

April 22, 1969

M. ANDREOLI
DIE-CASTING PROCESS USING MAGNETIC CORE
TO POSITION PREFORM

3,439,732

Filed Oct. 20, 1965

Sheet 1 of 2

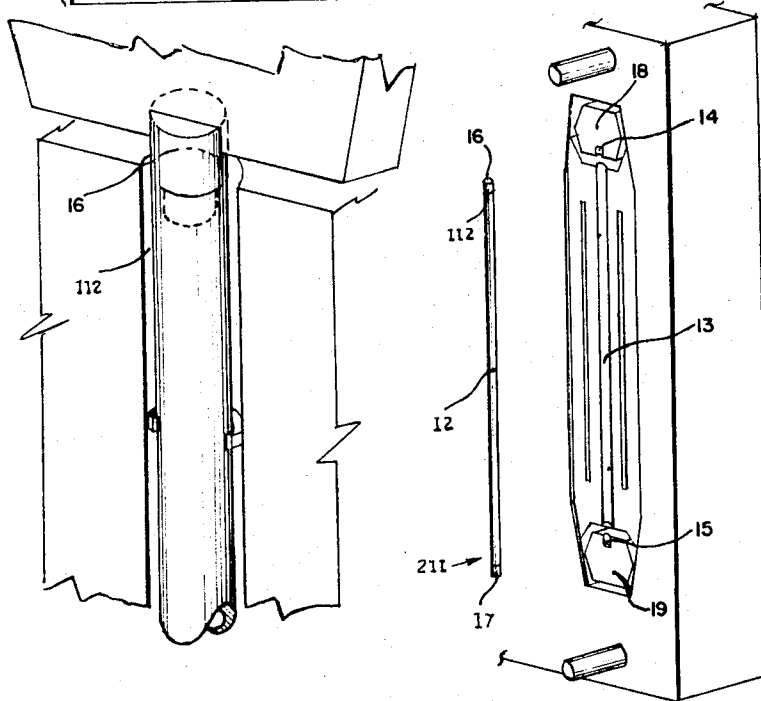
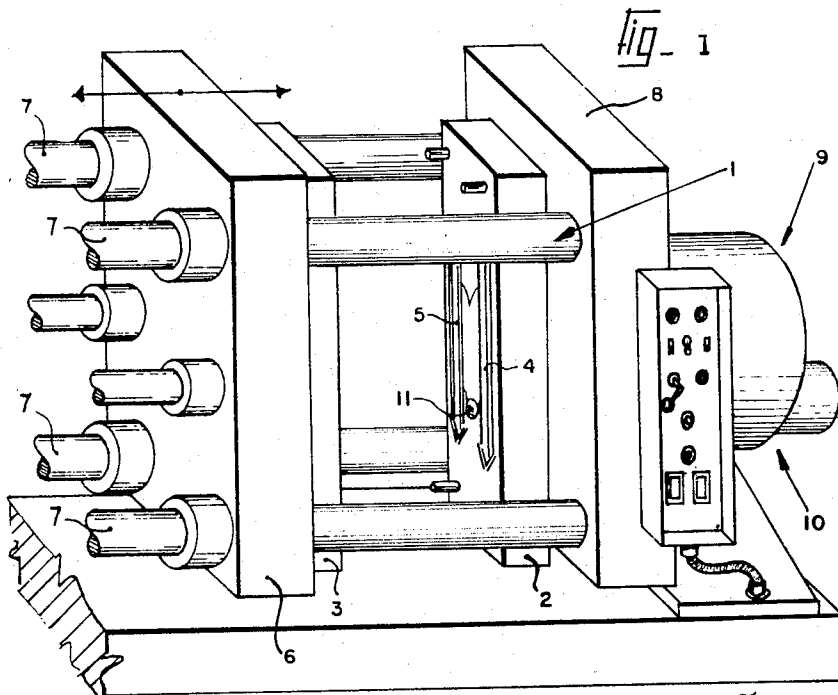


Fig. 3

Fig. 2

INVENTOR
2 Mario Andreoli
BY

Agent

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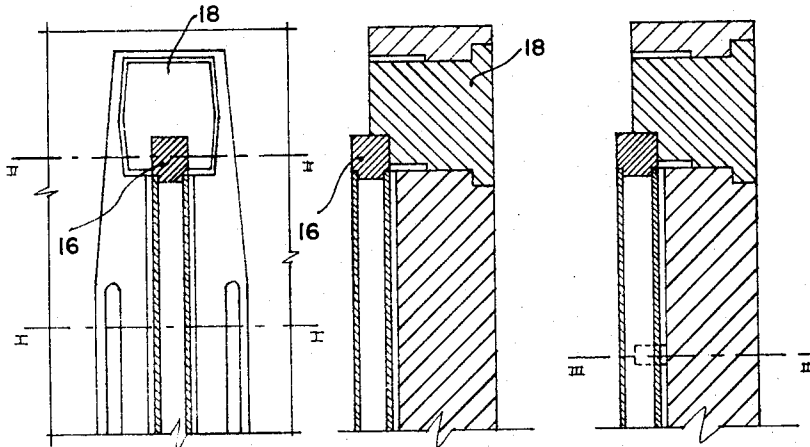


