Sept. 11, 1956 G. PEMETZRIEDER 2,762,095

APPARATUS FOR CASTING WITH ROTATING CRUCIBLE

Filed May 26, 1952

Fig. 1

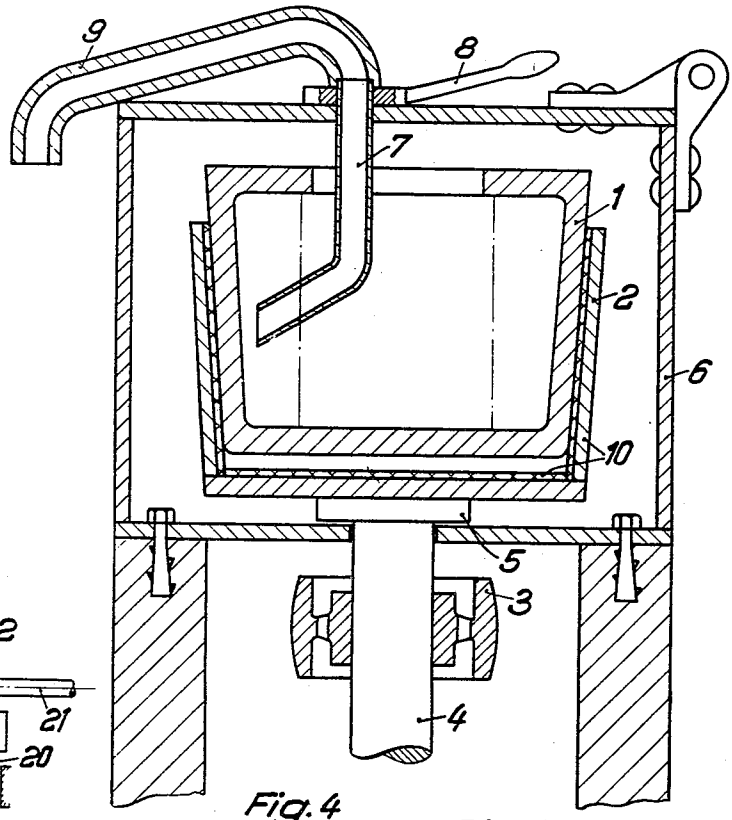


Fig. 2

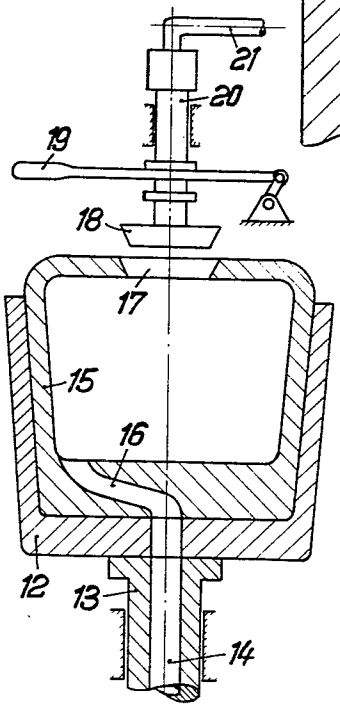


Fig. 4

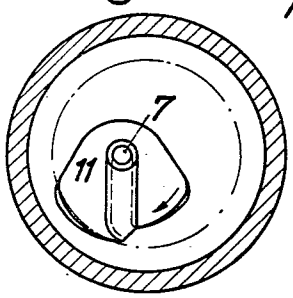


Fig. 5

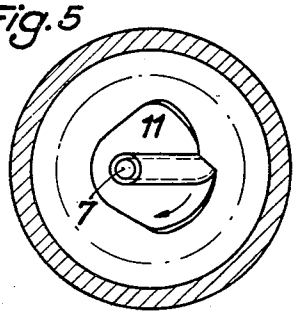
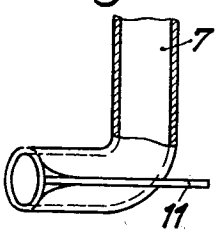


Fig. 3



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APPARATUS FOR CASTING WITH ROTATING CRUCIBLE

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1 Claim. (Cl. 22—79)

The methods known up to now for centrifuging liquid metal in a rotating centrifugal drum and for supplying the centrifuged liquid material to stationary moulds are limited with respect to their output in that the liquid metal filled into the centrifugal drum flows into an imperfectly preheated drum whereby the temperature of the material to be centrifuged falls considerably and the draining of the gases and oxides is considerably obstructed and can only be obtained imperfectly.

