

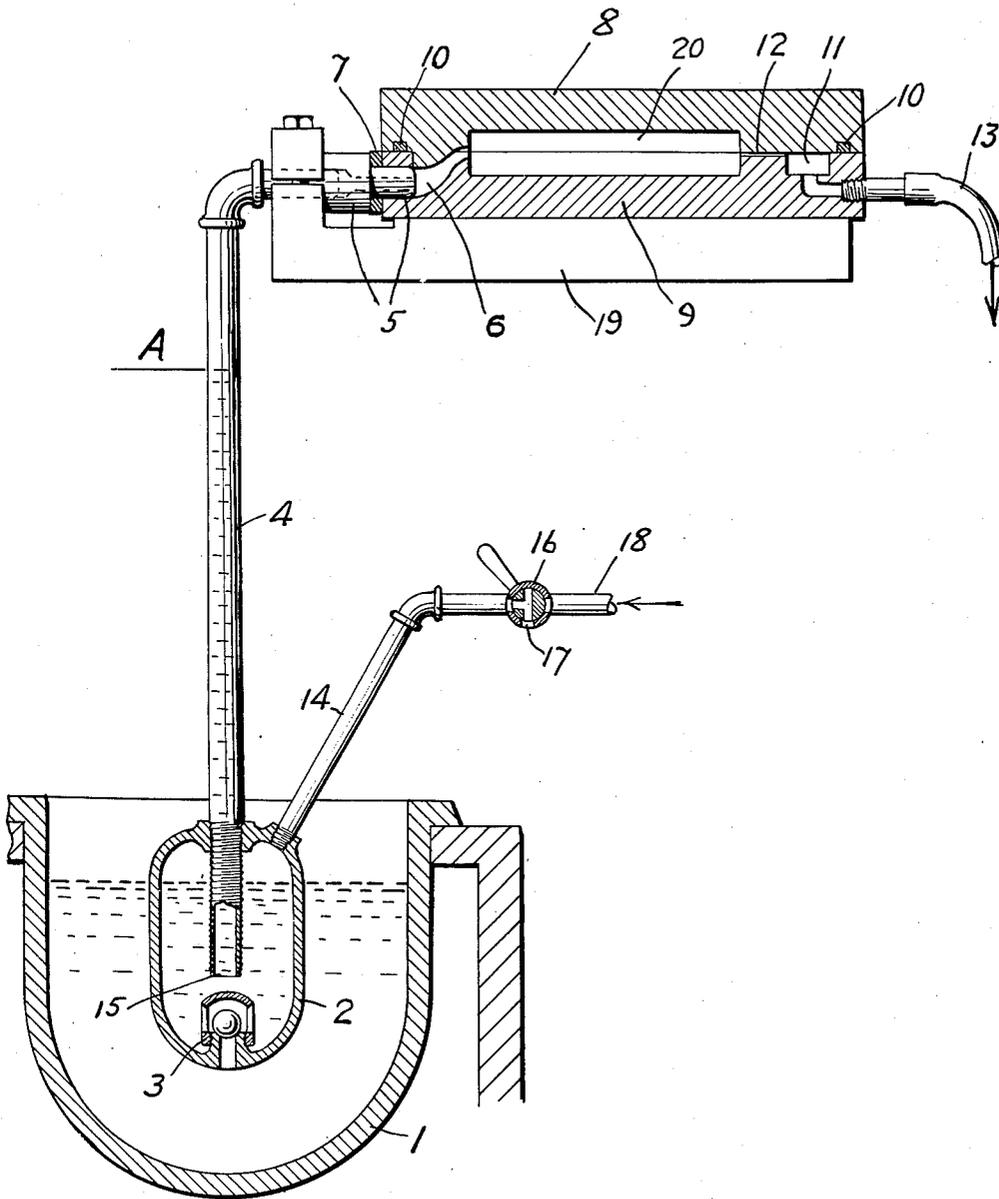
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C. D. GALLOWAY

2,210,544

CASTING

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INVENTOR

WITNESS:

R. P. Kitchel

Charles D. Galloway

BY

Augustus B. Stroughton
ATTORNEY.

UNITED STATES PATENT OFFICE

2,210,544

CASTING

Charles D. Galloway, Wyndmoor, Pa., assignor to
The Electric Storage Battery Company, Phila-
delphia, Pa., a corporation of New Jersey

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1 Claim. (Cl. 22—209)

The present invention relates to casting of the kind in which the metal is put into the mold under the combined influence of plus and minus air pressure and it relates more particularly to a method or mode and to apparatus for practicing the method or mode.

One object of the present invention is to minimize the introduction of air and gases into the mold in advance of the metal.

Another object of the invention is to improve the quality and character of the castings.

Another object of the invention is to provide apparatus by means of which the method or mode can be economically and successfully practiced.

Other objects of the invention will appear from the following description at the end of which the invention will be claimed.

Generally stated, the invention consists in raising the metal from a closed reservoir to a predetermined level in respect to the entrance to the mold by subjecting the molten metal to the difference between atmospheric pressure and a vacuum or partial vacuum in consonance with its specific gravity, thereby displacing from the path of the metal air and gases, and then introducing the metal from that level into the mold by superatmospheric pressure.

