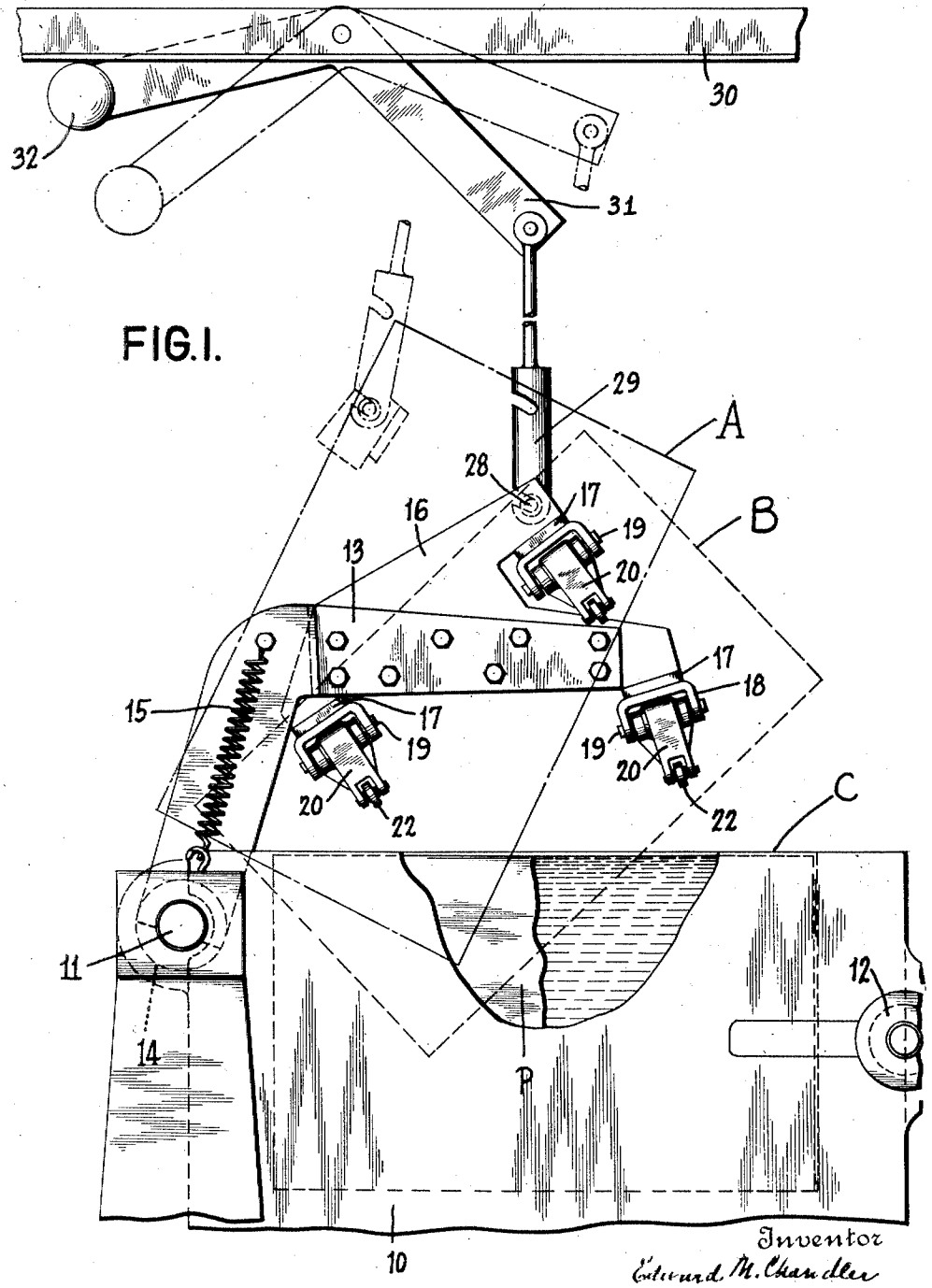
Feb. 16, 1932. E. M. CHANDLER 1,845,649

PLATE HOLDER FOR MOLDS

Filed April 11, 1930 3 Sheets-Sheet 1

FIG. 1.



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Filed April 11, 1930 3 Sheets-Sheet 2

FIG. 6.

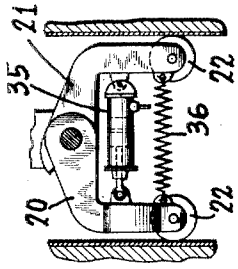

FIG. 2.

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Filed April 11, 1930 3 Sheets-Sheet 3

FIG. 3.