The present invention obviates these disadvantages in a simple way for the metal is molten outside the centrifugal drum in a melting pot or crucible heated in any liable melting furnace, and removed from the latter after the metal contained therein has become liquid. Then the melting pot is inserted into a centrifugal container. This centrifugal container together with the glowing melting pot containing the metal is rotated by a driving motor. The centrifugal metal is delivered into the moulds by a delivering pipe which is turned from a neutral position into a delivering position, i. e. the opening of the delivering pipe extends into the liquid metal and is in the form of a cylinder or a sleeve which is rotated by the centrifugal force acting thereon during rotation of the melting pot.

In cases in which a danger exists that, by incrustation, slag will enter the mould together with the liquid metal near the delivering pipe making the casting useless cutting plates are provided on the turnable delivering pipe. These cutting plates open the slag layer if the delivering pipe is turned from the neutral position into the delivering or casting position so that only pure, centrifuged metal may be supplied to the moulds through the opening of the delivery pipe. The metal may also be delivered from the centrifugal container in any other way, as pressing the centrifuged metal out of the rotating melting pot through an outlet opening provided in the bottom of the melting pot by introducing compressed air or gas into the pot. Finally, if the delivering pipe is omitted and a lower outlet opening is provided, it is possible to diminish the speed of rotation and thereby also the centrifugal force or to fully do away with the latter, with the result that the centrifugal metal flows off through the lower outlet opening.

The high heated melting pot or crucible inserted into the machine may be further heated although such heating is not necessary as generally the metal remains in the liquid state until it is emptied, because an insulating layer arranged betwen the centrifugal container and the inserted melting pot keeps it at the required temperature for a longer time so that even pouring liquid metal is maintained. Thereupon the melting pot may be exchanged, if required, so that solidification of the resting metal which was disturbing with the former methods is avoided.

Of course, the empty melting pot may be correspondingly high heated in the melting furnace and the liquid metal may be poured in subsequently. It is only essential according to the invention that the melting pot be brought to an intense heat within a melting furnace.

In the drawing two embodiments of the invention are illustrated by way of example.

Fig. 1 shows an apparatus according to the invention.

Fig. 2 is modified construction of such apparatus.

Fig. 3 shows a modified form of the delivering pipe for the embodiment shown in Fig. 1.

Figs. 4 and 5 show a modified delivering pipe with cutting plates provided on it. The pipe is shown at delivering position in Fig. 4 and at the neutral position in Fig. 5.

In Fig. 1 the melting pot or crucible containing the metal molten in any liable melting furnace is designated by the reference numeral **1**. A centrifugal container **2** is provided for receiving the melting pot and driving it rotatably. The container **2** is driven by the belt pulley **3** fastened on the shaft **4** provided with a flange **5** to which the container **2** is fastened. A delivering pipe **7** may be eccentrically arranged within the stationary protective covering **6** in any known manner. For example the delivering pipe may be turned by means of a handle **8** fixed thereon to project into the liquid metal ring formed during the rotation of the container and indicated in the drawings by dot and dash lines, or to a position outside the mentioned ring as shown in Fig. 5. The stationary transmitting pipe **9** serves to direct the jet of liquid metal to the moulds. The lid of the protective covering **6** may be hinged so that the melting pot coming from the melting furnace may be inserted in, or removed from the rotatable container. During the insertion or removal of the melting pot the delivering pipe must be turned into the neutral position. The protective layer **10** keeps the inserted melting pot **1** in the centrifugal container **2** at the required temperature for a long period of time.

