April 26, 1932. F. M. POE 1,855,529

CASTING MOLD

Filed Aug. 5, 1931

Fig. 1.

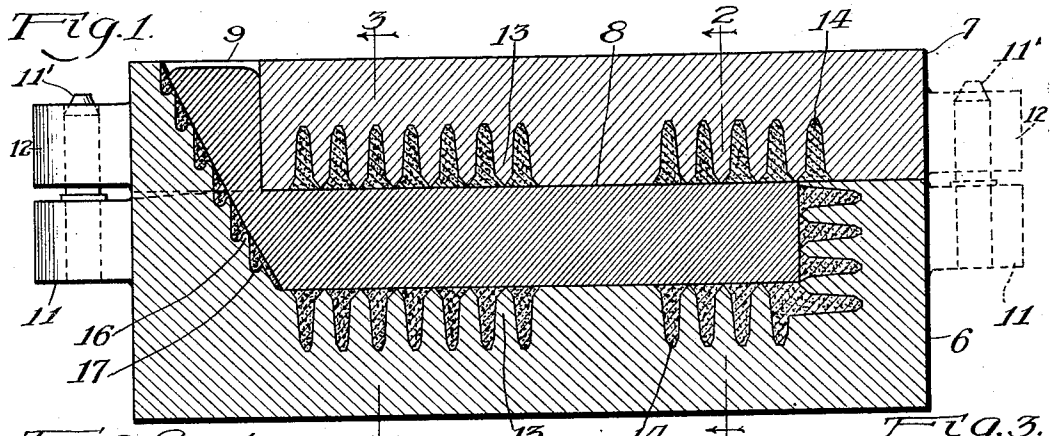


Fig. 2.

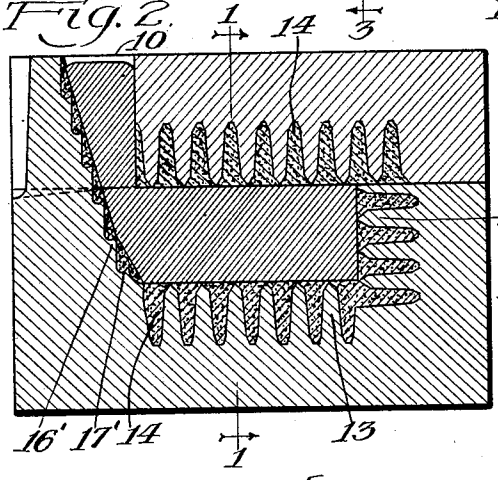


Fig. 3.

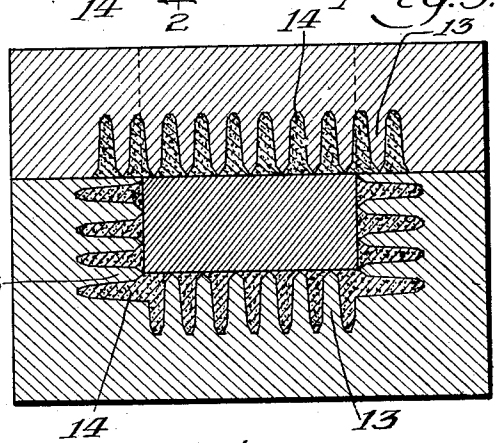


Fig. 4.

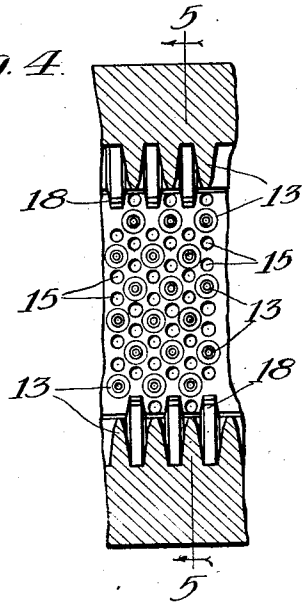
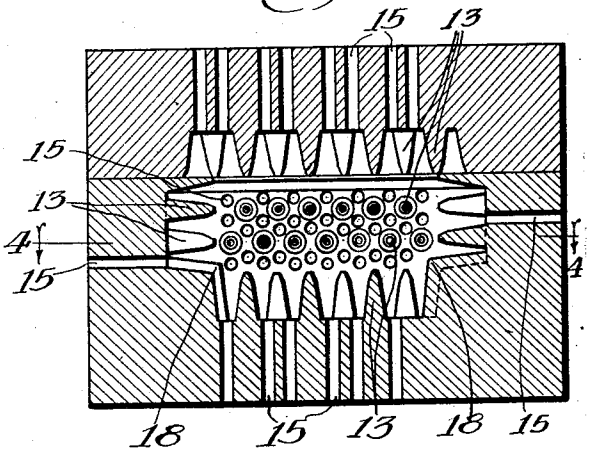


Fig. 5.