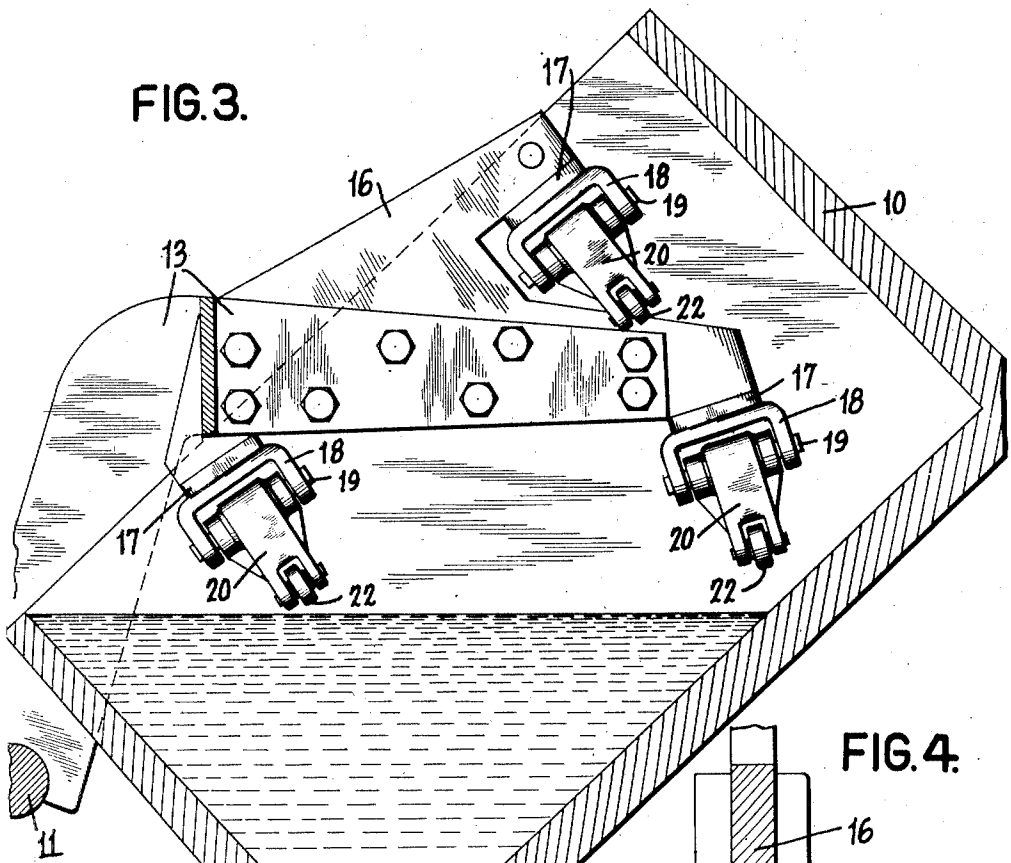


FIG. 4.

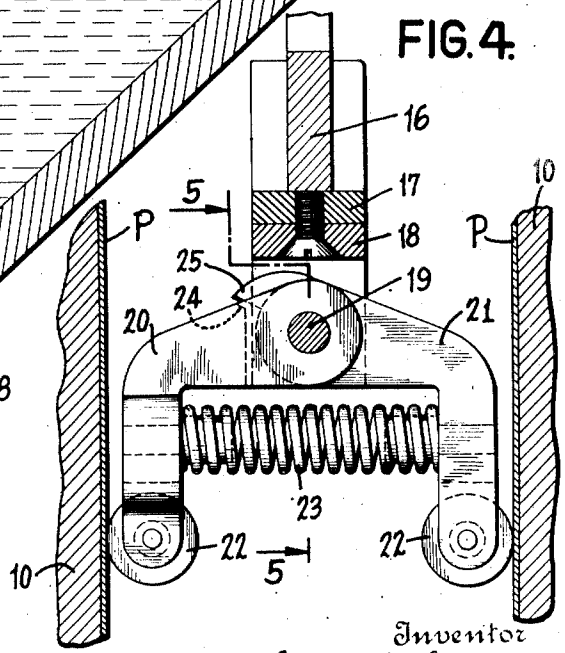
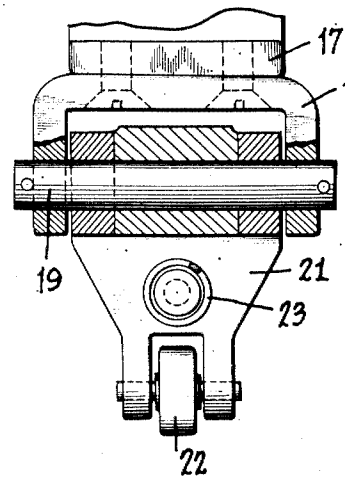


FIG. 5.



