United States Patent

Domres et al.

[15] **3,685,573**

[45] **Aug. 22, 1972**

[54] **MOVABLE CASTING APPARATUS**

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[22] Filed: **Sept. 15, 1970**

[21] Appl. No.: **72,362**

[30] **Foreign Application Priority Data**

Sept. 26, 1969 Germany .....G 69 37 640.5

[52] **U.S. Cl.** **164/335,** 266/38, 164/270

[51] **Int. Cl.** **B22d 41/00**

[58] **Field of Search** .....164/335, 336, 337; 266/36 P, 266/36 H, 39, 38

[56] **References Cited**

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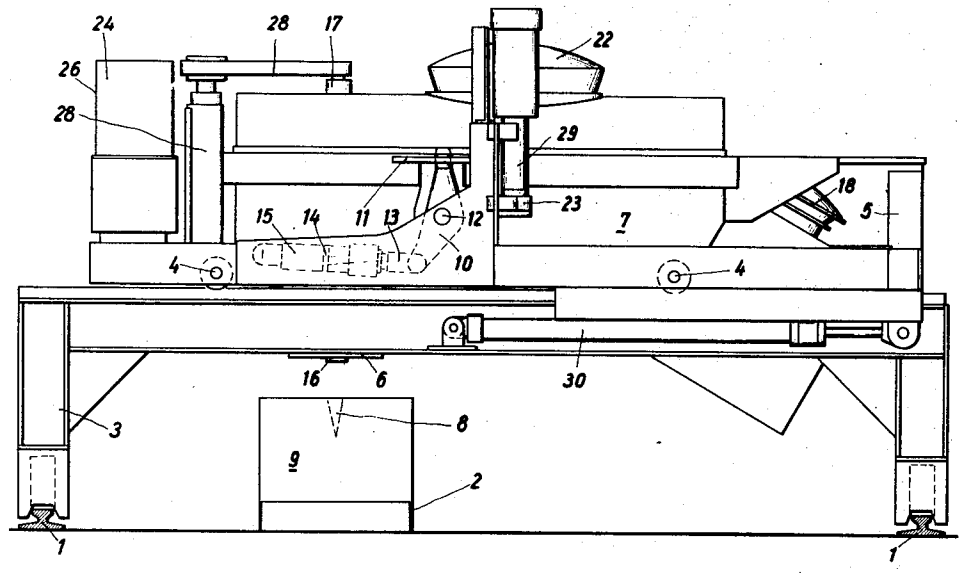
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[57] **ABSTRACT**

A movable casting apparatus, capable of being coupled to a casting mold transport device, includes an undercarriage arranged to move in the direction of the casting mold transport device and an upper carriage movably supported on the undercarriage for movement transverse to the direction of movement of the undercarriage. A closed induction channel furnace having a bottom tap and a removable cover is movably and tiltably mounted on the upper carriage and the means for moving, tilting and operating the furnace are incorporated on the upper carriage.

