June 1, 1948. E. C. JETER ET AL 2,442,568

CORE ASSEMBLY

Filed Dec. 8, 1945

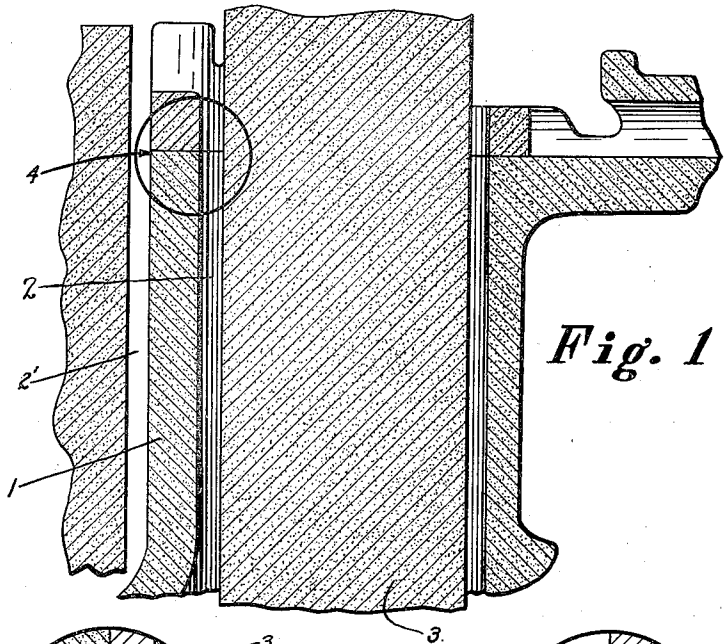


Fig. 1

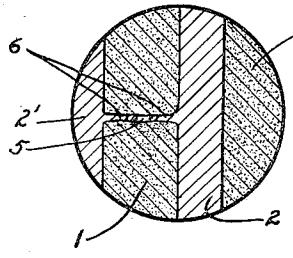


Fig. 2

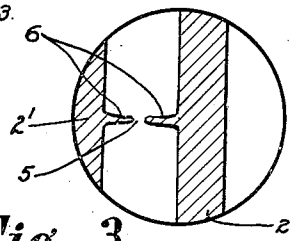


Fig. 3

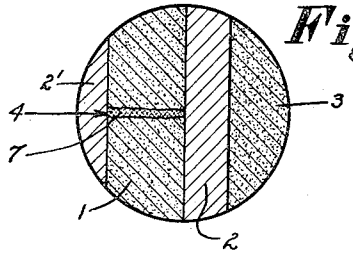


Fig. 4

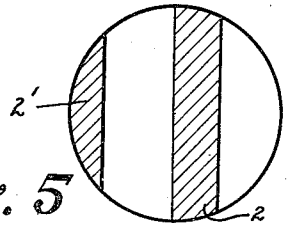


Fig. 5

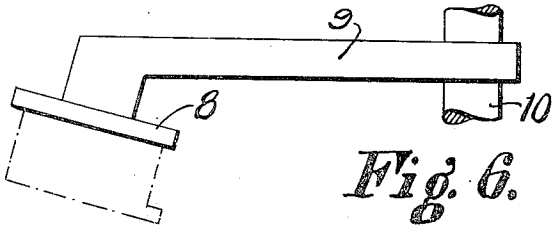


Fig. 6.

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Patented June 1, 1948 2,442,568

UNITED STATES PATENT OFFICE

2,442,568

CORE ASSEMBLY

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Application December 8, 1945, Serial No. 633,708

2 Claims. (Cl. 22—194)

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This invention relates to the founding art and more particularly to a process for casting in moulds hollow or jacketed metal articles.

The prime object of this invention is the provision of a moulding procedure whereby the occurrence of fins in the hollow space or jacket of the casting is avoided. This invention will be particularly described in connection with the production of motor blocks for internal combustion engines, although it is by no means so limited, but is applicable to the production of any casting involving a jacket.

In building cores for large or complex castings, it is often necessary to fabricate the core from a number of individual core pieces. This is required either because of the size or configuration of the casting.

Conventionally these individual core pieces have been dipped into the usual core wash, the excess of core wash rubbed off and the dipped individual pieces oven dried. The dried individual core pieces have then been given a coating of core paste on those surfaces which were to adhere to an adjoining core piece. These paste coated core pieces were then assembled into the completed core, the adhesive action of the paste being assisted by bolts or other suitable fastening means. The entire assembly is then oven dried to set the paste.

In the practice of the present invention this procedure is modified in the following manner. The individual unwashed core pieces are given a coating of paste on these surfaces which it is desired to cohere. These pasted individual unwashed core pieces are then assembled, the core pieces being held together by the paste and bolts or other suitable means as before. The assembly must of course be oven dried to set the paste. The complete core assembly is now dipped into a core wash and then subjected to centrifugal force to remove the excess core wash. During the centrifuging operation, any core wash which has entered a joint not completely filled with core paste will remain therein so that a flush joint between the core pieces or laminations is obtained.

