

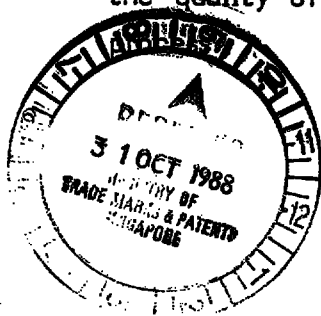
APPARATUS FOR USE IN PRODUCING CASTINGS

The present invention relates to an apparatus for use in producing castings, preferably by the so-called "lost-wax" method, whereby the whole operating cycle is accomplished under vacuum.

5 The use of a vacuum in order to improve the quality of lost-wax castings is long known in the goldsmith's craft. To this end, a plaster mould, after having been prepared and baked beforehand, is placed in a basket which is then located in a watertight vessel wherein, while the molten metal is cast, a certain degree of vacuum is created. This eliminates, by sucking
10 air out through the plaster pores, all the air residues inside the mould, to obtain a first quality casting. The casting of metal therefore takes place at room temperature, and vacuum is applied about the plaster mould only at the moment of tapping, using known apparatuses linked to a chamber wherein the basket that contains the mould is inserted, provided of course with suitable gaskets connected with the mouth.

15 According to the present invention there is provided apparatus for use in producing castings, comprising a first chamber containing a furnace, a second chamber for receiving a mould, and means for producing a vacuum within said chambers, the lower wall of said second chamber being formed by a piston movable within a cylinder between a lower position in which a
20 basket containing the mould can be inserted into or removed from the cylinder and an upper position in which said basket is located within said second chamber, said piston comprising two piston parts disposed one above the other, resilient means being provided for urging said two piston parts apart, an annular gasket disposed between said two piston parts at the outer
25 peripheries thereof and in contact with the cylinder wall, one of said piston parts being moved towards the other piston part at the end of the upward stroke of the piston to cause the annular gasket to be compressed against the cylinder wall.

30 In the apparatus of the invention all the cycle phases, inclusive of casting, are accomplished under vacuum with a view to further improving the quality of the castings and to simplify the different stages of the



In one embodiment of the invention, it is possible to programme the apparatus so as to obtain a completely automatic working, the operator attending only to feed the necessary amount of metal and to set the mould in place.

5 An embodiment of the present invention will now be described, by way of an example, with reference to the accompanying drawings, in which:-

Figure 1 is a partial, schematic section of an apparatus according to the invention;

10 Figure 2 shows schematically the bed of an apparatus according to the invention;

Figure 3 is a section of part of the apparatus according to the invention; and

Figure 4 shows a detail of Figure 3.

15 The apparatus consists of a chamber, generally indicated as a whole by the reference 1, limited by a bed 2 and a bell 3, within which there is a second substantially cylindrical chamber 4. In the chamber 4 there is inserted a basket 20 that contains the mould, said basket 20 having a gasket (not shown) connected with its upper edge.

20 Above the chamber 4 there is disposed a melting furnace 7, mounted on a support 8 by a pivot pin 9.

The pin 9 is pivoted, by means of a gear combination 10 and a shaft 11, preferably by an electric motor 12 located beneath and outside the chamber 1.

25 The support 8 of the furnace 7 and the connected devices are not fixed, but may be adjusted in known manner, so that when the furnace 7 is rotated by the motor 12 it is possible to direct the molten metal exactly towards the central area of the mould.

30 Moreover, the furnace 7, which may be of the electrically heated or of the high frequency heated kind, is preferably provided with a cover or the like, that is automatically lifted by electromagnetic or pneumatic devices of known kind when the furnace 7 is inclined to cast the molten metal.

35 Inside the bed 2 there is a cylinder 13 within which slides a piston 14, actuated by hydraulic or pneumatic means of known kind not shown in the drawings.

The bottom of the chamber 4 is open and communicates directly with the inside of cylinder 13. The upper end of the chamber 4 is provided with a transverse wall 35 in the central part of which there is a hole 36 for the passage of the molten metal. The lower wall of chamber 4, on the contrary, consists essentially of the piston 14. This consists of a lower piston part 15 and an upper piston part 16 that tend to be kept spaced apart by a plurality of helical springs 17, housed in recesses provided in the lower piston part 15.

Extending from the contacting surfaces, said parts 15 and 16 have a tapered edge, so as to define an annular seat in which a gasket 18 formed of an elastomeric material, such as rubber or the like, is inserted.

In the wall of bed 2 and in the wall of cylinder 13 there is an opening 19 through which it is possible to have access to the inside of the cylinder 13 to place the basket 20 on the platen formed by the piston 14, when the latter is in its fully lowered position. Such an arrangement, shown in Figure 2, enables the apparatus to be fed with a basket 20 without having to open the same, by just lowering piston 14 and inserting the basket 20 inside the cylinder 13.

The inside of the chamber 1 is connected to a pump 26 capable of producing internally a certain degree of vacuum, while the inside of chamber 4 is connected, through a valve 21 of known type, to a tank (reservoir) 22 wherein a boosted vacuum is produced by means of a high vacuum pump 23.

