United States Patent

[11] 3,544,058

[72] Inventor **Gordon R. Lohman**
Glen Ellyn, Illinois

[21] Appl. No. **698,448**
[22] Filed **Jan. 17, 1968**
[45] Patented **Dec. 1, 1970**

[73] Assignee **AMSTED Industries Incorporated**
Chicago, Illinois
a corporation of Delaware

[54] **MOLDS**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **249/158,** 164/323, 164/335, 249/79, 249/111, 249/155
[51] **Int. Cl.** **B28b 7/06**
[50] **Field of Search** 249/174, 79, 111, 167, 155, 158, 82, 163; 164/353, 280

[56] **References Cited**

UNITED STATES PATENTS

2,106,614	1/1938	Lindner	249/82
2,428,658	10/1947	Falk	249/82
3,125,786	3/1964	Savage	164/280
3,203,055	8/1965	Bungeroth	249/111X
3,340,926	9/1967	Sylvester	164/323

Primary Examiner—J. Spencer Overholser
Assistant Examiner—Ben D. Tobor
Attorney—Walter L. Schlegel, Jr. and Russell W. Pyle

ABSTRACT: In conjunction with a slab mold including spaced side blocks and top, bottom and end blocks engaged between the side blocks to define a casting cavity, an improved metallic bottom block is provided with a plurality of spaced transverse slits. One end of the bottom block is anchored to its supporting structure while the remainder is prevented from vertical warpage and yet allowed to expand longitudinally by means of rollers associated with the bottom block held down by rails secured to the support structure.

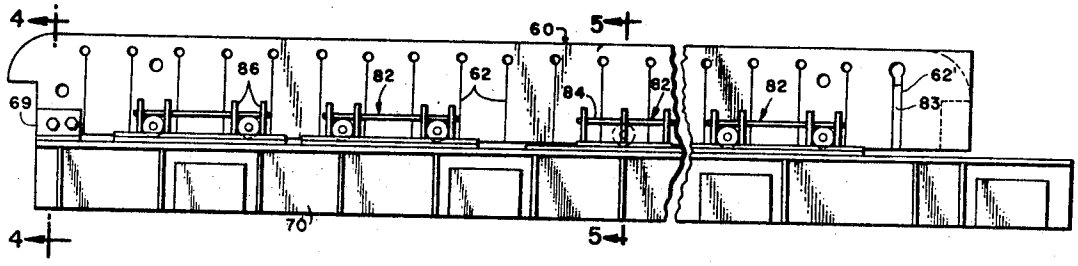


FIG. 1

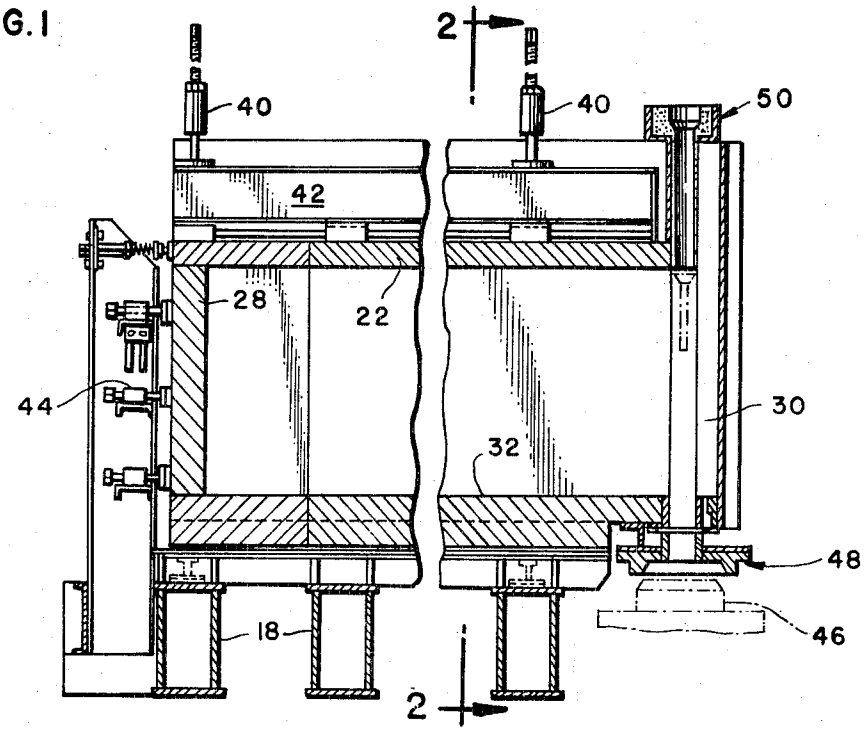
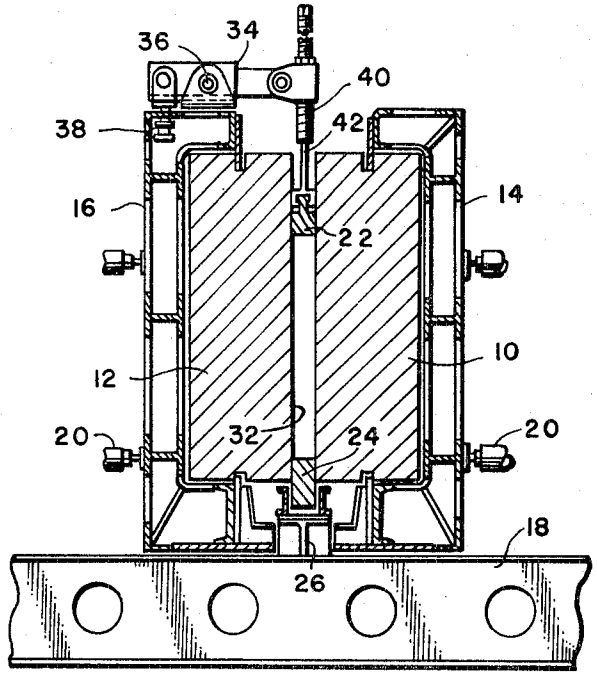


