June 30, 1931. C. L. LEE ET AL 1,812,491

CORE FOR METAL CASTING MOLDS

Filed Nov. 12, 1928 2 Sheets-Sheet 1

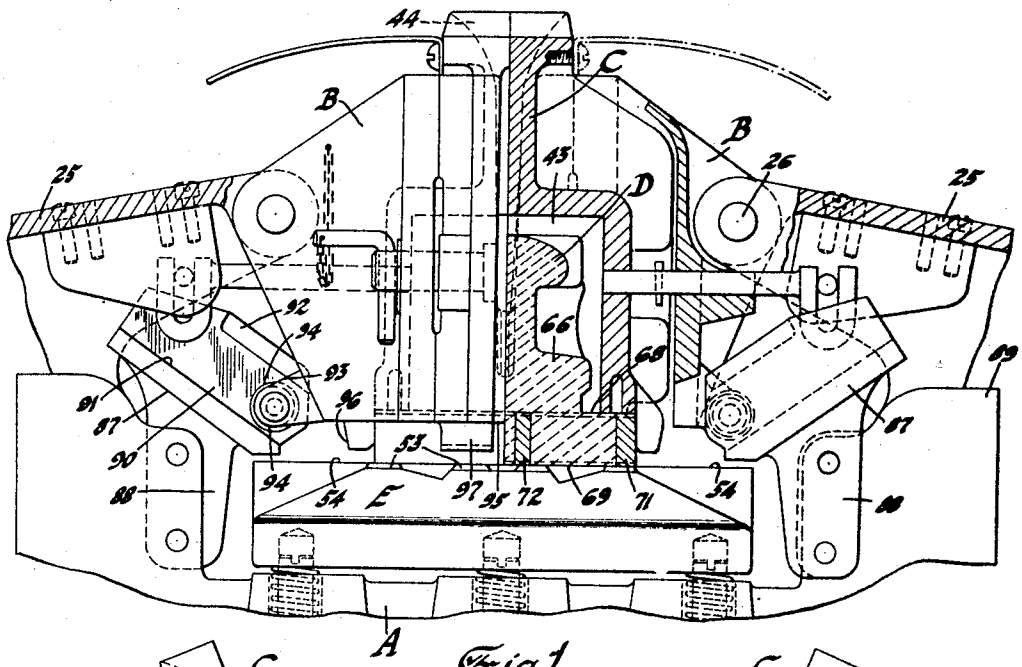


Fig. 1

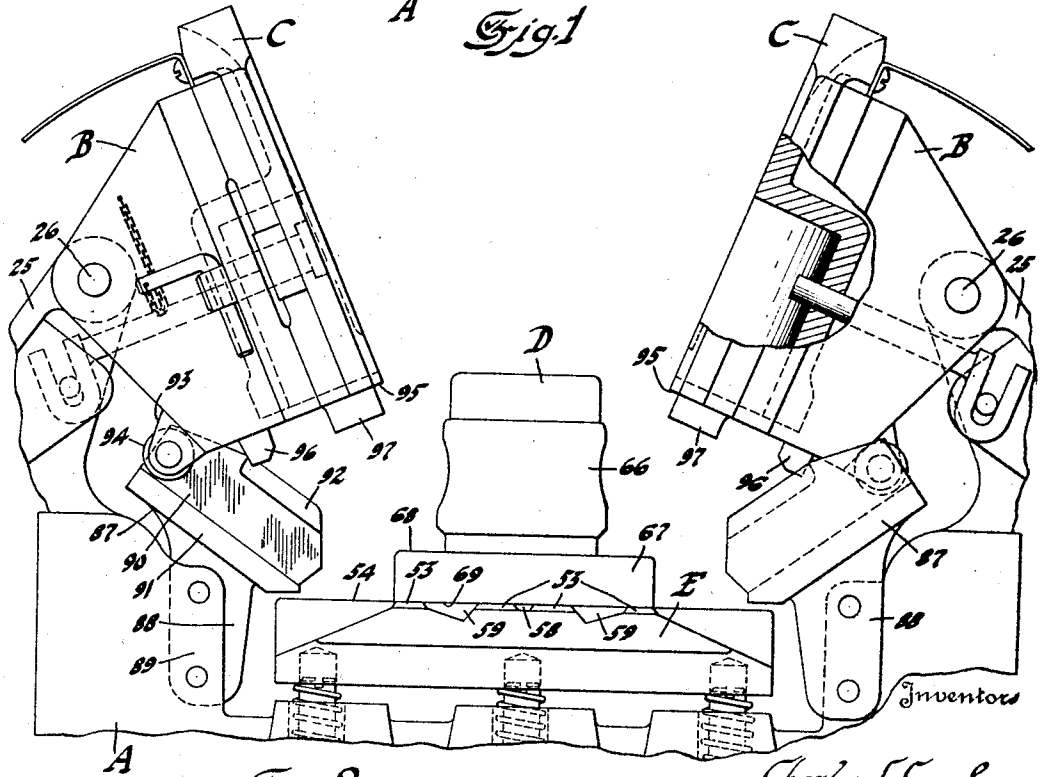


Fig. 2

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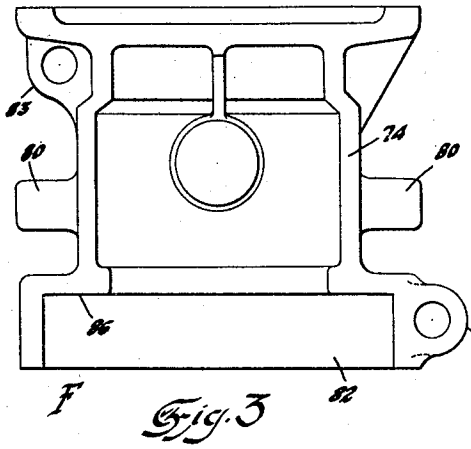


Fig. 3

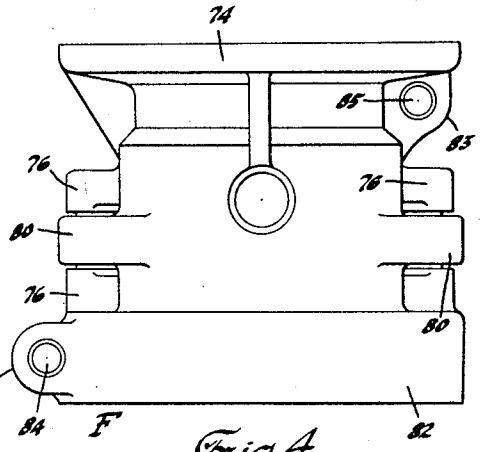


Fig. 4

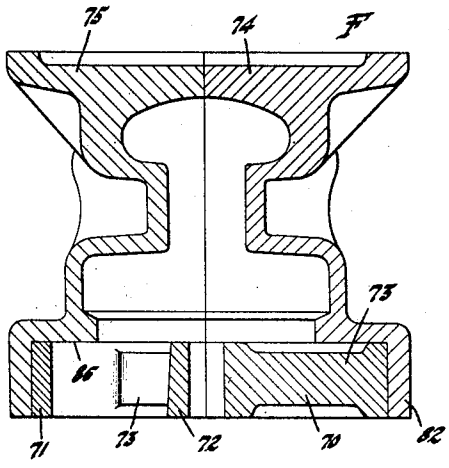


Fig. 6

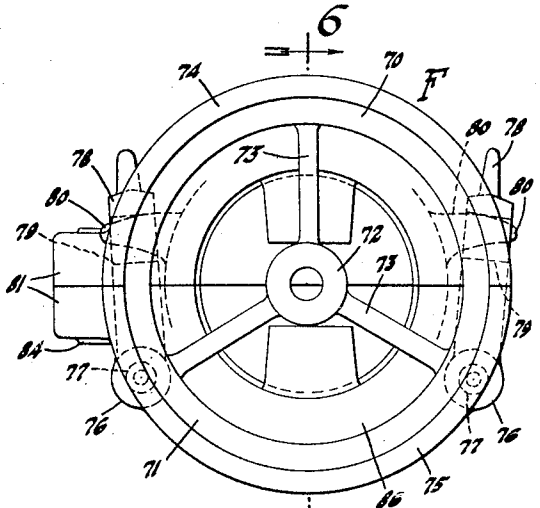


Fig. 5

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UNITED STATES PATENT OFFICE

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CORE FOR METAL CASTING MOLDS

Original application filed April 22, 1925, Serial No. 24,968. Divided and this application filed November 12, 1928. Serial No. 318,708.

This application is a division of application Serial No. 24,968, filed April 22, 1925, for the casting of metals in permanent molds.

The invention claimed in this application relates to cores and consists of a body of sand or like core material molded to a permanent base which forms a part of the complete core and facilitates centering in the mold.

In the drawings in which like parts are indicated by like reference characters throughout the several views:

Fig. 1 is a fragmentary view partly in side elevation and partly in section of a molding apparatus showing one-half of the core in vertical section.

