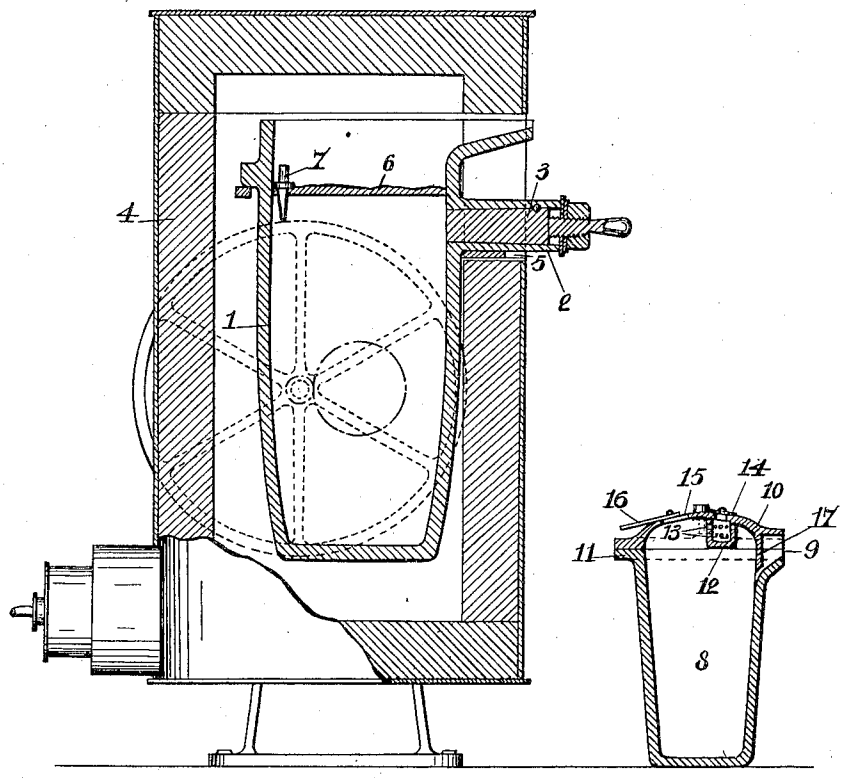
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TREATMENT OF METALS AND CHIEFLY OF MAGNESIUM AND ITS ALLOYS

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TREATMENT OF METALS AND CHIEFLY OF MAGNESIUM AND ITS ALLOYS

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5 Claims. (Cl. 75—58)

According to known methods a mixture of magnesium fluoride and anhydrous magnesium chloride has been used as a flux for cleaning and refining magnesium and its alloys at temperatures above 800° C. Due to the difficulty of melting this mixture, the refining must take place at a temperature above 800° C. To provide for a refining at temperatures below 800°, a chloride of an alkali metal or an alkaline earth metal, or a mixture of such chlorides, has been added to the mixture, but the presence of such substances may contaminate the metal.

I have now found, that the melting point of the mixture of magnesium fluoride and magnesium chloride will be lowered if instead of using the anhydrous magnesium chloride, a somewhat hydrous magnesium chloride is employed. Experience has shown that the presence of this hydrated mixture in the bath produces no prejudical effect, provided the proportion of water is maintained below a certain limit, and this has led to use as a cleaning and refining flux, no longer a mixture of magnesium fluoride and anhydrous magnesium chloride, but a mixture of magnesium fluoride and hydrous magnesium chloride.

I have now observed (contrary to what would be expected), that good results can be obtained with a mixture of 40% magnesium fluoride and 60% magnesium chloride, this latter being preferably free from oxide and containing from 2 to 20% of water. A small percentage of water is quite sufficient for the obtainment of a flux which will melt at the usual refining temperatures (i. e. somewhat above the melting point of magnesium, 651° C.). The percentage of water should, however, not be allowed to rise above 20 to 25%, otherwise the refining properties of the flux will be damaged.

The invention also embraces a method of forming above magnesium or its alloys, a solid protective crust preferably consisting of a mixture of magnesium fluoride and hydrous magnesium chloride. Thus when the metal is poured, the crust will not be carried along with the metal as often occurs when the crust is in the liquid or powdered state, or in pieces.

The invention further embraces a receptacle adapted to receive the metal to be melted, or the molten metal, and comprising one or both of the following arrangements.

