Feb. 23, 1943. F. J. MORAVECKY 2,311,680

MOLD FOR CASTING THIN-WALLED RECEPTACLES

Filed April 3, 1942 2 Sheets-Sheet 1

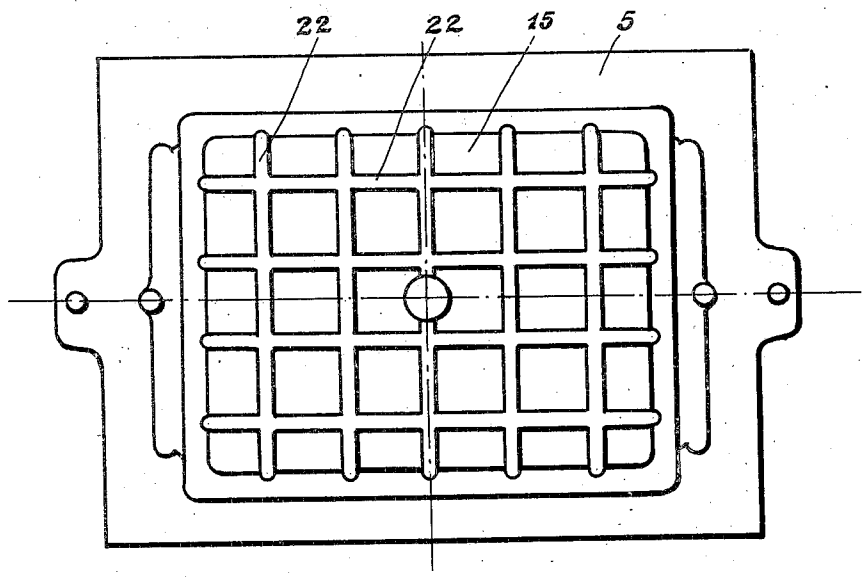


Fig. 1

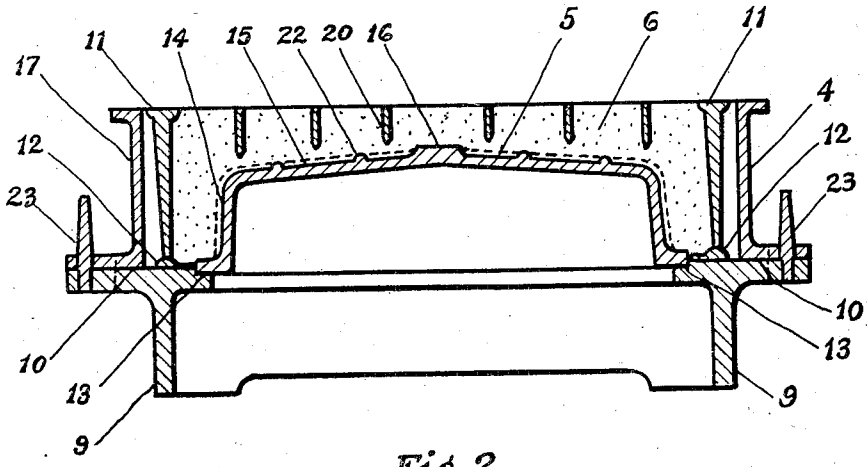


Fig. 2

INVENTOR
Frank J. Moravecky
BY Brown, Critchlow & Flick
his ATTORNEYS

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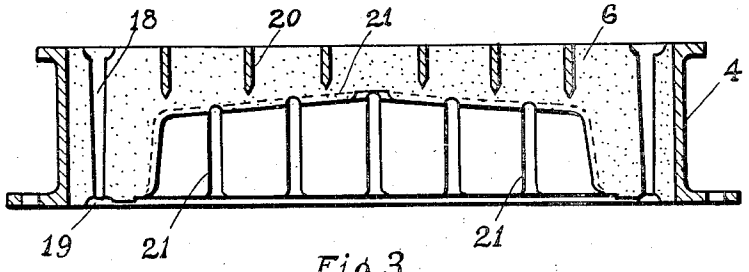