Fig. 2 is a fragmentary view partly in side elevation and partly in section showing the mold carriers retracted, the mold open and a core resting on the core platform.

Fig. 3 is an elevation disclosing the inner side of one section of a piston core box.

Fig. 4 is an elevation of a complete piston core box.

Fig. 5 is a bottom plan view of a piston core box with a metallic core centering member in place.

Fig. 6 is section on line 6—6 of Fig. 5.

In the illustrated embodiment of the invention, A indicates the base of a casting apparatus to which are attached the molds, mold carriers, operating mechanism therefor, and a yielding core platform. B indicates carriers to which mold sections C may be detachably secured. When the mold sections C are closed in position to receive molten metal, they are disposed substantially centrally above the base and above a platform indicated by the letter E, which is preferably mounted on springs so as to yield downward. The platform E may have a surface adapted to contact with the metal of the casting and form of itself, a section of a mold, or it may support on its surface a part of a mold, and the yielding of this part owing to the expansion of the casting avoids the necessity of providing means to let the mold sections C yield laterally under such conditions. In Figs. 1 and 2, a core D is shown in place on the platform E, said core having a flange-like base which closes the lower open ends of the sections C, shown in the drawings as sections of a piston mold, although obviously the sections may be formed as a reverse of other objects than pistons.

As this application relates to the core the detail description following will be limited to the core and so much of the apparatus as may be helpful in affording an apprehension of the utility of the core construction.

The core body may be made of green sand or baked oil sand or of other suitable material customarily used for cores. The body 66 of core D is of course a patrix the reverse in contour of the interior of the piston or other body to be cast. The body 66 is combined with a flange-like base 67, which, in the example shown, is circular and has its upper surface 68 parallel with its under surface 69, both of said surfaces being perpendicular to the axis of the core; whereby with a supporting surface or surfaces 53 on platform E trued in a plane perpendicular to the axis of the core and mold sections, the core may be readily centered with respect to said mold sections so that the casting produced will be accurate, and, in the casting of a piston for example, the walls will be of even thickness circumferentially.

The core base 67 is preferably formed of metal combined with sand or other core material molded together. The metallic portion of the core base 67 may consist of a metallic centering member 70 having a rim or annular exterior 71 connected to a central perforated hub 72 by radiating spoke-like members 73 (Figs. 1, 5 and 6). The open spaces between rim, hub and spokes are filled with sand or other core material during the process of forming the core. The metallic centering member should have the lower and upper surfaces of hub and rim machined or otherwise trued in parallel planes perpendicular to the axis and to the cylindrical perimeter. The spokes may be of less height than said hub and rim so as not to contact with the core base. Said centering member may be joined with the core material in a manner to be now explained.

Referring to Figs. 3, 4, 5 and 6, F represents a core box as a whole. The core box F

is composed of two partible sections 74 and 75 which may be substantially similar in internal contour. One section 75 is provided with two pairs of hinge lugs 76 through which extends pintles 77 on which are pivoted locking members 78 each having a hole 79. The other section 74 is provided with locking lugs 80. Each of the core box sections has an ear 81 at one side of the base portion 82 and another ear 83 diagonally opposite the ear 81, at the upper portion of said section. The said ears 81 and 83 of each pair have perforations which register when the sections match. Pins 84 and 85 maintain correct registration. The locking members 78, when turned to locking position, engage the lugs 80, said lugs 80 entering the openings 79 in the locking members. Lugs 80 are so formed that a camming engagement between them and the locking members draws the two sections close together and clamps them rigidly. The base portion 82 is preferably accurately bored or otherwise machined to receive the core-centering member 70, and has the surface 86 perpendicular to the axis of the core box so that said member 70 fits neatly within said base with its upper and lower surfaces also perpendicular to the axis of the core box.

When the core box is to be filled with core material, the core box should be inverted from the position in which it is shown in Figs. 4 and 6 and, with the centering member 70 in place, it would appear as in Fig. 5, if looked at from above. The core box may be filled with core material which may be tamped therein until it reaches a level a little below the surface 86. Then the centering member 70 may be inserted, care being taken to have the surface 86 perfectly free from sand or other particles and the member 70 likewise quite clean so that the base surface of the centering ring will be accurately positioned with respect to the axis of the core box. Sand or other core material may then be tamped into the core box through the openings between the rim, spokes and hub of the member 70 until said material is packed solidly to a plane flush with the exposed surface of said centering member.