FIG. 2



INVENTOR.
GORDON R. LOHMAN
BY Russell O. Pyle
Wm. C. F. Schlegel, Jr.
ATT'YS

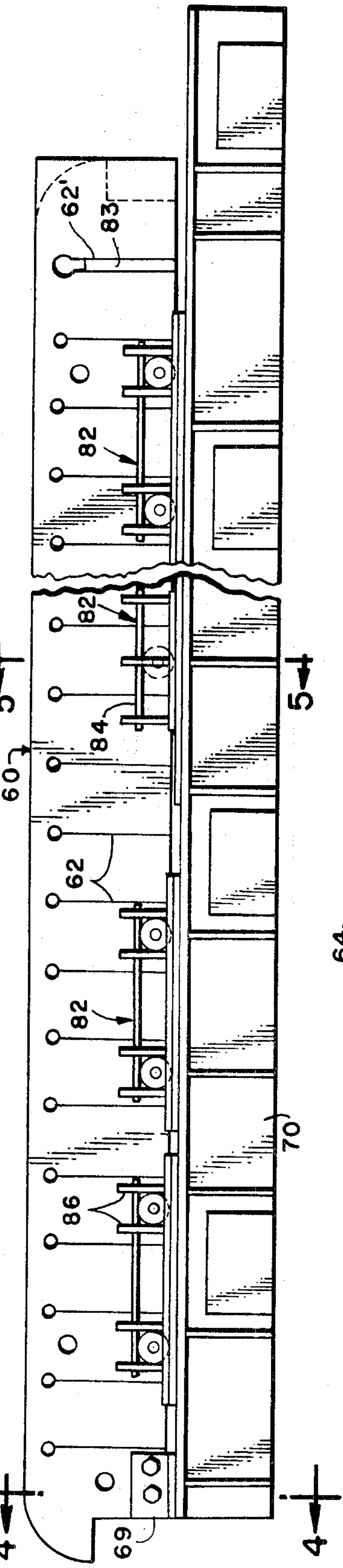


FIG. 3

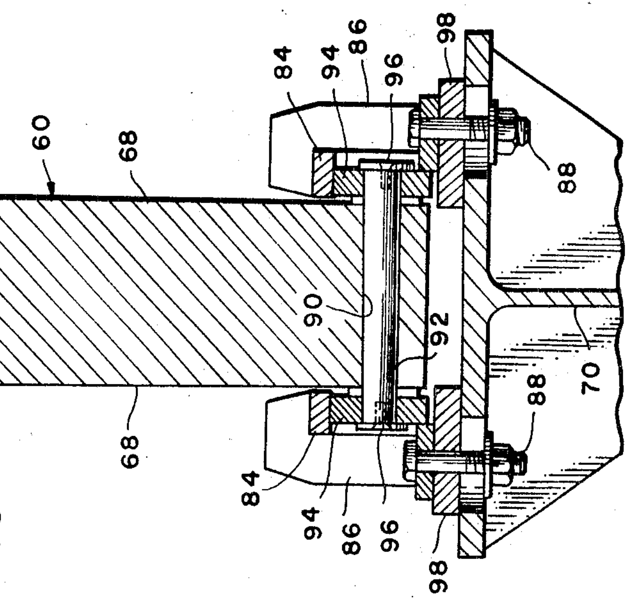


FIG. 5

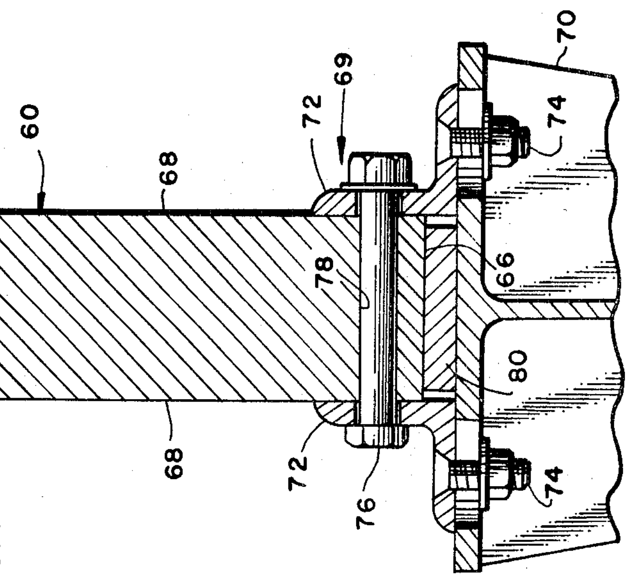


FIG. 4

INVENTOR.
GORDON R. LOHMAN
BY Russell W. Pyle
Walter L. Schlegel, Jr.
ATT'YS

MOLDS

This invention relates to mold constructions and more particularly to a new and improved mold part for use in connection with a slab mold.

In the Sylvester U.S. Pat. No. 3,340,926 a basic mold structure, particularly suitable for casting slabs of various sizes, is described. The mold structure therein described includes a pair of graphite side blocks and top, bottom and end graphite blocks interengaged between the side blocks to define a casting cavity.

One of the difficulties encountered in the use of such molds is the fragile nature of the graphite blocks, particularly the bottom block, which may often require replacement because of chipping or breaking. Also, since graphite bottom blocks are made up from segments, considerable effort must be expended to insure a substantially flat, continuous and level casting surface.

Metallic bottom blocks, composed of materials such as cast iron or steel, have been proposed in answer to the problems stated above. The use of metallic blocks, however, creates the additional difficulty of thermal distortion. Since one portion of the bottom block is exposed to the molten metal while the other portion remains relatively cool, the resulting unequal thermal expansion has been found to cause the metallic bottom block to bow up at its ends or middle, thereby causing hot tears or other defects in the casting.

Accordingly, an object of this invention is to provide an improved bottom block for use in conjunction with the mold described above, which is unsegmented, relatively flexible, and is capable of remaining flat during successive casting operations.