Fig 3

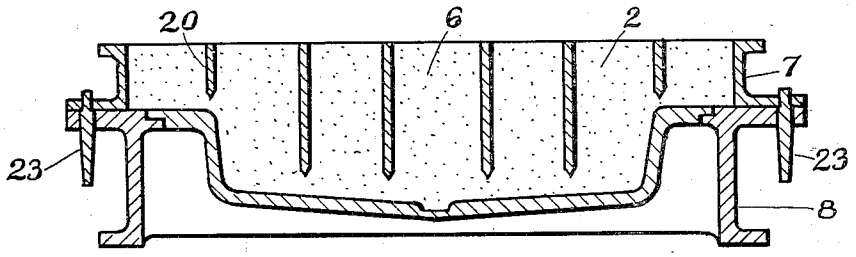


Fig 4

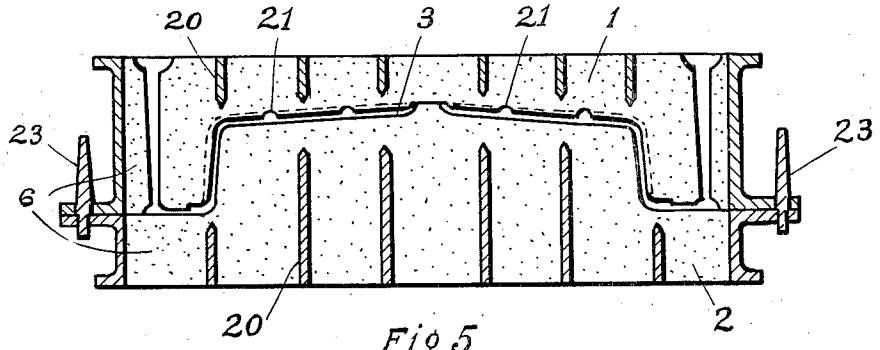


Fig 5

INVENTOR
Frank J. Moravecky
BY
Brown, Critchlow & Flick
his ATTORNEYS

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2,311,680

UNITED STATES PATENT OFFICE

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MOLD FOR CASTING THIN-WALLED RECEPTACLES

Frank J. Moravecky, Beaver Falls, Pa.

Application April 3, 1942, Serial No. 437,470

4 Claims. (Cl. 22—129)

This invention relates to the making of castings from molten metal, particularly iron. It is among the objects of the invention to permit a considerable saving in metal used in casting by providing a mold in which an exceptionally light, thin-walled casting can be cast, which nevertheless has the strength of heavier castings.

The difficulty heretofore experienced in casting thin-walled articles has been due entirely to the fact that, since an exceptionally thin mold cavity was required, the molten metal poured therein chilled rapidly and solidified, thereby choking the cavity and prohibiting a complete filling thereof.

To the best of my knowledge in cast iron sanitary ware, such as sinks or tubs, the present limit of thinness, when the iron is poured at the usual casting temperature (approximately 2500° F.), is ¼ inch. It is, of course, true that such a limit is a function of the size and shape of the final casting as well as the ladle temperature of the iron. Larger bath or wash tubs require a larger mold cavity and therefore the metal must fill a greater area. Consequently, their limit of thinness is greater than that of the sink, and is, in so far as I have determined, $\frac{9}{32}$ inch. Thus, I do not intend to limit my invention to castings having a wall thickness of less than ¼ inch, and any casting which, except for the practice of my invention, would have solidified prematurely within the mold cavity is within the scope of my invention.

The mold provided according to this invention has a normal or main wall cavity of flow-limiting thinness, by which I mean of such thinness that molten metal supplied to the cavity will solidify in it before filling the cavity, thereby resulting in a defective or incomplete casting. Wholly to fill the entire main wall cavity without increasing its thickness, the cavity is interrupted throughout its entire extent by vertically disposed channels of free-flow depth, by which I mean of such depth that molten metal will flow from the pouring sprues through the channels and thence to the parts of the main wall cavity furthest removed from the sprues. These channels are spaced from each other at intervals of not more than twice the distance that the metal will flow through the main wall cavity. Thus, metal which flows upwardly through each adjacent pair of channels will spread out laterally from them throughout the entire main wall cavity space between them.

The invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view of a cope pattern used to form the cope portion of the mold; Fig. 2 a vertical section through the cope pattern and its flask; Fig. 3 a vertical section through a cope flask tamped with sand and stripped from the cope pattern; Fig. 4 a view similar to Fig. 2 of a drag pattern and its flask; and Fig. 5 a section through the cope and drag flasks closed and ready to receive the molten metal.

Referring in detail to the above drawings, the mold used for the casting operation comprises the usual two mold sections, namely, cope 1, and a drag 2, which, when closed upon each other leave a mold cavity 3 therebetween. For illustrating the invention the mold cavity 3 is shaped to form a sink and the invention will be described with reference to such ware. The manner of forming the cope and drag is well known to the art and requires only brief description. In order to form the cope, a cope flask 4 is placed over a cope pattern 5 and sand 6 is manually or mechanically tamped into the flask and about the pattern. The flask containing the imprinted sand is then separated from the pattern. The drag is formed in an identical manner by a drag flask 7 and pattern 8. After separating the drag flask and pattern the flask is inverted and accurately aligned with the cope flask to form the completed mold.

The cope pattern, as seen in Fig. 2, comprises a base 9, having a horizontal surface 10 to support the flask 4, sprue gate patterns 11, feed gate patterns 12, and the pattern to imprint the sand with the shape of the final casting comprising a ledge-forming element 13, vertically inclined side walls 14, and wall 15 slightly inclined from the horizontal to form the bottom of the sink. The center of the wall 15 is provided with a circular knob 16 to form the drain of the casting. The cope flask comprises side walls 17 which are flanged at either end. Thus when the flask is placed over the pattern and sand 6 tamped therein a cope is provided which has sprue gates 18, feed gates 19, and the reverse imprint of the casting pattern.