Reverting now to the mold carriers B and means for operating them: The carriers B are pivoted to the carrier levers 25. In order that the carriers B may be caused to open wide for ready access to the core platform and tilt to such an angle as to make the insides of the mold sections readily accessible for sooting or otherwise coating, members having camways are connected to the base A which cooperates with lugs on the carriers B, said lugs and camways being so disposed as to control the angular position of the carriers during their movements to and from closed position. The said cams are formed in members 87 having depending arms 88 bolted or riveted to bracket member 89 formed on the base. In one side of each cam member 87 is an inclined cam groove 90, lying between a lower guide wall 91 and a shorter upper guide wall 92. A lug 93 on each carrier B supports a side pin preferably having a roller 94 guided in the groove 90. When the mold carriers are wide open, as shown in Fig. 2, the carriers may be tilted back still further about the pivots 26, as the guide wall 92 does not extend above the roller 94 when the carriers are fully separated. The design of the cam groove is also such as to cause the faces of the mold sections on the carriers to approach with their faces in parallel and the pivotal connection of the carriers with the levers 25 allows the faces of the molds to adjust themselves perfectly. The roller 94 may have a slight play in the cam groove. As before stated, the relative angle of the cam groove 90 and arcs of movement of pivot 26 and of carrier B are such as to cause a parallel movement of the mold faces in the final closing and initial opening stages. For convenience of manufacture, the cam members for each mold carrier are identical and are consequently reversed in position with respect to each other when mounted on the apparatus.

Referring to the construction of the mold sections C: Each mold section has a lower end constituting a ledge 95 which is preferably machined plane in the case of the piston mold shown, and perpendicular to the axis of said sections. Outside of and depending below the ledge 95 are centering lugs 96 and 97. Each lug 96 is disposed on a mold section directly over a surface 54 on base E while the lugs 97 are near the edges of the section. In a piston or like mold the inner faces of the lugs are substantially coincident with a circle of the same diameter as the centering member 70 of the core. The lugs are intended to engage the outside of rim 71 of centering member 70, when the molds are moving to closed position and center the core with respect to the mold sections. The ledge 95 closes down on top of the rim 71 and insures that the core is clamped to the top surface 53 of the base snugly and accurately. By this means the core is sure to be centered accurately so that the walls of the piston cast in the ledges 95 will also clamp down on the upper surface 68 of the core base 67 constitutes with the core a part of the complete mold closing the lower end of mold cavity 43. When metal poured into the mold through gate 44 expands on cooling, pressure on the surface 68 and on the core may cause the core platform to yield sufficiently to take care of expansion.

In preparing for pouring a casting, the mold sections are caused to occupy the position shown in Fig. 2. In this position the molding surface of the molds may be sooted or otherwise coated readily. With molds in this position, ready access can be had to the core platform. A core made as described in

the core box F may be set on the surface 53 of the core platform E. No particular care to set the core accurately need be taken other than to see that no particles of sand lie between the surfaces 53 on the core platform and the bottom of the core base, and that the surface 68 is clean. Grooves 58 and 59 in the platform E facilitate removal of particles from the surfaces 53. The core may, of course, be coated at this time or previously if desired. The mold may then be closed as shown in Fig. 1. As the mold sections approach final closed position, the centering lugs will contact with the perimeter of the ring 71 of core-centering member 70, if the core is not in central position, and the core will thereby be moved to final position. The ledges 95 will also clamp down on the upper surface of ring 71 and hold the core firm and true with the surface 68 forming the bottom of the mold. The mold is now ready to receive molten metal which may be poured into gate 44. When the casting has set, the mold sections are moved again to the open position illustrated in Fig. 2.

While the embodiment disclosed herein constitutes a preferred embodiment, it is understood that other might be adopted within the scope of the ensuing claims.

What is claimed is as follows:

1. In a casting apparatus, a non-metallic core body having a flange-like base combined with a metallic body having a rim and spoke-like members, the space between the spoke-like members being filled with core body material.

2. In a casting apparatus, a non-metallic core body having a flange-like base combined with a metallic body having a rim, a perforated hub-like center and spoke-like members radiating from the hub-like center to the rim.

3. In a casting apparatus, a core consisting of a non-metallic body united to a metallic base the latter having a perimeter extending parallel with the core axis and a plane supporting surface flush with one end of the core and perpendicular to the core axis and the perimeter.

4. In a casting apparatus, a core consisting of a non-metallic body united to a metallic base at one end, said base having a plain cylindrical perimeter parallel to the core axis and parallel plane surfaces perpendicular to the core axis and perimeter and of greater diameter than the core body.

In testimony whereof we affix our signatures.

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