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(54) Foundry apparatus for automatic casting with pressurized ladle

Giessapparat zum automatischen Giessen mit einer unter Druck stehenden Pfanne

Appareil de coulée pour couleur automatiquement avec une pochée de coulée sous pression

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Description

[0001] The present invention relates to a foundry apparatus for automatic casting with pressurized ladle.

[0002] Pressurized ladles are currently used in foundries; one of them is the subject of Italian patent no. 1,225,409 in the name of the same Applicant.

[0003] This pressurized ladle includes a steel plate container which is internally lined with refractory material and has a hermetic upper lid provided with means for discharging and introducing pressurized gas.

[0004] Two siphons, one for loading and one for casting, are connected below the container and extend upwards.

[0005] The first siphon has, in an upward region, a funnel-shaped loading mouth; the second siphon is instead provided with a basin with a casting hole in an upward region.

[0006] The ladle includes optical devices for controlling the level in the runner and a plug for closing the casting hole.

[0007] The molten metal is loaded by means of a secondary ladle which is appropriately removed from a melting furnace.

[0008] When the container has been filled, pressurized gas is injected therein; this reduces the internal level and raises the levels in the siphons and therefore in the runner.

[0009] The level control device, combined with the plug for opening and closing the casting hole, allows the material to be cast into a die arranged below.

[0010] Casting currently occurs by keeping the ladle fixed and by providing casting dies which are arranged in series and movable along a rail.

[0011] When one die has been filled, the assembly is conveniently moved by one step so as to position the next die for casting.

[0012] This fixed-ladle system is in any case a poorly flexible system from an operational point of view, since only the dies to be cast are movable, and production times are negatively affected if the movement is blocked for any reason.

[0013] The time for which the metal to be cast remains in the ladle furthermore increases, and the metal consequently cools to unacceptable limits.

[0014] This problem is not solved by a foundry apparatus for automatic casting such as that disclosed in DE-B-2429529. In such apparatus comprising a motorized means supporting a ladle, dies to be cast are movable along first translatory guides and the motorized means are movable along second guides, the second guides forming a circular path for the ladle. The first and second guides are close and parallel over only a short curved segment and therefore production would be adversely affected if the movement of the dies were to be blocked for any reason.

[0015] A principal aim of the present invention is therefore to provide a foundry apparatus for automatic

casting with pressurized ladle that is more flexible in operation than current ones.

[0016] A consequent primary object is to minimize downtimes.

5 [0017] Another important object is to provide an apparatus that also allows to obtain qualitative benefits in the casting.

[0018] Another object is to provide an apparatus that can be produced with conventional equipment.

10 [0019] This aim, these objects, and others which will become apparent hereinafter are achieved by a foundry apparatus for automatic casting with pressurized ladle, characterized in that it comprises a motorized means which cooperates with a casting line with dies and/or

15 flaskless dies (motta) to be cast that are movable along first translatory guides, said motorized means being movable along second guides which are parallel and close to the first guides at a straight portion thereof, said motorized means furthermore supporting a pressurized ladle.

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[0020] Further characteristics and advantages of the invention will become apparent from the following detailed description of an embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

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figure 1 is a first side view of the apparatus;
figure 2 is a top view of the apparatus;
figure 3 is a second side view of the apparatus, taken from the opposite side with respect to figure 1;
figure 4 is a front view of the apparatus.

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[0021] With reference to the above figures, a foundry apparatus according to the invention comprises a casting line with dies 10 to be cast which are connected to each other in succession, are mounted on a carriage with wheels 11, and are movable along a rail track 12.

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[0022] A second track 13 lies parallel alongside said first track 12 at a straight portion thereof, and a carriage 15 is coupled thereon by means of wheels 14 so as to be movable; said carriage 15 is motorized with an electric gearmotor, not shown in the figures, whose speed can be adjusted with an inverter (this adjustment is possible with a remote control post).

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[0023] The carriage 15 has a strong metal structure with two spaced vertical posts 16 between which a seat-shaped base 18 is rotatably coupled above a horizontal axis 17; said base usually rests downwardly on the structure of said carriage 15.

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[0024] The seat-shaped base 18 is rotated by means of a hydraulic cylinder 19 which is mounted between an arm 20 thereof, which is arranged radially with respect to the axis 17, and the carriage 15.