The invention also consists in a reservoir adapted to contain molten metal and open to the atmosphere, a closed vessel arranged in the reservoir and in the molten metal therein and provided with a dip stand pipe and with an inwardly opening check valve, a vacuum chamber adapted to be connected with the open end of the stand pipe through the instrumentality of a closed mold, and valved means for connecting the interior of the vessel above the dip end of the pipe, with (a) the atmosphere to establish substantially the same liquid level in the reservoir and dip pipe and vessel; and, after exhausting the stand pipe through the mold and permitting the level to rise in the stand pipe to a point predetermined by atmospheric pressure and vacuum pressure and by the specific gravity of the molten liquid, (b) with a source of air under pressure to force the metal into the mold.

The invention also comprises the improvements to be presently described and finally claimed.

In the following description reference will be made to the accompanying drawing forming part hereof and in which,

The single figure is a view principally in central section illustrating the condition just prior

to forcing the molten metal from the stand pipe into the mold and in which the molten metal stands at the level indicated at A.

Referring to the drawing, 1 is a reservoir or melting pot adapted to contain molten metal and open to the atmosphere. 2 is a closed vessel arranged in the reservoir 1 and dipping into the molten metal contained in the reservoir. The vessel 2 is provided with an inwardly opening check valve 3 and with a dip stand pipe 4. The dip stand pipe 4 is provided with a nozzle 5 adapted to enter the sprue hole 6 in the mold and with a gasket 7. The halves 8 and 9 of the mold are suitably secured together by means not shown because too well understood to require illustration or description and if desired a packing 10 may be provided between them. The mold as a whole may be arranged to slide horizontally on the base 19 to bring the sprue-hole 6 into and out of engagement with the nozzle 5; or the lower half 9 may be immovably mounted on the base 19, the upper half 8 being removable for taking the casting out of the mold and admitting air to the stand pipe 4 through the sprue hole 6 and the nozzle 7. One of the mold halves, 9 in the present instance, is provided with a vacuum chamber 11 connected with the mold cavity 20 by a channel 12 of cross section appropriate to permit the passage of air and to prevent the passage of molten metal. The chamber 11 is connected by a connection 13 to vacuum or to a source of minus air pressure such as an exhaust pump. The connection 13 may be a flexible rubber tube if the mold as a whole is movable.

14 is a pipe communicating with the interior of the chamber 11 above the lower end 15 of the dip pipe. This pipe 14 by means of the valve 16 may be connected to atmosphere as at 17 or to a source of air under pressure as at 18. The source of air under pressure is not shown or described because it is too well understood to require either illustration or description.

The mode or method of the invention will be explained and in the explanation reference will be made to the described apparatus which, although suitable for the practice of the method, is not exclusive of the employment of other apparatus varying somewhat from the described apparatus.

Assuming that the empty mold is open to the air, either by sliding it away from the nozzle 5 or by removing the upper half 8, so that the interior of the dip pipe 4 is subjected to atmospheric pressure. The valve 16 is turned to connect the

pipe 14 with the atmosphere by way of 17, so that the interior of the vessel 2 is subjected to atmospheric pressure. Under these conditions, the level of the molten metal will be the same in reservoir 1, vessel 2 and dip pipe 4. The exhaust pipe connected to 13 is operating and drawing air from the atmosphere.

The mold is now closed and, if movable, slid into connection with nozzle 5. The air in the mold cavity and in the upper end of dip pipe 4 is immediately exhausted through connection 13, causing the metal to rise in pipe 4 to the level indicated at A in the drawing, determined by the differential of pressure and the specific gravity of the molten metal. Then the valve 16 is turned to disconnect pipe 14 from the atmosphere (via 17) and connect it to high pressure air via 18. This pressure applied to the interior of vessel 2 closes check valve 3 and forces the molten metal through dip pipe 4 and nozzle 5 into the mold cavity 20, unobstructed by the presence of air or gases which have been exhausted as described above.

The valve 16 is then turned to its original position, shutting off the high pressure air and connecting pipe 14 to the atmosphere, the mold, if movable, is slid away from nozzle 5, is opened and the casting removed; the molten metal in pipe 4 falls to the original level and the cycle of operations is repeated.

It will be obvious to those skilled in the art

to which the invention relates that modification may be made in details of construction and arrangement without departing from the spirit of the invention which is not limited in respect to such matters or otherwise than as the prior art and the appended claim may require.

I claim:

Method of casting in a mold located a substantial distance above a pressure chamber and connected to said pressure chamber by a pipe leading from below the metal level in the pressure chamber to the sprue of the mold, which method consists in applying atmospheric pressure to the molten metal in the pressure chamber, closing and completely evacuating the mold to raise the metal in said pipe to a point just below the sprue, continuing these conditions until the molten metal in the pipe comes to rest, closing the connection from the pressure chamber to the atmosphere and connecting said chamber with a source of superatmospheric pressure to force the molten metal through the pipe into the mold, maintaining said pressure conditions until the molten metal in the mold has set, then cutting off the flow of superatmospheric pressure to the pressure chamber and again subjecting the pressure chamber to atmospheric pressure to draw the molten metal down said pipe and below the sprue, and opening the mold to remove the casting.

CHARLES D. GALLOWAY.