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UNITED STATES PATENT OFFICE

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PLATE HOLDER FOR MOLDS

Application filed April 11, 1930. Serial No. 443,287.

This invention relates to the production of duplex ingots in which the outside section of the ingot differs from the composition of the body of the core of the ingot.

In the making of ingots of this class the inner surface of the mold in which the ingot is to be cast is first lined with plates of the corrosion-resisting coating metal and the pouring of the core metal into the mold is so regulated so that as the core metal solidifies it forms a superficial bond with the lining plates and the plates become affixed to the casting.

In the practice of forming castings of the above description, certain precautions must be observed of holding the lining plates in the mold during the casting operation and for allowing proper freedom of movement of the plates during solidification of the molten metal. Heretofore, such plates have been retained in place in the mold by suction devices and a method of casting such ingots and retaining the plates in position by suction is set forth in United States patent to Carbis, No. 1,749,314, dated March 4, 1930.

The particular object of the present invention resides in an improved apparatus and method by which lining plates may be held and controlled in the mold during the casting mechanically instead of by employing suction as heretofore.

Further and other objects will be hereinafter set forth in the accompanying specification and claims and shown in the drawings, which by way of illustration show what is now to be considered a preferred embodiment of the invention.

In the drawings:

Figure 1 is a side view of the mold, shown partly in section and also showing an elevational view of the novel plate clamping means. This view also shows a series of successive positions of the mold;

Fig. 2 is a top view of the mold showing the plate holding means disposed within it and securing the plates in position;

Fig. 3 is a detail side sectional view showing the mold and with the clamping means retaining one of the side plates in position against the wall of the mold;

Fig. 4 is a detail side view of one of the expanders or plate holding devices;

Fig. 5 is a detail sectional view taken on line 5—5 of Fig. 4; and

Fig. 6 is a view of a modification of one of the expanders or plate holders in which an air cylinder device is used in lieu of a single spring.

In more detail in the drawings, the mold 10 which is here shown, is of the split type, being suitably hinged at the left lower corner (Fig. 2) and being mounted to pivot about the supporting mold shaft 11 as shown. The mold is held closed by suitable clamping bolts such as 12.

It will be understood that the mold is adapted to be hoisted up to variable positions by means of a suitable cable connected to a suitable eye which is located at the lower right hand corner of the mold but which is not shown in Fig. 1. Such hoisting cable and its use during pouring of the metal into the mold is fully described in the Carbis patent mentioned above.

Molten metal is poured into the mold from the left hand side and the mold is gradually lowered during the pouring operation as is described in the Carbis patent.

It may be here stated that initially the mold is in the upper dotted line position designated A in Fig. 1, when pouring is commenced, then as pouring proceeds, it is gradually lowered to the intermediate dotted line position (i. e. position B) and finally when the mold is completely filled with molten metal the mold will reach the full line position (i. e. position C) on Fig. 1.

The plate holding apparatus here shown comprises a plate holder frame 13 in the form of a yoke having the forked ends thereof grooved to provide for a half bearing upon the mold shaft 11. The plate holder frame is centralized upon the shaft by suitable collars 14 and the holder is kept in contact with the mold shaft by suitable springs 15. The plate holder frame has secured to it a plate 16 having three flanged feet 17. To these flanged feet 17 are secured yokes or bracket members 18 (see Figs. 4 and 5). Each yoke 18 supports a transverse stud or shaft 19

which provides a pivotal support for a pair of expander levers 20 and 21. Each expander lever has journalled upon its lower end a roller 22. The expander levers are thrust apart by a suitable compression spring 23 (Fig. 4). Extreme outward motion of the expander levers relatively to each other is limited by the inter-engagement of parts 24–25.

As clearly shown in Fig. 4, the plates P are pressed tightly against the mold walls by the action of the rollers under the influence of the spring. Mounted in the extreme upper right hand corner of plate 16 (see Fig. 1) is a bolt or stud 28 which is adapted to fit the inclined slot of a suspension bar 29. The upper and opposite end of the suspension bar is connected to one end of a balancing or controlling bar 31 which is pivoted upon the fixed members or rails 30. Preferably the opposite end of member 31 is provided with a counterweighted portion 32 which projects under member 30 and is adapted to contact therewith when the suspension bar 29 is in intermediate position, i. e. the B mold position.