It will be seen from the drawings that the internal wall of the container **2** is of upwardly diverging conical configuration disposed concentrically about the axis of the shaft **4** and that the external wall of the crucible **1** has its exterior wall of conical shape conforming to and enveloped by the internal conical wall of the container **2** in concentric relation to the axis of the shaft **4**. Thus, the crucible **1** is axially slidably received in the container **2** with its external conical wall in contiguous frictional engagement with the internal conical wall of the container. It will be noted that the bottom of the crucible is spaced axially from the bottom of the container. With the foregoing arrangement, the action of gravity on the crucible may serve the multiple functions of centering the crucible coaxially in the container, maintaining a frictional drive grip between the crucible and the container and maintaining the internal wall of the container in snug confining relation with the crucible to prevent bursting thereof under centrifugal force.

In operation, after the crucible or melting pot **1** is high heated in an ordinary crucible furnace and its charge is liquefied it is inserted into the centrifugal container **2** after the lid of the protective covering has been raised. The delivering pipe **7** is turned into the neutral position by means of the lever or handle **8**, the lid is closed, and the driving motor started. The level of the metal opens, the metal rises at the walls and forms the liquid ring or sleeve indicated in Figures 1, 4 and 5 by dot and dash lines. By turning the delivering pipe to the position shown in Fig. 4, the centrifuged metal may be supplied to the moulds through the delivering pipe **7** and the transmission pipe **9**.

In Figs. 3–5 a modification of the delivering pipe **7** is shown. As may be seen, cutting plates **11** are provided at the delivering pipe, said plates being formed so that when the delivering pipe is turned from the neutral position (Fig. 5) into the liquid metal cylinder indicated by dot and dash lines, first the sharp edge of the cutting plate **11** enters said cylinder whereby the centrifuged slag

layer which may be at the inner side of the liquid metal cylinder is cut open and the pure centrifuged liquid metal becomes clear for being received by the delivering pipe. By turning the delivering pipe further, the casting channel itself reaches its full casting position and thence it is turned again out of the liquid metal into the neutral position.

In the modification of the apparatus shown in Fig. 2 the delivering pipe is omitted. The centrifugal container **12** and its shaft **13** are provided with a boring **14** and the melting pot **15** has in its bottom a passage **15**, opening at the one end into the melting pot and at the other end into the boring **14**. The top wall of the melting pot has an opening **17** which may be closed by a lid **18** adapted to be raised and lowered by means of a manually operated lever **19**. The lid is attached to a hollow stem **20** connected to a pipe **21**. Through this pipe and boring of the stem compressed air or compressed gas may be supplied to the melting pot. With this embodiment the molten metal may escape through the outlet boring **16, 14** under pressure of the compressed air and gas supplied through the stem **20** and pipe **21**. The metal may also escape by its gravity. In this case during the delivering of the metal the speed of rotation of the centrifugal container must be diminished or the said container must be stopped and the lid **18** lifted.

What I claim is:

An apparatus for the centrifugal pouring of molten metal comprising in combination a stationary protective covering, a container within said covering and having an upwardly diverging conical internal wall disposed concentrically about an axis, means for rotating said container about said axis, a melting crucible supported for rotation by said container and having an external conical wall conforming in shape to and enveloped by said container wall and concentrically disposed about said axis, said crucible being axially slidably received in said container with its external conical wall in contiguous frictional engagement with said internal wall of the container and its bottom spaced axially from the bottom of the container, whereby the action of gravity may serve the multiple functions of centering the crucible coaxially in the container, maintaining a frictional drive grip between the crucible and the container, and maintaining the internal wall of the container in snug confining relation with the crucible to prevent bursting of the crucible under centrifugal force, and duct means for transferring moulten metal from said crucible to stationary moulds, said duct means comprising stationary and movable duct portions.

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