

[54] **LOW PRESSURE CASTING APPARATUS
FOR MAGNESIUM**

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164/307, 308, 66, 68, 119, 134, 142, 254,
284, 285, 259, 337, 309, 310, 311

[56] **References Cited**

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[57]

ABSTRACT

This disclosure relates to a low pressure casting apparatus for magnesium including a riser passing the liquefied furnace contents into the cast mold. The upper wall of the riser has a guide bore for a longitudinally shiftable hollow plunger sealing said bore, the hollow plunger being provided near its end adjacent to the interior space of the riser with an outlet opening for passing a shield gas therethrough, with the outlet opening closed upon moving the plunger into the guide bore.

10 Claims, 5 Drawing Figures

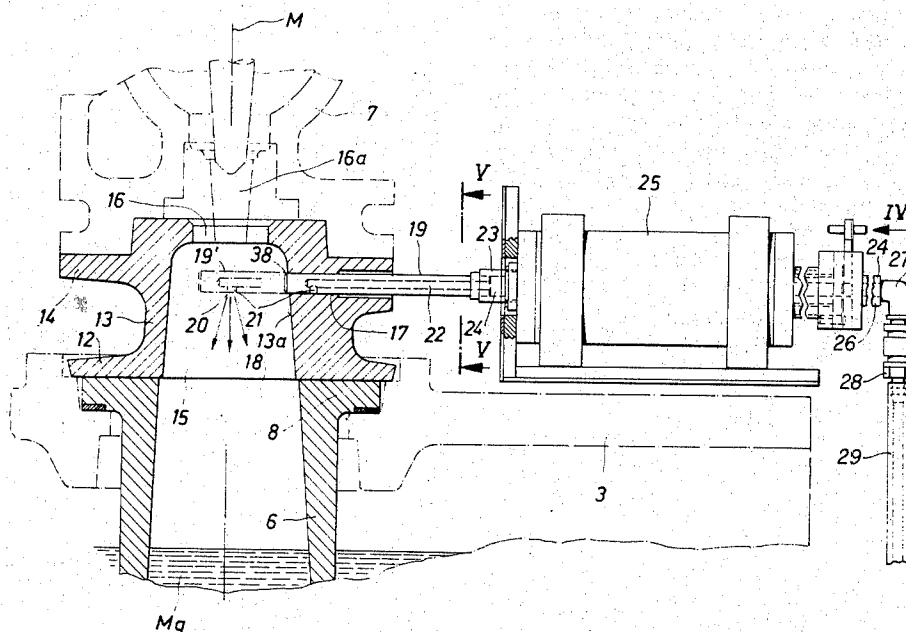


Fig. 1

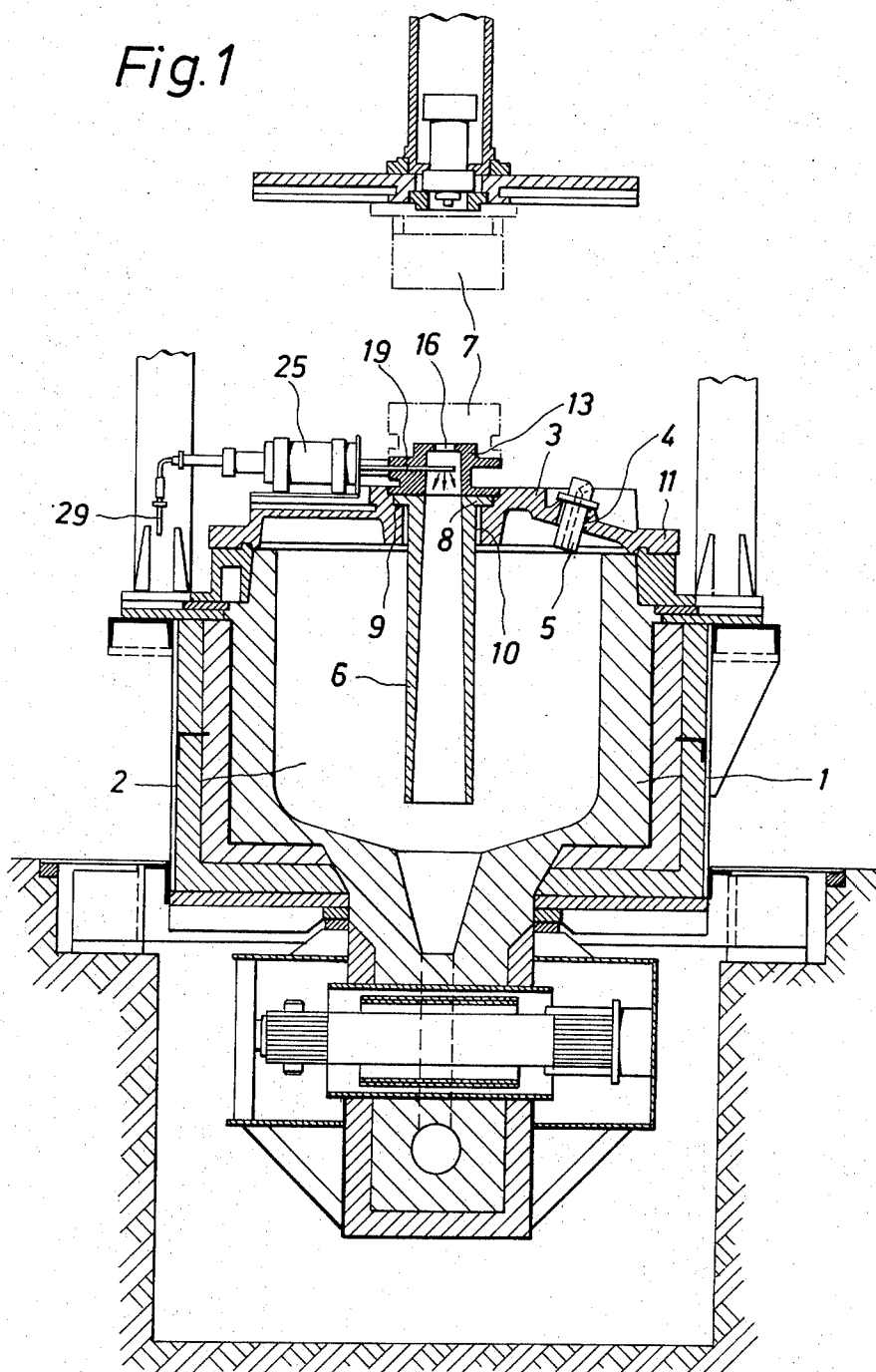


Fig. 2

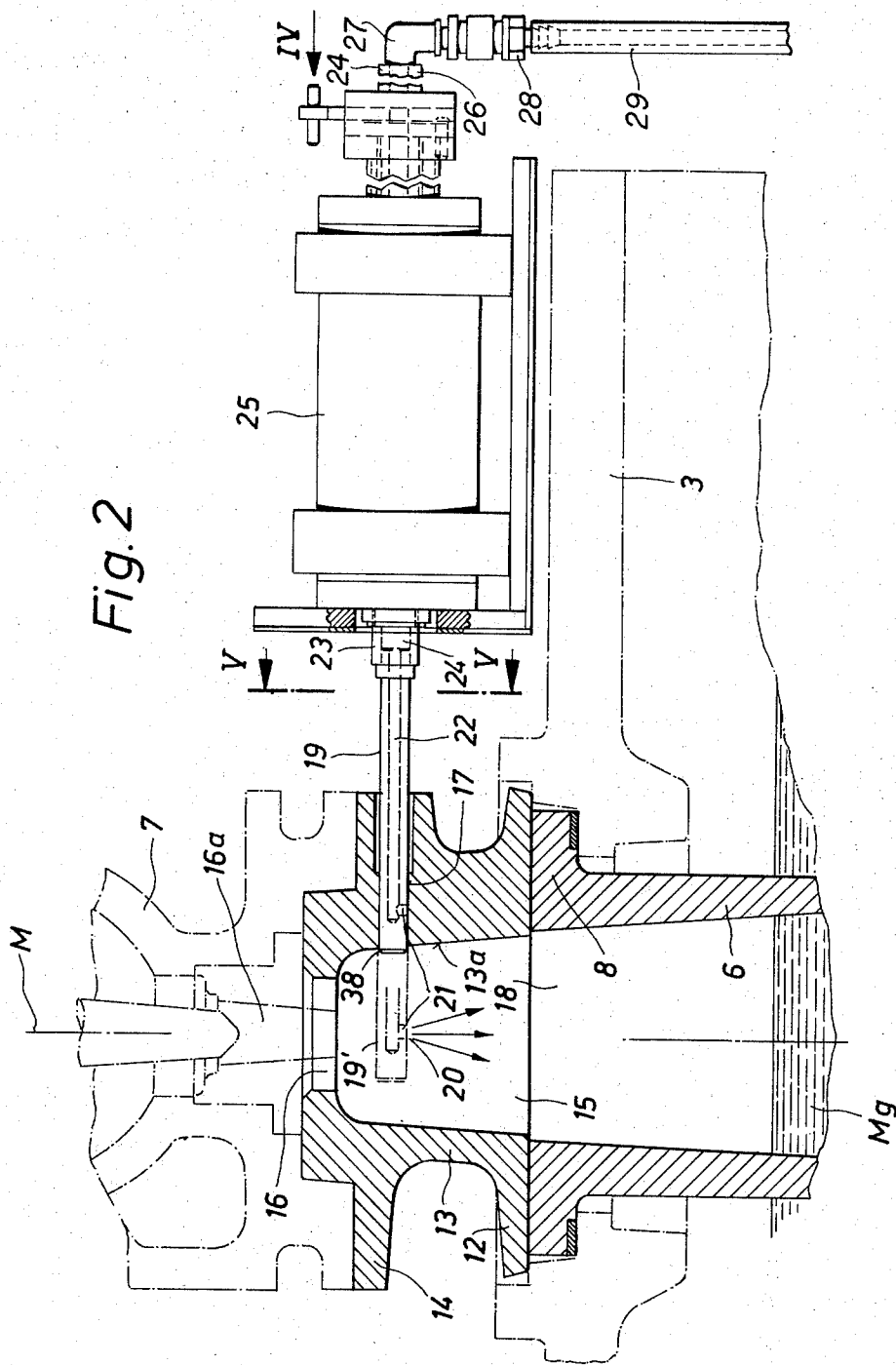


Fig. 3

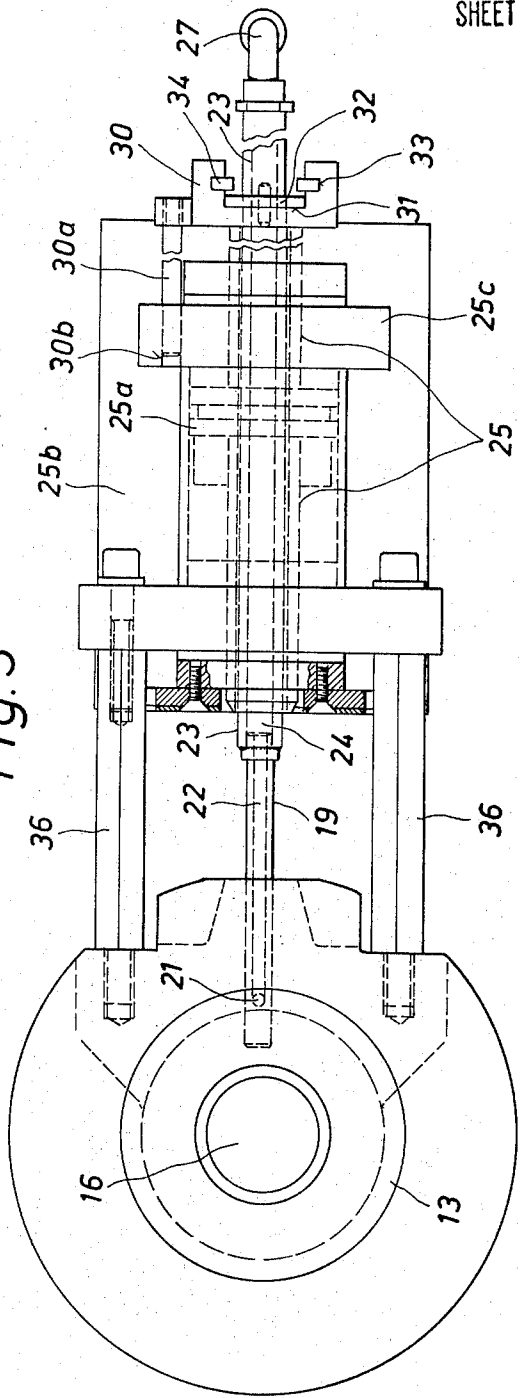


Fig. 4

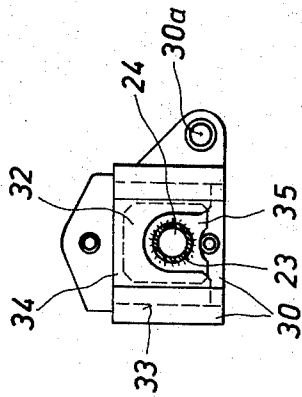
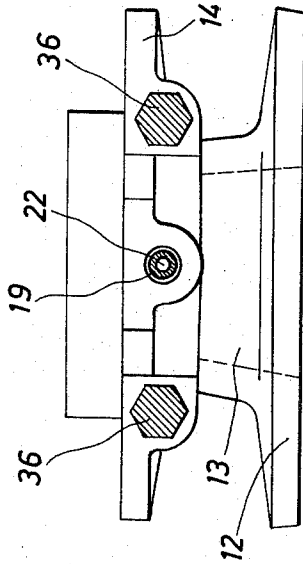


Fig. 5



LOW PRESSURE CASTING APPARATUS FOR MAGNESIUM

This invention relates to a low pressure casting apparatus for magnesium including a riser passing the liquefied furnace contents into the cast mold. When casting magnesium, substantial difficulties arise due to the fact that the liquid magnesium disposed in the riser must be protected against contacting oxygen in the air since an exothermic reaction results thereby causing ignition of the magnesium. Upon removing the casting from the cast mold or upon removing the cast mold from the riser, air oxygen passes downwardly through the cast opening of the mold into the riser.

The methods and apparatus known up to now for using a shield gas are of low efficiency, or are time consuming in operation, or the apparatus are costly in production.

This invention attempts to solve the problem of providing a low pressure casting apparatus for magnesium of the type mentioned above in which with simple means and in consideration of labor and time saving operation the admission of air oxygen to the liquid magnesium disposed in the riser of the low pressure furnace is reliably and efficiently prevented.

For solving this problem, it is provided according to this invention, in a low pressure casting apparatus for magnesium with a riser, passing the liquefied furnace contents, i.e., magnesium, into the cast mold, so that the upper side wall of the riser, or an intermediate member arranged between it and the cast mold, has a guide bore for a hollow plunger longitudinally shiftable and sealing the bore.

The hollow plunger is provided near its end adjacent to the interior of the riser or the intermediate member with an outlet opening to be closed upon movement of the plunger in the guide bore, the outlet opening being provided for a shield or inert gas to be passed through the hollow plunger.