The operation of the device is as follows. The ingot mold is first closed and lowered to the C or lowermost position. The liner plates P are then placed in position in the ingot mold. With the mold in lowermost position (C) the three expander or plate holding devices are disposed above the top of the mold as shown in Fig. 1. The mold is then elevated towards the intermediate position B and as it is raised the expander units are compressed manually or mechanically so that the rollers may enter the mold between the plates and are thereafter released to press laterally upon the plates. The mold is then elevated by the hoisting cable to the extreme upper position (A position). During this movement of the mold from position B to position A the expander units ride with the ingot mold and maintain the relative position thereto which these parts have in Fig. 1 with respect to mold position B. During such movement of the mold the balancing lever 29 moves from the full line position to the dotted line position (Fig. 1).

With the mold in the upper position everything is ready for the beginning of the pouring operation. As the metal is poured into the mold it is gradually lowered and finally reaches the B position. During this preliminary lowering movement of the mold the part 31 pivotally swings upon the rail 30 and 32 abuts the lower side of the rail just as the mold reaches the B position. Further downward movement of the ingot mold from the B to C position causes the plate holder with the associated expander devices to be gradually withdrawn from mold. When the mold has reached the bottom or lowermost position all of the expanding or plate holding devices will have been wholly withdrawn from the mold and out of cooperation with the plates therein.

In Fig. 6 a slightly modified form of plate holder is provided. In lieu of utilizing a compression spring as heretofore, an air cylinder device 35 provided with piston and plunger and acting to press the levers 20 and 21 apart against the action of a tension spring 36. With this arrangement the tension spring 36 would normally keep the rollers 22 drawing toward one another so that the plate holder could be introduced into the mold without manual compression of a spring. After the plate holder was introduced between the plates air pressure could be applied to the air cylinder 35 to thus press the plates apart and against the mold walls.

While the improved plate holder has been shown as applied to a tiltable mold it will be understood that the same mechanism could also be used with stationary molds in which case the plate holding mechanism would be drawn out of the mold as metal was poured into the stationary molds, or the plate holder may remain stationary while the mold is lowered away from it.

What I claim is:

1. A plate holder for holding plates in casting duplex ingots, comprising pressing means cooperating with the inner sides of a pair of plates in a casting mold, and means for withdrawing the pressing means from cooperation with the plates as the metal is poured into the mold.

2. A plate holder for holding plates in contact with walls of a mold in casting duplex ingots, comprising a plurality of plate holding pressing devices disposed between and cooperating with a pair of plates to press the latter toward walls of the mold for the purpose described.

3. A plate holder for pressing plates against walls of a tiltable mold in casting duplex ingots, said plate holder comprising a plate holder support which is both tiltable with the mold and which is relatively shiftable with respect thereto as the mold is tilted, and plate holding means carried by said support and adapted for cooperation with plates disposed adjacent the walls of the mold.

4. A plate holder for pressing plates against walls of a tiltable mold in casting duplex ingots, said plate holder comprising pressing devices adapted for disposition between the plates and for pressing the latter apart toward the mold walls, and means for progressively withdrawing the plate holder plate pressing devices from pressing cooperation with the plates as the mold is tilted and progressively filled with molten metal.

5. A plate holder device for holding plates in contact with the walls of a tiltable mold in casting duplex ingots, comprising plate pressing devices for forcing the plates apart by

pressure which is applied between the plates, means supporting the pressing devices to provide for their maintaining an unchanged relation with the plates while the mold is in certain tiltable position, and means for causing the pressing devices to traverse across the surface of the plates during other tilting displacements of mold.

6. A plate holder device for holding plates against mold walls in casting duplex ingots, said devices comprising a pair of members each carrying a roller for contact with a plate, and means for pressing said members apart to thrust the rollers into contact with the plates to hold the latter into contact with the mold walls.

7. In a casting apparatus having a mold supported for tiltable movement upon a mold shaft and plate holding means for pressing plates against the mold walls for casting duplex ingots and comprising in combination a plate holder frame also supported upon said mold shaft, plate pressing devices carried by said frame with provisions for pressing plates apart into contact with the mold walls, said pressing devices by a relative tilting of their frame with respect to the mold being adapted for disposition inside of a mold and between plates disposed adjacent the mold walls, means for causing the plate holder frame and the pressing devices to travel with the mold as the latter is tilted from one position to another position, and means for automatically bringing about a relative shifting movement of the frame and mold when the mold is tilted from a certain position to another position so that the pressing devices travel over the plates and are eventually removed from cooperation therewith.

In testimony whereof I hereto affix my signature.

EDWARD M. CHANDLER.