4 Claims, 2 Drawing Figures



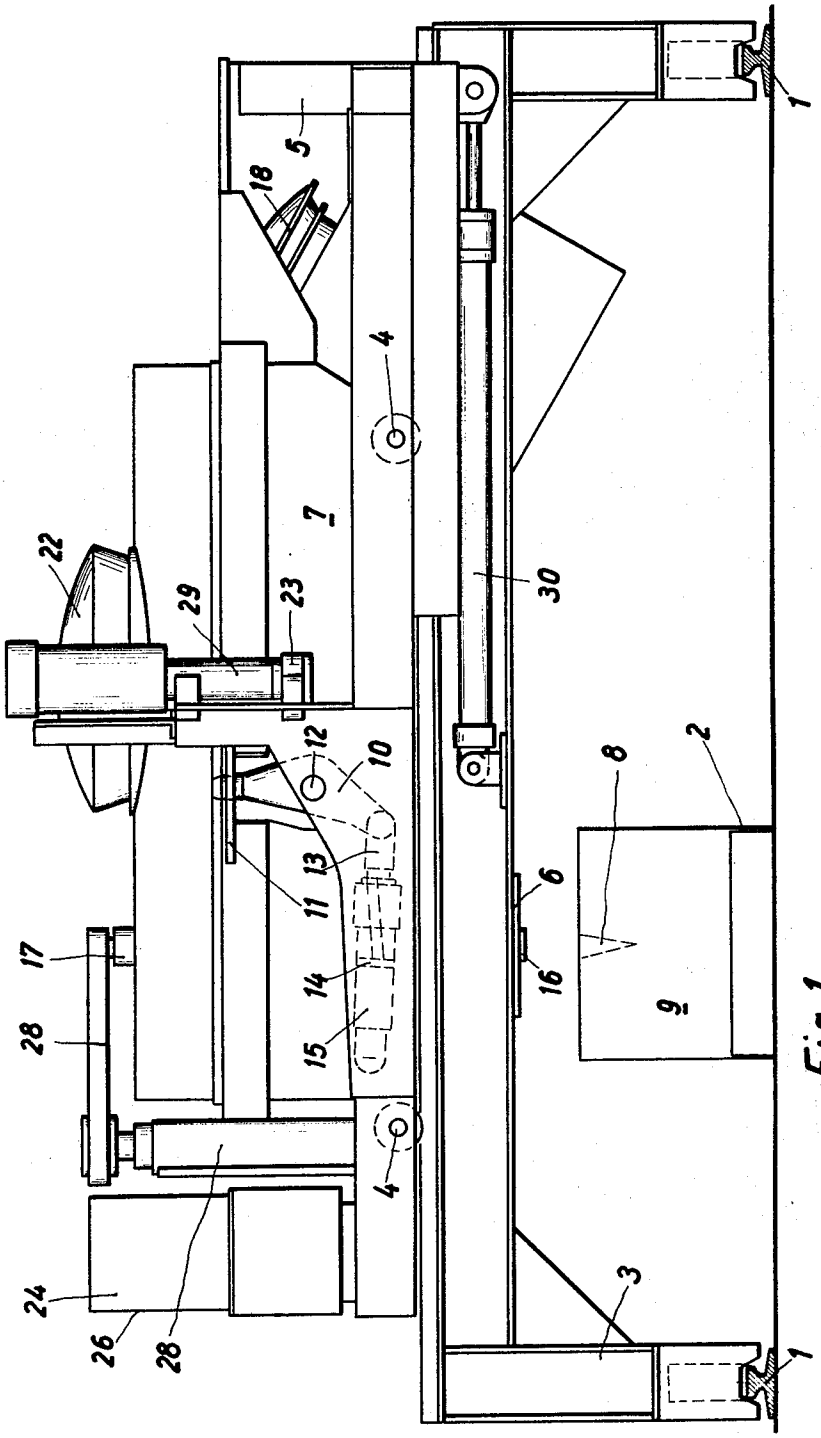


Fig. 1

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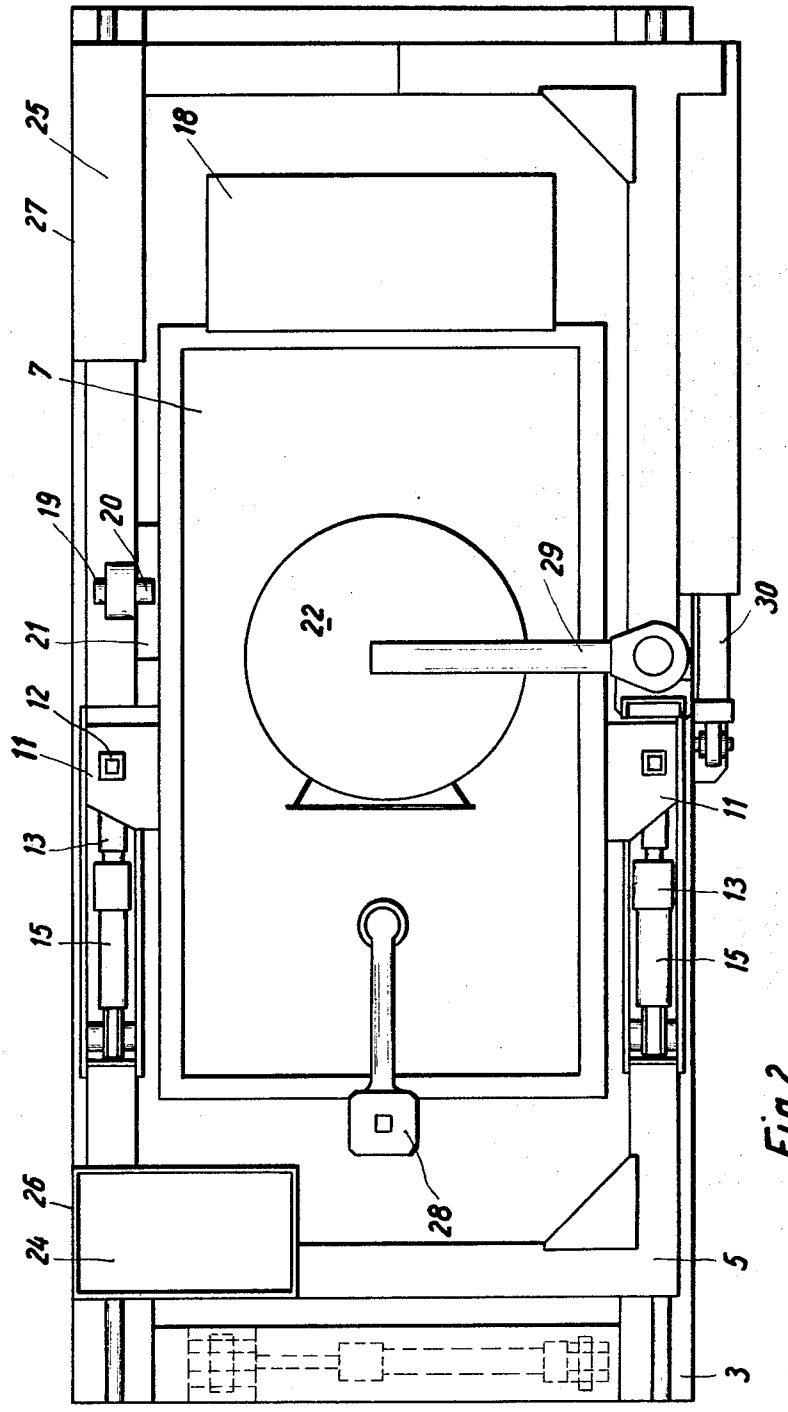