Fig. 4

Fig. 5

Fig. 6

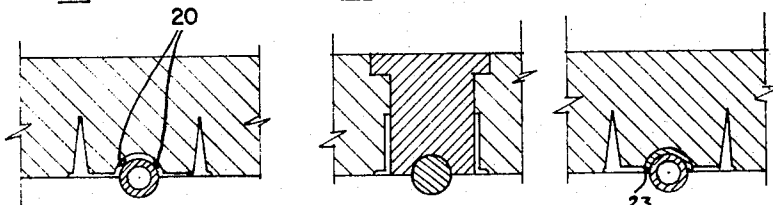


Fig. 7

Fig. 8

Fig. 9

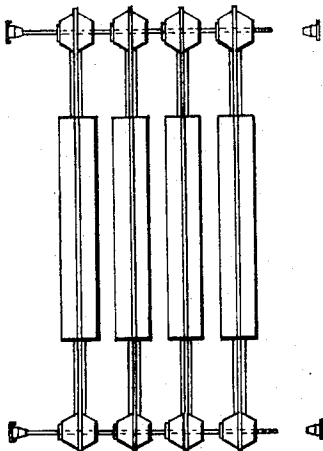


Fig. 11

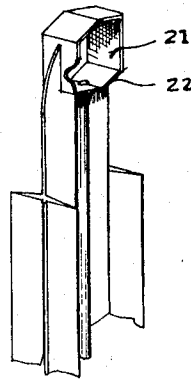


Fig. 10

INVENTOR
BY Mario Andreoli

Agent

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3,439,732 DIE-CASTING PROCESS USING MAGNETIC CORE TO POSITION PREFORM

Mario Andreoli, Rastignano, Bologna, Italy

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25,864

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1 Claim

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a method of making composite hollow die-cast articles having a tubular portion connected to a hollow head portion, wherein use is made of a tubular insert, which is positioned in the die cavity and the molten material is cast around it during the casting stage of the method so that the solidified casting has the tubular insert as an integral part thereof.

The present invention relates to a process for manufacturing by die-casting such hollow elements, which have not been heretofore suitable for production by means of conventional die-casting methods; moreover this invention relates to die-casting of elements of the class described and which are made of light materials as aluminium or the like. A preferred field for the process of this invention is the manufacturing of articles such as heating radiators, readily assemblable boiler components and the like.

It is well known to use casting processes applied to ferrous materials, more particularly to cast iron, to obtain radiators, boiler component parts and the like. It is also well known that these processes are rather complicated, since bodies are to be cast, having compartments and conduits which are to be kept in hydraulic communication between each other, which compartments and conduits on the other hand are to be completely surrounded by walls (with the exception of the openings aimed at allowing the junction of the various component elements). These requirements, besides the fact that the surfaces which get in mating contact for conjunction purposes are rather rough and do not provide a tight joint, imply complicated steps and operations, which give raise to high expenses in the manufacture. It may be added that the high weight of such cast iron elements disadvantageously affects the assembling and mounting operations in buildings and the like.

It is an object of this invention to provide a method for die-casting hollow elements which reduces the manufacturing costs so that more expensive materials may be used without increasing appreciably the overall cost of the product. Another object is to obtain smoother inner surfaces of the conduits, which are a part of the die-cast product so that circulation difficulties may be avoided, and smoother external surfaces avoiding on the one hand the need to provide a plurality of enamel layers or coatings and permitting on the other hand the conjunction to quickly proceed, without finishing requirements for the mating surfaces.

These and other objects are attained by the process according to the invention, which comprises locating tubular inserts within the die-cavity for one of the elements of a die-casting mold, provided with die-cavity portions suitable for defining hollow spaces at the end of said pipe members and in communication therewith and with the exterior, and die-casting a light weight material around these tubular inserts, so as to obtain a body wherein an outer low weight material is intimately connected to said tubular inserts. Conveniently, said process

ess further comprises plugging said tubular inserts and removing the plugs through said hollow end spaces.