Other objects will appear in the following description and claims, taken in connection with the accompanying drawings, wherein:

FIG. 1 is a fragmentary side sectional of the mold in which the novel bottom block may be used;

FIG. 2 is a transverse cross-sectional view through section line 2–2 of FIG. 1;

FIG. 3 is a detailed elevational view of a bottom block that incorporates the features of the presently described invention;

FIG. 4 is a cross-sectional view taken through section line 4–4 of FIG. 3; and

FIG. 5 is a cross-sectional view taken through section line 5–5 of FIG. 3.

With more particular reference to the drawings, FIGS. 1 and 2 show an adjustable slab mold, including opposed side blocks 10 and 12, mounted in respective flasks 14 and 16 and supported upon suitable framework 18. Hydraulic or other suitable devices 20 are provided for moving the side blocks toward and away from each other.

A plurality of inner blocks are interengaged between the side blocks 10 and 12 and include a top block 22, a bottom block 24 supported on a beam 26, and end blocks 28 and 30, which together define a casting cavity 32. The height of the casting cavity 32 may be varied by raising or lowering the top block 22. An arm 34 fulcrumed at 36 on one of the flasks 16, with one end connected to a power device 38 and the other end connected to a rod 40 and beam 42 holding the top block 22, may serve this purpose. The length of the casting cavity 32 is also adjustable by means of suitable power devices 44 for urging one end block 28 toward and away from the other end block 30.

In the use of the mold structure herein described, molten metal is introduced under pressure from a pouring tube 46 upwardly through an ingate 48 and into the casting cavity 32. A suitable riser construction 50 communicates with the casting cavity 32 to feed shrinkage which would otherwise develop in the casting during cooling.