In the practical embodiment of the invention the plunger is shiftable with its outlet opening up to the longitudinal axis of the riser so that the shield gas flowing from the outlet opening of the plunger can be passed downwardly centrally into the free surface of the magnesium disposed in the riser.

In furtherance of the invention the plunger is connected to an extension having a longitudinal bore, said extension being shiftable into the hollow piston rod of a pressure fluid cylinder. The piston rod and the plunger project at both ends from the pressure fluid cylinder, the end of the tubular extension remote from the plunger being releasably connected to a shiftable or flexible supply line for a shield gas.

According to a further feature of the invention, the extension of the plunger is capable of being coupled to the piston of the pressure fluid cylinder and is removable together with the plunger from the pressure fluid cylinder. In this regard the piston rod of the pressure fluid cylinder is provided with an attachment the end of which projecting from the cylinder is provided with a yoke or the like coupling the plunger extension to the attachment.

The pressure fluid cylinder may be connected through struts, pins or the like to the riser or the intermediate member between the riser and the cast mold so that no additional bracket is required for the pressure fluid cylinder.

In the drawings, the apparatus of the invention has been illustrated by way of example, and in said drawings:

FIG. 1 is a vertical sectional view of the low-pressure casting apparatus,

FIG. 2 is a part-sectional view in an enlarged scale in relationship to FIG. 1 showing the intermediate member, the pressure fluid cylinder, and the plunger with the tubular extension,

FIG. 3 is a plan view of the riser, the cylinder with the piston and the hollow piston rod as well as the plunger with the tubular extension,

FIG. 4 is a side elevational view of the coupling between the hollow piston rod and the tubular extension of the plunger, and

FIG. 5 is a sectional view taken along line V—V of FIG. 2.

The furnace 1 of the low-pressure casting apparatus of this invention has an interior space 2 which is closed upwardly by the furnace cover 3. Through an opening 4 of the cover a supply line 5 extends for the gas inert in relationship to the liquid furnace contents, i.e. the magnesium to be cast, said inert gas being passed pressurized into the interior space 2 of the furnace 1 and pressing a part of the furnace contents into the riser 6 and from there into the cast mold 7.

The riser 6 is provided at its upper end with a flange 8 which abuts a complementary shoulder 9 of the bore 10 of the cover 3, which is supported on the furnace at its margin 11.

An intermediate member 13 (FIG. 2) is positioned on the flange 8 of the riser 6 with its flange 12, the interior space 15 of said intermediate member being disposed coaxial relative to the interior space 18 of the riser 6, so that the two cited interior spaces merge with one another. The cast mold 7 is supported on the flange 14 of the intermediate member 13, the magnesium coming from the furnace 1 into the riser and the interior 15 of the intermediate member 13 passing through the opening 16 of the intermediate member into the cast mold 7.

Both when opening the cast mold and when removing it air oxygen can get through the intermediate member 13 and the upper portion of the riser 6 via the openings 16a or 16 to the furnace contents, i.e., to the magnesium Mg in the riser. An exothermic reaction hereby results which can bring about an ignition of the magnesium.

For avoiding the admission of air oxygen through the openings 16a or 16, the intermediate member 13 and the upper portion of the riser 6, a horizontal guide bore 17 is provided in the side wall of the intermediate member 13, said guide bore being provided for a plunger 19. The bore 17 and the plunger 19 are formed in such a way that the plunger sealingly closes the bore so that liquid magnesium rising in the riser 6 and the intermediate member 13 is not able to flow in the bore 17. Possibly the front end of the plunger may support seal discs engaging the inner wall 13a.

The plunger 19 is shiftable from the position represented in full lines in FIG. 2 into position 19' so that the outlet opening 20 of a small duct 21 of the plunger is positioned in the longitudinal center M of the riser 6 and the intermediate member 13.