Fig. 2

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MOVABLE CASTING APPARATUS

SUMMARY OF THE INVENTION

The present invention is directed to a movable casting apparatus which can be coupled with a casting mold transport device during the casting operation and, more particularly, it is directed to a casting apparatus consisting of an undercarriage which is movable in the direction of the casting mold transport device and an upper carriage supported on the undercarriage and movable transverse to the direction of movement of the undercarriage. Further, a bottom tap ladle is movably and tiltably supported on the upper carriage.

In an arrangement, such as shown in DAS 1,288,767, which can be connected temporarily by means of a known synchronous unit to a casting mold transport device, an unheated, open top bottom tap ladle is used which is replaced by another filled ladle when the first ladle is emptied.

A disadvantage of the casting machine presently in use, is that the temperature of the melt in the bottom tap ladle drops to such an extent during the successive filling of individual molds that differences in quality appear in the products cast, and such differences result in unusable products. In addition, when an empty ladle is replaced by a filled one, the casting mold transport device must be stopped because it is not possible to continue casting during this changeover. Accordingly, a primary object of the present invention is to prevent cooling of the melt as it is poured from the bottom tap ladle into the casting molds, and, furthermore, to permit refilling of the ladle without interrupting the casting operation.

Therefore, in accordance with the present invention, a closed induction channel furnace is used as the bottom tap ladle and it incorporates a removable and replaceable cover which is operated by a hydraulic cylinder assembly. To permit replacement of those parts of the induction channel furnace which are most subject to wear, such as the bottom spout, the stopper rod, and the channel inductor, the induction channel furnace is tiltably supported on pivot bearings secured to the upper carriage so that the furnace can be tilted or rotated about a horizontal axis when the furnace is partially filled and the casting operation is discontinued.

To assure safe operating conditions when the partly filled bottom tap ladle is tilted, in accordance with the present invention, a tilting mechanism including a pair of lever arms articulated to opposite sides of the induction channel furnace and coupled with piston rods of hydraulic cylinder assemblies, is used for effecting the tilting procedure.

When the induction channel furnace is tilted from its normal casting position, means are provided for securing the furnace in the tilted position which include a locking pin secured to the upper carriage and arranged to engage within bores formed in a cam disk attached to the furnace.

To assure the unhindered movement of the upper carriage and the induction channel furnace relative to the undercarriage, a hydraulic plant with the necessary switching and control elements is incorporated on the upper carriage, such as in cabinets, for operating the various hydraulic cylinder assemblies used in the movement and operation of the upper carriage and the induction channel furnace.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a side view of a movable casting apparatus, in accordance with the present invention; and

FIG. 2 is a top view of the apparatus illustrated in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIGS. 1 and 2, a casting apparatus consists of an undercarriage 3 movably supported on a pair of spaced rails 1 so that the undercarriage is movable in the direction of movement of a casting mold transport device 2. The undercarriage 3 is coupled with the continuously moving casting mold transport device during the casting operation and at the completion of the casting operation it returns to its starting position.

An upper carriage 5 is movably supported on the undercarriage 3 by means of rollers 4 and the upper carriage moves transversely to the direction of movement of the undercarriage and the casting mold transport device so that the bottom tap 6 of an induction channel furnace 7 can be positioned by known means, not represented in the drawing, over an inlet 8 into a mold 9 on the casting mold transport device 2.

The induction channel furnace 7 is supported on the upper carriage 5 by means of a pair of pivot bearings 11 located on the opposite sides of the upper carriage. Each pivot bearing 11 has a lever arm attached to it and the lever arms are arranged to pivot about a horizontal axis 12. The lever arms are secured at their upper ends into the pivot bearings and their lower ends are articulated to piston rods 13 secured to pistons 14 movably displaceable within cylinders 15 in response to the admission of hydraulic fluid into the cylinders. By displacing the piston rod 13, the induction channel furnace 7 can be tilted about a horizontal axis and the spout 16 in the bottom tap 6, the tapping rod 17, and the channel inductor 8, all parts which are subject to rapid wear during casting operations, can be replaced during interruptions in the casting operation when the induction channel furnace is partly filled, if it is necessary to do so.