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[0025] A pressurized ladle 21 is seated on the base 18 on self-centering locators, not shown in the figures, and is provided with nitrogen feeding systems equipped with a quick coupling.

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[0026] The ladle is per se known and is of the type described in the previously mentioned Italian patent no. 1,225,409.

[0027] The parts of the ladle 21 that are visible in the figures are the container 23 with the lid 24, a loading funnel 25, and a runner 26 with its plug 27.

[0028] The runner 26 protrudes from the second track 13 and is arranged above the region where the dies 10 pass at the casting holes.

[0029] A cantilevered structure 28 is rigidly coupled to the structure of the carriage 15 within the dimensions of the rails of the second track 13, and a control booth 29 is placed on said structure; said booth supports, close to the ladle 21, a per se known threading inoculation system 30, with the associated inoculant reserve tank and infrared optical sensor for adjusting and synchronizing the casting operation.

[0030] The inoculation system 30 is controlled by the control post by means of mechanical and electrical connections.

[0031] A festoon guide, not shown in the figures for the sake of simplicity, with festoons carried by carriages on an appropriate overhead rail, is provided to supply electric power, nitrogen, air, and methane to the carriage 15.

[0032] The fact that the pressurized ladle is movable along guides in this apparatus makes the assembly particularly flexible from an operational point of view.

[0033] By synchronizing the translatory motion of the dies 10 with the movement of the carriage 15 it is in fact possible to perform casting even while the casting boxes move.

[0034] Furthermore, should the casting box line stop for any reason, it is possible to move the ladle to nonetheless continue the casting.

[0035] This method minimizes downtimes and the time for which the molten metal remains inside the ladle.

[0036] Another advantage is that it is possible to replace the casting ladle without tampering with or disassembling any part of the carriage.

[0037] The ladle is allowed to turn over in order to reduce the lateral bulk, placing the runner 26 in the space between the rails of the second track 13.

[0038] In practice it has been observed that the intended aim and objects of the present invention have been achieved.

[0039] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0040] In particular, it has been observed that the apparatus is adapted not only for casting lines formed by casting boxes but also for casting lines formed by flaskless dies with a continuous or intermittent carousel.

[0041] All the details may furthermore be replaced with other technically equivalent elements.

[0042] In practice, the materials employed, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to the requirements.

[0043] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Foundry apparatus for automatic casting with pressurized ladle, characterized in that it comprises a motorized means (15) which cooperates with a casting line with dies (10) and/or flaskless dies to be cast that are movable along first translatory guides (12), said motorized means (15) being movable along second guides (13) which are parallel and close to the first guides (12) at a straight portion thereof, said motorized means (15) furthermore supporting a pressurized ladle (21).
2. Apparatus according to claim 1, characterized in that a threading inoculation system (30) cooperates with said ladle (21) and is also mounted on said motorized means (15).
3. Apparatus according to one or more of the preceding claims, characterized in that said motorized means is constituted by a carriage (15) that is movable along rails (13).
4. Apparatus according to claim 3, characterized in that said carriage (15) is motorized with an electric gearmotor unit whose speed can be adjusted by means of an inverter.
5. Apparatus according to one or more of the preceding claims, characterized in that a seat-like base (18) is rotatably coupled on vertical posts (16) of said carriage (15), said ladle (21) being placed on said base (18).
6. Apparatus according to claim 5, characterized in that said seat-like base (18) can be turned over by means of a hydraulic actuation cylinder (19).
7. Apparatus according to one or more of the preceding claims, characterized in that a cantilevered structure (28) with a control booth (29) is mounted on said carriage (15).
8. Apparatus according to one or more of the preceding claims, characterized in that said threading inoculation system (30) is mounted on said cantilevered structure (28).
9. Apparatus according to one or more of the preceding claims, characterized in that the electric power,

nitrogen, air, and methane required for the operation of said ladle (21) and of said threading inoculation system (30) are supplied by means of a festoon line with festoons carried by carriages on an appropriately provided overhead rail.