The application of centrifugal force in the case of an engine block core is effected by rotating the completed core in an upright position around an axis eccentric to the vertical axis of the core a distance of 12 to 24 inches and at a speed of 80 to 120 revolutions per minute. The exact radius and speed of rotation can be adjusted to suit the requirements of the individual core. It has been found that best results are obtained

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when an engine block core is mounted with its vertical axis inclined 10 to 20 degrees from a true vertical position.

The underlying reason for the above outlined change will be apparent from a consideration of the drawing in which:

Figure 1 is a vertical sectional view taken through the center line of the bore core assembly, and

Figure 2 is an enlargement of the circled portion of Figure 1 showing the core structure of the prior art after pouring the metal and illustrating a defective joint between adjacent core pieces partially filled with metal, and

Figure 3 is Figure 2 with the core material removed to show the casting with the fins attached, and

Figure 4 is an enlargement of the circled portion of Figure 1 showing the core structure of the present invention and the absence of defects in the joint between the core pieces, and

Figure 5 is Figure 4 with the core material removed to show the absence of fins, and

Figure 6 diagrammatically illustrates a simple form of core centrifuging apparatus.

In Figure 1, core pieces 1 and 3 are core members which together define space 2 and 2' in which will flow the metal to form a cylinder wall and jacket wall. When the casting is poured, metal will of course flow on each side of core piece, this core piece being later removed to provide a jacket through which cooling water circulates.

As described earlier, these cores are built up from component parts and in Figure 1 this joint between such parts has been circled and indicated by 4.

Figures 2 and 3 illustrate the difficulties resulting from a defective joint 4 between adjacent core pieces. These defective joints stem primarily from irregularities in the amount of core paste applied to different parts of the cores. When a small space is left between adjacent core members, during the pouring of the casting, metal will fill or partially fill such opening and produce a casting fin. This is shown in Figure 2 in which the metal has run into the opening from each side and produced fins 6 separated by an open space 5. The appearance of the water passage in the jacket of such a casting is clearly seen in Figure 3 in which the section of the water jacket is reduced from the full distance between 2 and 2' to the small space indicated at 5. These casting fins are on the interior of the motor block where it is economically impossible to detect their pres-

ence or to remove them if detected. These fins result in a partial or complete stoppage in the flow of cooling water in the jacket with the concomitant local overheating or destruction of the engine during operation.

Figure 4 illustrates the same joint 4 in which the space between contiguous core sections has been filled by core wash 7 with the resulting completely open jacket space shown in Figure 5.

As has already been indicated, the complete core assembly is dipped in a core wash and then subjected to centrifugal force to remove the excess core wash, in order to complete the fabrication of the core. Figure 6 diagrammatically illustrates, by way of example and not limitation, a simple form of apparatus for effecting the removal of excess core wash. Thus, an assembled core is diagrammatically shown in dot-and-dash lines attached by any suitable means, not shown, to a support 8 carried at one end of an arm 9. The other end of the arm 9 is mounted upon a driven shaft 10. The support 8 is preferably disposed nonparallel to the general plane of the arm 9 so that the core axis is disposed eccentric to the axis of the shaft 10 and is also inclined from a true vertical position. Upon rotation of the core assembly, the centrifugal force developed is effective to remove the excess core wash, but insufficient to remove the core wash from between the joints of the assembled core.

Some changes may be made in the process of our invention and it is intended to cover by the subjoined claims all such changes as may reasonably be included within the scope thereof.

We claim as our invention:

1. The process of forming a composite core assembly to be used in casting articles which include an internal jacket, comprising the steps of pasting together the adjacent faces of the core units which comprise said composite core assembly, drying said pasted composite core, dipping said dried composite core in a core wash, and then applying sufficient centrifugal force to said dipped core assembly to remove excess core wash from the exposed faces of said composite core but insufficient to remove said core wash from between the joined faces of said assembly.

2. A process for building up a laminated core for castings which include an internal jacket comprising the steps of applying core paste to the faces of the individual laminae, assembling the laminae, drying the assembly, dipping the assembly including the core paste in a core wash and revolving the dipped assembly about an axis outside the core to remove by centrifugal force only the excess core wash which is not retained between pasted faces of the laminae.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,586,321	Newport	May 25, 1926
1,658,084	Hudson	Feb. 7, 1928
1,769,141	Keen	July 1, 1930
1,990,075	Horak	Feb. 5, 1935
2,270,770	Ray	Jan. 20, 1942

OTHER REFERENCES

Foundry Practice, by R. H. Palmer, John Wiley and Sons, Inc., New York, third edition, 1926; pages 190 and 191.