To secure the induction channel furnace 7 in the tilted position, a locking pin 19 is secured to the upper carriage 5 and the pin can be selectively inserted into one of a plurality of spaced bores 20 in a cam disk 21 secured to the induction furnace 7.

During casting operations the melt is always maintained at the prescribed temperature within the furnace by means of its inductor, accordingly, to seal the furnace hermetically during casting, so that oxidation of the melt is reduced during that period, and also for charging melt into the furnace during casting operations, the furnace is provided with a cover 22 which is operatively connected to a hydraulic cylinder 23 for lifting the cover from its opening, for moving the cover laterally and, after charging the melt into the furnace

from a feeder ladle or moving trough, the cover can again be replaced in the furnace opening. To assure that the induction channel furnace **7** can be tilted and to avoid any interference with its operation, the elements **28** for operating the tapping rod **17** as well as the elements **29** for handling the cover, are arranged on the furnace itself.

To provide the independent movement of the upper carriage **5** relative to the undercarriage **3**, a hydraulic plant **24** with the necessary switching and control elements **25** is arranged in cabinets **26, 27** on the upper carriage. By means of the hydraulic plant the lateral movement of the upper carriage can be accomplished by means of hydraulic cylinders **30** and, in addition, the tilting of the furnace and the raising and lowering of its cover can also be achieved. The movable casting apparatus, described above, has the advantage that successive amounts of melt can be delivered from the induction channel furnace at a constant temperature into casting molds which are moved continuously through the casting zone without interruption with the result that castings of uniformly good quality can be produced in larger quantities within a given unit of time than had been possible in the past.

We claim:

1. Movable casting apparatus capable of being coupled to a casting mold transport device during a casting operation, comprising a movable undercarriage arranged to move in the direction of movement of the casting mold transport device, an upper carriage movably mounted on said undercarriage for movement transverse to the direction of movement of the casting mold transverse device, a bottom tap ladle supported on said upper carriage, wherein the improvement comprises said bottom tap ladle is a closed induction channel furnace, a removable cover for said induction channel furnace, and means for removing and replacing said cover, said means for removing and replacing said cover comprises a hydraulic cylinder assembly mounted on said upper carriage and operatively connected to said cover.

2. Movable casting apparatus capable of being coupled to a casting mold transport device during a casting operation, comprising a movable undercarriage arranged to move in the direction of movement of the casting mold transport device, an upper carriage movably mounted on said undercarriage for movement transverse to the direction of movement of the casting mold transport device, a bottom tap ladle supported on said upper carriage, wherein the improvement comprises said bottom tap ladle is a closed induction channel furnace, a removable cover for said induction channel furnace, means for removing and replacing said cover, means provided for tiltably supporting said induction channel furnace about a horizontal axis, means for securing said induction channel furnace in the tilted position, and said means for securing said furnace in the tilted position comprising a cam disc having a plurality of spaced bores therethrough attached to said furnace, and a locking pin secured to said upper carriage and selectively arranged for engagement within the bores in said disc for securing said furnace in its tilted position.

3. Movable casting apparatus capable of being coupled to a casting mold transport device during a casting operation, comprising a movable undercarriage arranged to move in the direction of movement of the casting mold transport device, an upper carriage movably mounted on said undercarriage for movement transverse to the direction of movement of the casting mold transport device, a bottom tap ladle supported on said upper carriage, wherein the improvement comprises said bottom tap ladle is a closed induction channel furnace, a removable cover for said induction channel furnace, means for removing and replacing said cover, and means operatively connected to said upper carriage for movably displacing said upper carriage and said furnace transversely of the direction of movement of the casting mold device, said means for movably displacing said upper carriage comprises a hydraulic cylinder assembly operatively connected to said undercarriage and to said upper carriage.

4. Movable casting apparatus capable of being coupled to a casting mold transport device during a casting operation, comprising a movable undercarriage arranged to move in the direction of movement of the casting mold transport device, an upper carriage movably mounted on said undercarriage for movement transverse to the direction of movement of the casting mold transport device, a bottom tap ladle supported on said upper carriage, wherein the improvement comprises said bottom tap ladle is a closed induction channel furnace, a removable cover for said induction channel furnace, means for removing and replacing said cover, a hydraulic plant including switching and control elements and hydraulic cylinder assemblies supported on said upper carriage for movably displacing said upper carriage, for tilting said furnace, and for removing and replacing said cover on said furnace and for opening the bottom tap in said furnace.

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