The present invention resides in an improved bottom block structure and the manner in which the bottom block is mounted on its supporting structure, as shown in FIGS. 3, 4, and 5. The bottom block indicated generally at 60, is an elongated unitary member and is composed of a metal such as cast iron or steel. The bottom block 60 has a plurality of slots 62

extending transversely therethrough from the bottom upwardly, with the top or cavity-defining surface 64 of the block being substantially flat and continuous. As shown in FIG. 3, the slots 62 are spaced at intervals along substantially the entire length of the block 60 and extend upwardly for more than half but less than the entire height of the block, but preferably in the neighborhood of at least three-fourths of the height.

As shown in FIG. 3, the slots 62 are very narrow, in order to prevent localized humping of the block during the casting operation. In the alternative, as shown at the extreme right-hand portion of FIG. 3, the slots 62' may be made wider and a narrow strip or shim 83 composed of the same material as that of the bottom block may be inserted and secured in the slots by any convenient means, such as by frictional engagement. This latter method is normally preferable, because the cutting of wider slots has been found to be less costly and has found to be the equivalent of using very narrow slots.

As best shown in FIGS. 3 and 4, the bottom block 60 is generally rectangular in shape and cross section and includes a top or casting surface 64, a bottom surface 66 and two side surfaces 68, said bottom block resting on a fixed support beam 70 along its entire length.

As shown in FIGS. 3 and 4, means 69 are provided to anchor one end of the bottom block 60 to the fixed support beam 70, preferably at that end of the mold assembly where the ingate 48 (FIG. 1) is located. As shown, such means 69, may comprise a pair of opposed L-shaped brackets 72 mounted by bolts 74 on the support beam 70, with one or more bolts 76 passing through an aperture 78 in the bottom block 60 and secured between the vertical arms of said brackets. A spacer pad 80 is provided between the bottom block 60 and the support beam within that portion of the assembly which is anchored.

As shown in FIGS. 3 and 5, means are provided along the remainder or free end of the bottom block assembly to limit vertical warpage of the bottom block 60 and yet to permit longitudinal thermal expansion from the anchored end thereof during the casting operation. A plurality of guide assemblies, as generally indicated at 82 in FIG. 3, may be provided at intervals along the length of the bottom block 60 and support beam 70. Each of the guide assemblies 82 comprises corresponding parallel rail segments 84 extending longitudinally adjacent both sides 68 of the bottom block 60, said rail segments being spaced from the support beam 70 by a plurality of brackets 86 secured from the support beam by bolts 88. One or more pins 92 are rotatably mounted within a respective transverse aperture 90 in the bottom block 60 intermediate the rail segments 84 and the support beam 70. Nonresilient rollers 94 are secured at both ends of each pin 92 by cap screws 96. Flat spacers 98 are secured between each rail bracket 86 and its respective location on the support beam 70, said spacers extending inwardly beneath the area in which the rollers 94 travel to serve as a lower bearing surface therefor. Sufficient clearance is provided between the rollers 94 and the rail segments 84 and spacers 98 to allow the rollers to travel thereon during thermal expansion of the bottom block 60, thereby limiting vertical warpage because of contact between the rollers and the rail segments.

From the foregoing, it will be understood that the features disclosed in connection with the bottom block may be applied to the other inner blocks, including the end blocks and the top block.

I claim:

1. In conjunction with a mold assembly including opposed side blocks and top, bottom and end blocks interengaged between said side blocks to define a casting cavity, an improvement in the bottom block thereof comprising a unitary elongated member of rectangular cross section, a plurality of spaced transverse slits in said member extending from the lower surface for more than half the height thereof, the upper surface thereof being flat and continuous, a support beam for supporting said member, means for anchoring one end of said member to said support beam, and means for limiting vertical

warpage of as said member while permitting longitudinal expansion thereof.

2. The invention according to claim 1 wherein said last-mentioned means comprises a plurality of assemblies along the length of said member, each of said assemblies comprising a rail segment on both sides of said member and spaced from said support beam, bracket means for securing each of said rails to said support beam, at least one transverse aperture in said member intermediate said rails and said support beam, and a roller secured on each end of said shaft and engageable with a respective rail upon vertical warpage of said member.

3. The invention according to claim 1 wherein said spaced transverse slits are filled with a shim substantially frictionally engaged therein, said shim being composed of the same material as that of the bottom block.

4. In an apparatus for casting metal articles including opposed side blocks and a plurality of inner blocks the side surfaces of which are engaged between the side blocks in definition of a casting cavity, the improvement comprising a plurality of spaced slits along the length of at least one of said inner blocks extending between the side surfaces thereof and opening away from said cavity, said block having a casting surface facing toward said cavity, means for supporting said block, means for anchoring said block at one location, means for limiting warpage of the casting surface of said block relative to the casting cavity, and means to permit lengthwise thermal expansion of said block from the location at which said block is anchored.

5. The improvement of claim 4 wherein a plurality of said slits have a shim therein.