Patentansprüche

1. Gießapparat zum automatischen Gießen mit einer unter Druck stehenden Pfanne, **dadurch gekennzeichnet**, daß sie umfaßt ein motorisiertes Mittel (15), welches mit einer Gießstrecke mit Druckgußformen (10) und/oder kastenlosen Formen, die auszugießen sind, zusammenarbeitet, welche längs erster translatorischer Führungen (12) bewegbar sind, wobei dieses motorisierte Mittel (15) längs zweiten Führungen (13) bewegbar ist, welche parallel zu und nahe den ersten Führungen (12) an einem geraden Teil dieser angeordnet sind, wobei weiterhin dieses motorisierte Mittel (15) eine unter Druck stehende Pfanne (21) trägt.
2. Apparat nach Anspruch 1, **dadurch gekennzeichnet**, daß ein Einfädelokulationssystem (13) mit der Pfanne (21) zusammenarbeitet und dieses ebenfalls auf dem motorisierte Mittel (15) montiert ist.
3. Apparat nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß das motorisierte Mittel durch einen Wagen (15) gebildet wird, der längs Schienen (13) bewegbar ist.
4. Apparat nach Anspruch 3, **dadurch gekennzeichnet**, daß der Wagen (15) mit einer elektrischen Getriebemotoreinheit motorisiert ist, dessen Geschwindigkeit mittels eines Wechselrichters eingestellt werden kann.
5. Apparat nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß eine sitzartige Basis (18) drehbar an vertikalen Pfosten (16) dieses Wagens (15) gekoppelt ist, wobei die Pfanne (21) auf dieser Basis (18) angeordnet ist.
6. Apparat nach Anspruch 5, **dadurch gekennzeichnet**, daß die sitzartige Basis (18) mittels eines hydraulischen Betätigungszylinders (19) umgewendet werden kann.
7. Apparat nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß eine auskragende Struktur (28) mit einer Steuerkabine (29) an dem Wagen (15) befestigt ist.
8. Apparat nach einem oder mehreren der vorherge-

henden Ansprüche, **dadurch gekennzeichnet**, daß das Einfädelokulationssystem (30) auf der auskragenden Struktur (28) befestigt ist.

- 5 9. Apparat nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß die elektrische Energie, Stickstoff, Luft und Methan, welche zum Betrieb dieser Pfanne (21) und dieses Einfädelokulationssystems (30) benötigt werden, über eine Girlandenleitung mit Girlanden zugeführt wird, welche von Wagen an einer geeignet vorgesehenen Überkopfschiene getragen werden.

15 Revendications

1. Dispositif de coulée pour la coulée automatique avec une poche de coulée pressurisée, caractérisé en ce qu'il comporte des moyens motorisés (15) qui coopèrent avec une ligne de coulée comprenant des coquilles (10) avec ou sans châssis destinées à recevoir une coulée et qui sont mobiles le long de premiers guides (12) de translation, lesdits moyens motorisés (15) étant mobiles le long de deuxième guides (13) qui sont parallèles et proches des premiers guides (12) sur l'une de leurs parties droites; lesdits moyens motorisés (15) supportant en outre une poche de coulée pressurisée (21).
2. Dispositif selon la revendication 1, caractérisé en ce qu'un système d'inoculation de fil (30) coopère avec ladite poche de coulée (21) et est également monté sur lesdits moyens motorisés (15).
3. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé en ce que lesdits moyens motorisés sont constitués par un chariot (15) qui est mobile le long de rails (13).
4. Dispositif selon la revendication 3, caractérisé en ce que ledit chariot (15) est motorisé par une unité électrique de moto-transmission dont la vitesse peut être réglée au moyen d'un onduleur.
- 45 5. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé en ce qu'une base (18) en forme de siège est couplée en rotation sur des poteaux verticaux (16) dudit chariot (15) ladite poche de coulée (21) étant placée sur ladite base (18).
6. Dispositif selon la revendication 5, caractérisé en ce que ladite base (18) en forme de siège est susceptible d'être retournée par l'intermédiaire d'un vérin hydraulique d'actionnement (19).
7. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé en ce qu'une struc-

ture en porte-à-faux (28) avec une cabine de contrôle (29) est montée sur ledit chariot (15).

8. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé en ce que ledit système d'inoculation de fil (30) est monté sur ladite structure en porte-à-faux (28). 5
9. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé en ce la puissance électrique, l'azote, l'air et le méthane nécessaires pour le fonctionnement de ladite poche de coulée (21) et dudit système d'inoculation de fil (30) sont fournis par l'intermédiaire d'une ligne en boucle avec des boucles portées par des chariots sur un rail suspendu prévu de façon appropriée. 10 15

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