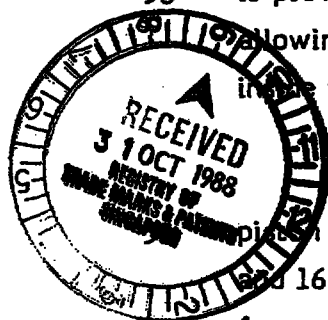
Obviously, instead of having two pumps 26 and 23 shown in the drawing, only one high vacuum pump may be used, which will be connected by suitable switches either with the tank (reservoir) 22 or with the inside of chamber 1.

The bell 3 rests on a gasket 24 located around the boundary zone of the upper wall of the bed 2, and may be raised and lowered by known means.

The bell 3 is made of a material able to withstand a high vacuum and is provided with one or more bull's eyes 25, preferably of tempered glass, allowing an operator to visually check the operations that are carried out inside the bell 3.

The working takes place as follows:-

The furnace 7 is fed with the required amount of metal, and the piston 14 is brought to its lowered position. In this stage the two parts 15 and 16 which constitute the piston 14 are slightly separated, by effect of the force exerted by the springs 17, as shown in Figure 4.



At this point it is possible to position in the cylinder 13, through the opening 19, the basket 20 carrying the plaster mould, which is allowed to rest on the platen formed by the piston 14.

5 The piston 14 is then raised until the upper edge of the basket 20, provided with a suitable gasket, is brought into contact with the upper wall 35 of the chamber 4. The force that drives the piston 14 upwardly also causes the parts 15 and 16 of the piston 14 to come into contact with each other, by overcoming the force exerted by the springs 17. As a consequence thereof, the annular gasket 18 is thrust outwardly and pressed against the
10 wall of the cylinder 13, so as to ensure fluid tightness.

Then the vacuum pumps 23 and 26 (with the bell 3 properly positioned on the bed 2 and on gasket 24) are actuated and the furnace device 7 is turned on.

During this step a certain degree of vacuum is produced inside bell 3
15 by the pump 26, while at the same time the pump 23 produces a higher vacuum in tank (reservoir) 22 (in this position the valve 21 connects the pump 23 to the tank 22).

Due to the vacuum created in the chamber 1, it is possible to suck away any air, if any, present in the molten metal. When the furnace 7 has
20 reached the pre-set melting temperature, automatic means lift the cover of the furnace 7 and actuate the motor 12 (provided with a suitable speed reducer), which inclines the furnace 7 to pour the molten metal into the mould.

The electro-valve 21 opens the connection between the inside of
25 chamber 4 and tank 22, so that the higher vacuum brings about a sucking action particularly effective in removing the fumes and gases that form at the moment when the molten metal touches the walls of the plaster mould.

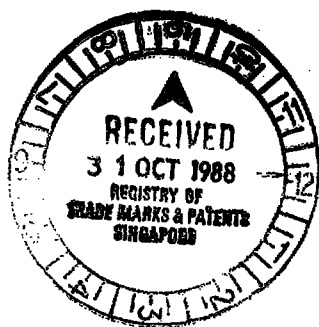
Thus it is possible to obtain cast pieces with a smooth surface, perfectly malleable and without any impurity or fault.

30 The means for controlling the automatic operation of the apparatus could either be absent, or be left unactuated when it is desired to effect manual control of the different operations; this is the case, for instance, when the metal is melted in an outer furnace of known kind, in such an amount as to supply several apparatus.

35 From said furnace the already molten metal is tapped into the furnace 7, that has the function of keeping it liquid while vacuum is produced inside the bell 3, to subject it to de-gassing.

At the end of the cycle, after connecting chambers 1 and 4 to the atmosphere, the piston 14 is lowered and the basket that contains the cast article is removed.

Of course the size of the apparatus, as well as the used materials, may vary according to the requirements of use.



CLAIMS

1. Apparatus for use in producing castings, comprising a first chamber containing a furnace, a second chamber for receiving a mould, and means for producing a vacuum within said chambers, the lower wall of said second chamber being formed by a piston movable within a cylinder between a lower position in which a basket containing the mould can be inserted into or removed from the cylinder and an upper position in which said basket is located within said second chamber, said piston comprising two piston parts disposed one above the other, resilient means being provided for urging said two piston parts apart, an annular gasket disposed between said two piston parts at the outer peripheries thereof and in contact with the cylinder wall, one of said piston parts being moved towards the other piston part at the end of the upward stroke of the piston to cause the annular gasket to be compressed against the cylinder wall.
2. Apparatus as claimed in claim 1, in which the first chamber comprises a bell connected to external means for producing a vacuum within the bell, there being provided means for producing a higher vacuum within the second chamber.
3. Apparatus as claimed in claim 1 or claim 2, in which there are provided means for adjusting the position of the furnace, so as to direct the cast metal accurately when said furnace is tilted.
4. Apparatus as claimed in any preceding claim, in which there are provided means for producing a vacuum inside the first chamber, and means for producing a higher vacuum inside a reservoir external to said first chamber, there being provided means for connecting said reservoir to the inside of said chamber when the mould is located therein.
5. Apparatus for use in producing castings substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.
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