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Patented Apr. 26, 1932 1,855,529

UNITED STATES PATENT OFFICE

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CASTING MOLD

Application filed August 5, 1931. Serial No. 555,164.

This invention relates to molds for casting metal articles and more particularly to permanent or semi-permanent molds for repetition casting operations.

The object of the invention is to enable the use of molds for repetition casting operations and to avoid or to materially reduce the chilling effect of a casting mold upon the casting, and thereby eliminate the necessity for normalizing or annealing certain types and classes of castings, by making the walls of the mold cavity sufficiently refractory for the purpose and in such a way that they will stand the heat changes, the ordinary molding practices and other factors which tend to seriously damage and destroy refractory surfaces so that the mold cavity, made in whole or in part of refractory wall surfaces, may be used for repetition casting operations.

Heretofore it has been proposed to apply a coating of refractory material to the walls of the mold cavity; to make up the walls of a plurality of blocks of refractory material; or to inset blocks of refractory material in the metal walls of the mold cavity. The refractory material in all such cases is liable to damage and destruction because of heat changes, molding practices and other factors which enter into molding operations. I have found that the life of the refractory material may be greatly prolonged if the body thereof is reenforced and protected interiorly by metal projections which may conveniently be made in the form of studs on the mold with the refractory material filled in the recess formed about the studs and finished off covering the outer ends of the studs or flush therewith to form the surface of the mold cavity wall. The refractory prevents or materially reduces the chilling effect of the metal mold and at the same time it is protected by the embedded studs against the ill effects of heat changes, molding practices and other factors common in casting operations so that the life of the refractory will be prolonged to permit the mold to be continued in use for repetition molding operations.

And a further object of the invention is to provide mold cavity walls composed in part of studs of metal integral with or otherwise connected to the body of the mold and embedded in refractory material, the refractory material covering or being flush with the outer ends of the studs and the studs being distributed throughout the body of the refractory material.

My invention has other objects in view which will appear hereinafter in the detail description thereof in connection with the accampanying drawings which illustrate selected embodiments of the invention and referring thereto.

Fig. 1 is a longitudinal sectional view of a mold embodying the invention and taken on the line 1—1 of Fig. 2 with the mold cavity filled with a casting.

Figs. 2 and 3 are transverse sectional views on the lines 2—2 and 3—3 respectively of Fig. 1.

Fig. 4 is a detail sectional view of a drag on the line 4—4 of Fig. 5 and showing another embodiment of the invention.

Fig. 5 is a transverse sectional view of a mold showing another embodiment of the invention.

Referring to the drawings, the mold comprises a drag 6 and a cope 7 having a mold cavity 8, a pouring gate 9 and a riser 10. The drag is provided with ears 11 and pins 11′ thereon to engage openings in the ears 12 on the cope to register the cope in place on the drag. I have shown a mold of simple construction to illustrate the invention but I desire it to be understood that the invention may be embodied in molds of any construction and for any purpose for which it is or may be adapted. All or a part of the walls of the mold cavity are formed in part of metal and in part of refractory material, the metal and refractory material being divided and spaced and arranged so that there is a predetermined distribution of the metal in the refractory, the area and depth of the refractory being determined by the character of the casting operation to provide the proper protection for the casting and prevent the casting from becoming chilled by the metal of the mold and so that the mold can be used for repetition casting operations; and the metal is distributed and arranged in a prede-

