing the molds to work in a vacuum; but these means which may be used for the manufacture of small pieces cannot at all be used for pieces of a certain weight—as, for instance, for large plates for accumulators, the weight of which is sometimes of about fifty kilos, and the lifting of such heavy plates out of the mold being especially difficult and delicate. There is another difficulty to be met for the molding of large-sized accumulator-plates. The liquid metal being driven by a very high pressure in a direction in the mold crossing the transverse recesses of said mold thereby causes a sucking action in said recesses, and therefore rendering impossible a good manufacture and a perfect homogeneousness of the plates of large sizes. Moreover, the different sections of the channels forming the grate cause some differences of speed in the flowing of the liquid metal. The channels having the largest section are sooner filled than those of a smaller section, thus forming rings which confine some air in certain portions of the mold. These disadvantages have prevented until now the use of machines for casting metal under pressure for the manufacture of electric accumulator-plates. The purpose of the present invention is to do away with all these disadvantages by the following means: first, a device intended to limit at a certain point the cooling of the melted metal and to allow the portion of the said metal which remains liquid to flow back from that point after the pressure has ceased, so that the cast piece can be readily removed without removing the form or mold from the pump; second, a device intended to allow the escapement of the air out of the mold, preventing at the same time any liquid metal to flow out of the same.

The accompanying drawings show, by way of example, one part of the machine for casting electrodes for electric batteries or accumulators, which includes my invention. The other parts of the machine may be of any well-known construction whatever.

Figure 1 is a vertical section of the machine. Fig. 2 is a horizontal section of the same, taken on line 2 2, Fig. 1. Fig. 3 is a horizontal section of the top cooling-boxes, taken on line 3 3, Fig. 1. Fig. 4 is an enlarged horizontal section of one portion of the top cooling-boxes, showing the device intended to allow the escapement of air, also taken on line 3 3, Fig. 1.

In the pump-body g the metal is strongly compressed by the piston l, which is actuated by compressed air, steam, or other means. The introduction of lead is made on the whole width of the form or mold, which is composed of two parts C′ and C², through a channel f', crossing a large metallic mass f, one portion of which is dipped in the melted lead contained in a furnace h. This metallic mass f forms a heat-storing device, storing up the heat of the liquid metal in order to constantly maintain the parts of the machine up to the boxes d' d^2, through which the liquid metal must flow to enter the form or mold C′ C², heated to the temperature of the melted metal.

The boxes d' and d^2 are provided with channels n, combined with a cooling device controlled either by an expanding gas or by a current of water circulating through the channels n, and said boxes are adjusted against the mass f and the mold C′ C², so that the passage of heat may be controlled by the grooves n^2 and n^3. (Shown in Fig. 1.) At the top por-

tion of the mold are also adjusted two boxes b' and b^2, which may be rapidly cooled by a current of air or by a current of water circulating through the channels n'. Said boxes do not entirely close the top and the bottom of the hollow portion k of the mold, which in Fig. 1 shows the space for a plate for an accumulator, but shows said space continued by several very narrow channels m, as shown in Figs. 3 and 4. Said channels or openings may have any suitable form whatever which present a large cooling-surface. The small blades separating the said channels from each other being rapidly cooled oppose no resistance to the escaping of the air contained in the mold; but as soon as the liquid metal comes in contact with said blades it is instantaneously cooled. Whatever the actual pressure may be, the mold is automatically closed at the desired time by the cooled metal.

The cooling of the boxes d' and d^2 may be controlled, so that the cooling of the metal in this portion be produced afterward. The pressure always acting upon the piston i, the feeding goes on, and the contraction which is produced in the portion k will be compensated in proportion to the cooling, which is successively produced from top to bottom.

The parts b', c', and d' of the mold are screwed on the part a' of the press, and the parts b^2, c^2, and d^2 are screwed on the other part, a^2, of the press, which is firmly fixed, by means of screws, to the pump-body, the latter being fixed to the furnace.

The front part a' of the press and of the mold may be opened like a cupboard by means of hinges placed on one side and shown in Fig. 3. Under the pressure of the screw e the box d' forms a tight joint on the beveled portion f, and as said box is also beveled it may easily be moved aside on opening the mold for lifting out the molded plate.

The working is as follows: The piston i being at the beginning of its stroke, a strong pressure is exerted upon said piston by any means whatever. The liquid metal is driven under pressure out of the channel f', having at the same time to overcome the counter pressure due to the gravitation which causes it to expand in all the hollow transverse portions of the mold. The liquid metal rises in the mold like a piston, driving away the air, which escapes through the openings m of the boxes b' and b^2. As soon as the metal comes into contact with the cooling-blades it begins to harden and tightly shuts the mold, and the cooling of the metal slowly begins from top to bottom. This operation lasts hardly one second. The pressure on the piston i is then taken off, and the metal, which constantly remains liquid in the mass f, falls again to the level of the melted metal in the furnace h, having been first cooled in the openings m of the top boxes b' and b^2, open at the top and through which the air escapes, then in the space of the mold K, and, finally, in the boxes d' and d^2 to their bottom. The mold is then opened, and after having lifted out the plate said mold is again ready for another operation.

Having thus fully described my invention, I claim—

1. In a mold having a molten-metal inlet and an air-outlet, means for cooling a zone in proximity to said inlet and a zone in proximity to said outlet.

2. The combination, with a mold having an inlet for the molten metal and an air-outlet, of cooling-boxes in proximity to said inlet and outlet.

3. In a mold having a molten-metal inlet and an air-outlet, cooling-boxes arranged at either side of said inlet and said outlet.

4. The combination, with a mold having a molten-metal inlet and an air-outlet, of parallel cooling-boxes arranged at either side of said inlet and said outlet.

5. The combination, with a mold having a molten-metal inlet in the lower portion and an air-outlet in the upper portion thereof, of horizontally-disposed cooling-boxes arranged at either side of said inlet and outlet.

6. In a mold of the class described, contiguous cooling-boxes having interengaging blades forming channels for the escape of air.

7. In a mold of the class described, contiguous cooling-boxes provided upon their inner surfaces with coöperating cooling-blades.

8. In a mold of the class described, parallel cooling-boxes provided upon their contiguous surfaces with coöperating cooling-blades, the edges of the corresponding blades of said boxes abutting each other.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CARLOS VELLINO. [L. S.]

Witnesses:

STANLEY C. HARRIS,

RICHARD G. LAY.