1. A cup or the like which is situated at the upper part of the crucible, or even on the cover, and whose interior communicates with the interior of the crucible, the said cup or the like being adapted to contain material of such nature as to give off, when heated, a substance which is without action upon the metal and capable of protecting it against the effects of the air or the like.

2. A screen which is mounted on the crucible, or even on its cover, on the side at which the metal is poured, and which is provided with one or more relatively narrow passages which allow the metal to flow while retaining the impurities. The said screen preferably consists of a comb having several teeth and affording passage to the metal.

In particular, when the metal is melted in a crucible and is transferred to an intermediate ladle prior to pouring into the molds, there is used in conformity to the present invention a crucible whose pouring orifice is situated on the side of the crucible and below the level of the molten metal in the said crucible, and a closing plug serves to retain the liquid until the pouring is to take place.

By way of example, the accompanying drawing shows a crucible embodying this last-mentioned arrangement. Said drawing shows a vertical section of the apparatus, the larger element being the furnace and its crucible, and the smaller element being the ladle, both as described herein.

According to the drawing, about 4'' from the top of a cast steel melting pot 1 there is a projecting lug 2 which is bored out with a tapered hole in order to take a closing plug 3. The pot 1 is placed in a tilting furnace 4, heated by any suitable means, which has a slot 5 cut out at the front to accommodate a projecting lug 2 which should protrude slightly from the furnace.

The pot 1 is then charged with magnesium which is melted and refined below 800° C. with a flux composed of 40% magnesium fluoride and 60% of hydrous magnesium chloride, special care being taken that the surface of the molten metal is about 2'' above the outlet hole of the lug 2.

The metal being thus completely cleaned, there is projected on the surface of the metal a mixture of magnesium fluoride and hydrous magnesium chloride, thus forming a crust 6 which solidifies.

A small collared pin is inserted into the crust during its formation, so as to provide a hole for the insertion of a pyrometer element. The metal is then ready for transferring to the intermediate ladle 8 prior to pouring into the moulds.

The ladle 8 is of cast iron having a spout 9 and a removable cover 10 which is preferably tight-fitting.

The top of the ladle has a flanged edge 11 which

is machined to a smooth face to take the cover 10. The cover, which is also machined smooth, has a cast iron cup 12 drilled with small holes 13 by which the interior of the cup 12 communicates with the interior of the ladle, and a pivoted removable cover 14 is fitted on the top of the cup. There is also a hole 15 in the cover for filling from the crucible, and this hole can be closed to advantage by a tight-fitting removable lid 16.

The cast iron cup is charged with an inert gas or a chemical substance which when the ladle 8 is heated or when the metal is poured in, will give off an inert gas in order to prevent oxidation, the gas passing into the ladle through the small holes 13 drilled in the cup 12.

The ladle 8 is heated before the metal is poured in, and is then carried in a pouring ring to the tilting furnace 4; sulphur or any suitable chemical substance is placed in the cup 12 which is immediately covered in at the top by means of the removable cover 14.

The plug 3 is then removed, the furnace is tilted forward, and the metal, whose temperature has been checked by a pyrometer, is then poured into the ladle 8 through the tapered outlet hole of the crucible, whilst the body of the molten metal is covered and protected by the solid crust and by a stream of sulphurous anhydride (SO_2) which is passed through the pyrometer hole by means of a nozzle. The metal in the ladle, which is kept perfectly clean by means of the inert gas contained therein, is then poured into the mould to produce castings free from flux inclusions or oxidation.

The crucible 1 may contain from 180 to 200 lb. of metal and the ladle 8 from 25 to 35 lb.

The cover is provided with a comb-shaped device 17 having several teeth and extending the whole width of the spout 9, and thus the metal will pass between the teeth of the comb, whilst the impurities and solid matter are stopped by the teeth of the comb 17.

I claim:

1. A method of refining magnesium and its alloys, which comprises adding magnesium fluoride and hydrated magnesium chloride to the metal to be melted.

2. A method as claimed in claim 1, characterized by the fact that the magnesium chloride contains from 2 to 20% of water.

3. A method as claimed in claim 1, characterized by the fact that the refining is effected at a temperature below 800° C.

4. A method of protecting molten magnesium and its alloys against oxidation by the atmosphere, characterized by the fact that there is formed above the molten metal a solid crust of a mixture of hydrous magnesium chloride and magnesium fluoride.

5. A method of refining magnesium and its alloys wherein the metal which is melted and treated with the flux according to claim 1, is then poured into a receptacle and preventing oxidation of said metal therein, by the presence of an inert gas.

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