termined manner to form a substantial support for the refractory and thereby provide stable surfaces for the walls of the mold cavity to enable repetition casting. These surfaces may be all refractory or they may be mainly refractory with spots of metal distributed therein. These spots of metal are of such small area that individually and collectively they will not produce a chilling effect upon the casting or otherwise destroy the effect of the refractory. The walls of the metal drag and cope are cored, bored or otherwise recessed to provide a plurality of studs 13 which extend to or almost to the surface of the mold cavity. These studs are preferably tapered and they may have their ends reduced to a small point so that if the ends are exposed at the surface of the mold cavity wall, they will be so small in area that they will not affect the casting. The studs may be of any height and of any thickness and of any shape and they may be arranged in any manner suitable for the purpose. The cavity around the studs is filled with refractory material 14 of any suitable kind and it preferably covers the points of the studs so that a continuous refractory surface is provided on the cavity walls; but the points of the studs may be flush with the refractory to form a part of the surface of the cavity wall without destroying the effectiveness of the refractory material to prevent chilling the casting, and for some castings this may be a desirable construction rather than a possible objection. The refractory material may be packed in the recesses of the cavity walls in any suitable manner, and by any suitable means. The refractory material may be packed in from the face of the wall as it would be in Figs. 1–3 or the mold may be provided with openings 15 extending therethrough and communicating with the space about the studs 13 so that the refractory may be forced in from the outer surface of the drag and cope through the openings 15 and into the space about the studs 13 to form the walls of the mold cavity. The bottom wall of the pouring gate including the end wall of the mold cavity may be recessed to provide studs 16 in a step-like arrangement with the intervening recess filled with refractory 17, Fig. 1, and the bottom wall of the riser may be similarly provided with studs 16′ and refractory 17′, Fig. 2. I may also provide transverse angular projections 18 in the drag, Figs. 4, 5, at the lower corners of the mold cavity to cooperate with the studs 13 in sub-dividing the refractory material.

The refractory material is disposed about the metal studs and the metal studs are distributed through the refractory material in a more or less uniform manner depending upon the number, design and arrangement of studs so that the metal will support and protect the refractory and the refractory will protect the casting from any chilling effect which the metal might otherwise have thereon. Thus I obtain the benefit of metal walls without the chilling effect thereof and I also obtain the benefit and advantages of refractory walls without the liability of damage thereto which is liable to occur in repetition casting operations. Furthermore, the disposition of the metal in the refractory tends to protect the refractory from spalling and wearing as it would be liable to do if it were made in large sections; and the distribution of the metal through the refractory protects the refractory from the damaging effects of heat changes and molding practices and its life is thereby prolonged.

Preliminary to the casting operation I prefer to coat the surface of the mold cavity walls, whether the surface is of refractory or part refractory and part metal, with lamp black or any other protective coating which is or may be suitable for the purpose. I do not restrict the invention to refractory material of any particular kind but I may use any material of low heat conductivity suitable for the purpose; and it is my intention to vary the size, shape and arrangement of the studs to provide the refractory in bodies suitable for cooperation with the studs in forming cavity walls for molding any castings desired.

I do not limit my invention to the particular form, construction or arrangement shown and described herein but I reserve the right to embody the invention in any mold and in any form, construction and arrangement suitable for the purpose and within the scope of the following claims.

I claim:

1. A wall with which the molten metal contacts in a mold and comprising a plurality of spaced metal studs and refractory material embedding the studs.

2. A wall with which the molten metal contacts in a mold and comprising a plurality of spaced metal studs tapering toward the surface of the wall and refractory material embedding the studs and covering the ends thereof at the surface of the wall.

3. A wall with which the molten metal contacts in a mold and comprising a plurality of spaced metal studs tapering toward the surface of the wall and refractory material embedding the studs and forming the major part of the surface of the wall with the ends of the studs exposed therein.

4. A metal mold having a mold cavity therein, a wall of the mold cavity being recessed to provide a plurality of studs and the recess being filled with refractory material.

5. A metal mold having a mold cavity therein, a wall of the mold cavity being recessed to provide a plurality of studs disposed normally to the surface of the wall,

and the recess being filled with refractory material to embed the studs.

6. A metal mold having a mold cavity therein, a wall of the mold cavity being recessed to provide a plurality of studs, and the recess being filled with refractory material which embeds the studs, the mold having openings extending therethrough and communicating with the recess to permit the introduction of the refractory material into the recess through said openings.

7. A metal mold having a mold cavity therein, a wall of the mold cavity being composed of refractory material with metal studs distributed throughout the body thereof.

8. A metal mold having a mold cavity therein, a wall of the mold cavity being recessed to provide a pluralty of studs and having projections spaced from said studs, the recess being filled with refractory material which embeds the studs and the projections.

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