The duct 21 directed vertically downwardly of the plunger 19 merges in an axial bore 22 so that the plunger represents a hollow plunger. The end of the

3

plunger 19 remote from the inner space 15 of the intermediate member 13 is screwed in a tubular extension 23 which likewise has an axial bore 24 and which is inserted through the hollow piston rod 25 of the piston 25a of a pressure fluid cylinder 25b. The end 26 projecting from the hollow piston rod 25 of the tubular extension 23 of the plunger 19 is connected via an elbow member 27 of a quick-action coupling 28 to a supply line 29 for a shield gas.

The free end of the hollow piston rod 25 mounts an attachment 30 defining a shoulder 31. The attachment 30 having two parallel cutouts 33 is secured against a rotation by a guiding pin 30a which slides in a bore 30b of the outboard cylinder cap 25c. The tubular extension 23 of the plunger 19 is provided with a plate 32. By a hoke 34 capable of being shifted into cutouts 33 of the attachment 30 and having a recess 35 (FIG. 3), the tubular extension 23 is connected to the piston 25a and the hollow piston rod 25 by means of the plate 32 secured thereto. After removal of yoke 34 the plunger 19 together with the extension 23 can be pulled out of the hollow piston rod 25 of the pressure fluid cylinder 25b.

The apparatus of this invention has the merit that upon moving the plunger 19 from the position illustrated in FIG. 2 into the position 19' the opening 38 of the bore 17 (FIG. 2) is exposed, i.e., magnesium collecting at the wall 13a is pushed into the interior space 15 of the intermediate member 13.

Furthermore, the apparatus of this invention has the advantage of being able to do without additional movable control means such as valves and the like for the supply of inert gas to the interior of the riser. Finally, the plunger can be quickly withdrawn from the cylinder 25b or the attachment 30 which can be done after releasing the yoke 34. After releasing the coupling 28 and the attachment of a new plunger 19 with an extension 23, the mentioned parts can quickly be coupled to the attachment 30 again. The releasing of the plunger 19 from the extension 23 can also be effected readily since the plunger is screwed into the extension 23.

I claim:

1. A low pressure casting apparatus for magnesium including a riser passing the liquefied furnace contents into the cast mold, characterized in that the upper side wall of the riser has a guide bore for a longitudinally

4

shiftable hollow plunger sealing said bore, said hollow plunger being provided near its end adjacent to the interior space of the riser with an outlet opening for passing a shield gas therethrough, and said outlet opening closed upon moving the plunger into the guide bore.

2. A low pressure casting apparatus according to claim 1, characterized in that the plunger is shiftable with its outlet opening into the longitudinal axis of the riser.

3. A low pressure casting apparatus according to claim 2 characterized in that the hollow plunger is provided with an axial blind bore in which a duct opens defining the outlet opening and directed toward the lower riser end.

4. A low pressure casting apparatus according to claim 3 characterized in that the plunger is connected to an extension having a longitudinal bore, said extension being shiftable into the hollow piston rod of a pressure fluid cylinder.

5. A low pressure casting apparatus according to claim 4 characterized in that the piston rod and the extension project at both ends from the pressure fluid cylinder, the end remote from the plunger of the tubular extension being releasably connected to a shiftable supply line for a shield gas.

6. A low pressure casting apparatus according to claim 5 characterized in that the extension of the plunger is capable of being coupled to the piston of the pressure fluid cylinder and of being removed with the plunger from the pressure fluid cylinder.

7. A low pressure casting apparatus according to claim 6 characterized in that the piston rod is provided with an attachment the end of which projecting from the cylinder is provided with a yoke coupling the extension to the attachment.

8. A low pressure casting apparatus according to claim 7 characterized in that the pressure fluid cylinder is connected through struts and pins to the riser.

9. A low pressure casting apparatus according to claim 8 characterized in that an intermediate member is arranged between said riser and said casting mold.

10. A low pressure casting apparatus according to claim 2 characterized in that an intermediate member is arranged between said riser and said casting mold.

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