Further features and advantages of the invention will be more evident from the detailed description of a preferred example illustrating the process with the aid of the accompanying drawing, wherein:

FIG. 1 shows diagrammatically a part of a die-casting machine and its associated mold or die;

FIG. 2 shows a die half, having die-cavities for a radiator element, with a tubular insert just before is positioned within the die-cavity,

FIG. 3 shows the same element as in FIG. 2 in a larger scale, with the pipe member or tubular insert just located within a die-cavity,

FIGS. 4, 5 and 6 show, partially in perspective view and partially in sectional view, a die with a pipe member located therein,

FIG. 7 is a section along line I—I of FIG. 4, the line I—I being in a plane perpendicular to the drawing sheet,

FIG. 8 is an analogous section along line II—II of FIG. 4, whilst

FIG. 9 is a section of FIG. 6 along line III—III,

FIG. 10 shows in perspective view, which detail refers to a head part of the radiator element, whilst

FIG. 11 shows an exploded view of the elements as they are assembled to form a radiator.

Referring now more particularly to the drawings, of the die-casting machine only the die zone 1 is shown, which includes the die-halves 2, 3 with die-cavities 4, 5 arranged one in front of the other. The die half 3 is mounted on a slide 6 which might slide on guides 7 secured on a stationary part 8 of the machine. Projecting from said stationary part 8 is a cylinder 9 and tubular elements 10, which in a per se known manner are aimed at feeding and compressing the material to be cast. The inlet in the die-cavity is shown in 11.

Referring now to FIGS. 3 and 2, the step is pointed out by which an auxiliary pipe member or tubular insert 12 is arranged within the longitudinal recess 113 of the die-cavities of one of the die-halves, so that the ends 112, 212 of the tubular insert 12 are partly housed within end recesses or seats 14, 15, provided in cores 18, 19 and receiving the corresponding ends of plugging elements 16, 17, which are partly inserted into the end of the auxiliary pipe member or tubular insert 12. Such plugging elements 16, 17 are made for instance of ferromagnetic material, suitable for attraction by cores 18, 19 when made as permanent magnets inserted at the ends of the die-cavities, in the respective die-half, so that the said auxiliary pipe member or insert 12 is held in position. Through the opening 21 (FIG. 10) of the head portion of the die-cast article, which will be more particularly described hereinafter, the plugging elements 16, 17 may be removed from the die-cast radiator element. In the longitudinal recess 13 of the die-halves, spacing projections 20 (FIG. 7) are provided, which keep the auxiliary pipe member or insert conveniently spaced apart from the walls defining the die-cavity in order to allow the cast material to flow around the pipe member and to cover the same, when the die is closed and die-casting occurs according to the conventional art.

Analogous spacing projections are provided in the die-cavity of the other die-half and are aimed at cooperating with the former ones so as to self-center and keep in the pre-established position the auxiliary pipe member, avoiding thus the bending of this pipe during the injection of the cast material. The magnetic cores 18, 19, project from each die-half into the die-cavity, and when the die is closed, define the hollow head portions with end openings or recess 21 (FIG. 10). Furthermore, as a consequence of the shape of the die-cavity, the head-

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portions of the radiator elements will have conjunction seats 22 for tightly coupling to respective adjacent elements, as may be noted from FIG. 11. On these seats 22 a gasket may be arranged, without the need to smooth the respective mating surfaces.

The spacer means for the pipe inserts located in the die-cavities may be made of ring elements 23 or the like, as may be seen in FIG. 9. Such spacers cooperate with the recessed seats 14, 15 for the plug elements arranged at the end of the auxiliary pipe members for mechanically keeping into place the auxiliary pipe members. In other words, the positioning of the pipe members in a spaced-apart condition with respect to the corresponding die-cavity should not compulsorily occur by magnetic action. According to another embodiment the die-casting apparatus may be kept in a slightly inclined position, so that possibilities arise to position the pipe members 12 without having recourse to securing means, since the pipe members may thus be supported on certain points of the die-cavities suitable to ensure correct positioning.

While a preferred method and apparatuses for carrying out the invention have been heretofore described, it is not intended to limit the invention to the details heretofore described or illustrated, reserve being made to all such modifications and changes as come within the scope of the appended claim.

I claim:

1. A method for making articles having a structure consisting of a tubular part and one hollow head on each end of said tubular part, the method including the steps of positioning a tubular insert in the die-cavity portion for the tubular part of the article, closing the die,

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casting molten material into the die and around the tubular insert, cooling the die-cast materials, removing the solidified casting with the tubular insert united therewith and wherein according to the improvement, prior to the step of closing the die a core of magnetized material is positioned in the die-cavity parts for the hollow heads of the article to be formed, the ends of the tubular insert are plugged with plugs of ferromagnetic material and the so plugged tubular insert is positioned in said die-cavity portion with said plugs abutting against said cores thereby to hold in position said tubular insert by magnetic action of said cores.

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J. SPENCER OVERHOLSER, *Primary Examiner*.

ROBERT D. BALDWIN, *Assistant Examiner*.

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