The drag flask and pattern should be clearly understandable from Fig. 4 without detailed verbal description. The drag pattern, of course, must be accurately fashioned with respect to the cope pattern so that the proper mold cavity will be left between the cope and drag when they are closed. Both the cope and the drag flasks may be provided with ribs 20 in order to more firmly support the sand therein. These flasks also are provided with aligned apertures to receive guide

pins 23 which insure an exact relationship between the mold sections. As shown in the drawings these pins may also be used in forming the mold sections.

It is a feature of the present invention that the cope and drag of a mold are so shaped that, when closed upon each other, the mold cavity therebetween is of such thinness that molten metal supplied thereto solidifies before completely filling the mold. In a mold for a sink or a tub such a thickness could be as low as ⅛ inch and normally would not exceed $\frac{3}{32}$ of an inch. In order to permit molten metal to completely fill the cavity the casting-forming portion of the cope is provided with channels 21 which should have a depth of about $\frac{3}{16}$ inch.

In order to form the channels in the cope the cope pattern must be provided with ribs 22. The arrangement of the ribs in the pattern must be predetermined with regard to the size of the casting to be made. Thus, the channels formed by the ribs must be placed closely enough together so that the metal will not solidify while spreading from the channels into the thinner cavity between them. Such determination should be made for each casting but, by way of example, a spacing of six inches between channels is sufficient for larger ware such as tubs, while in casting smaller tubs or sinks the spacing could be eight inches with a maximum of about ten inches. Since there are variables in metals, wall thicknesses, and other casting conditions it should be understood that the above spacings are approximations and not definite limitations.

A particular arrangement for the ribs is shown in Fig. 1 in which the outside surface of the wall 15 of the cope pattern is provided with parallel longitudinal ribs which are intersected by parallel horizontal ribs both of which being continued along the vertically inclined side walls 14 of the cope pattern. The intersecting ribs on wall 15 of the pattern imprints the cope with a plurality of squares bounded by channels so that, when the poured metal solidifies and chokes any further flow through the thin mold cavity, subsequent molten metal can flow in the path afforded by the channels and spread into the unfilled squares between them from any one or all of the channels forming the squares. The ribs on the vertical side wall 14 of the pattern imprint channels in the cope which facilitate and speed the rising of the metal in the mold cavity as well as providing pathways for molten metal to spread beyond any metal which may have solidified in the narrow cavity. It should be understood that this particular arrangement is merely preferred and that other arrangements which suit the purposes of the invention are within its scope.

As should be apparent from the above description the receptacle formed by this mold is a casting having a normal wall thickness as low as ⅛ inch and having ribs on its outside surface which locally increase the wall thickness to approximately $\frac{5}{16}$ inch. These ribs reinforce the casting so that it has sufficient strength to withstand the service conditions to which a heavier casting of ¼ inch thickness throughout is normally subjected. In addition the casting uses considerably less metal than the heavier ¼ inch casting and is therefore much lighter and more economical.

According to the provisions of the patent statutes, I have explained the principle and method of practicing my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appanded claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A mold for casting a thin wall receptacle or like structure from molten metal, the mold being provided with a main wall cavity of flow-limiting thinness, such cavity being interrupted by vertically disposed channels of free-flowing depth throughout their entire extent and spaced from each other at intervals of not more than twice the flowing distance of metal through the main wall cavity, and a pouring sprue communicating with the lower ends of said channels.

2. A mold for casting a thin wall receptacle or like structure from molten metal, the mold being provided with a main wall cavity of flow-limiting thinness, such cavity being interrupted by vertically disposed channels of free-flowing depth throughout their entire extent and spaced from each other at intervals of not more than about ten inches, and a pouring sprue communicating with the lower ends of said channels.

3. A mold for casting from molten metal a receptacle or like structure having a main wall of not more than about ⅛ inch thickness, the mold being provided with a main wall cavity of not more than about ⅛ inch thickness, such cavity being interrupted by vertically disposed channels of free-flowing depth throughout their entire extent and spaced from each other at intervals of about not more than twice the flowing distance of metal through the main wall cavity and a pouring sprue communicating with the lower ends of said channels.

4. A mold for casting from molten metal a receptacle or like structure having a main wall of about ⅛ inch thickness, the mold being provided with a main wall cavity of about ⅛ inch thickness, such cavity being interrupted by vertically disposed channels about $\frac{3}{16}$ inch in depth, said channels being spaced from each other at intervals of not more than about ten inches, and a pouring sprue communicating with the lower ends of said channel.

FRANK J. MORAVECKY.