Oct. 21, 1969 E. PFENNING 3,473,601

LIQUID-COOLED PLATE MOLD FOR CONTINUOUS CASTING OF HIGH-MELTING METALS

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Fig. 1

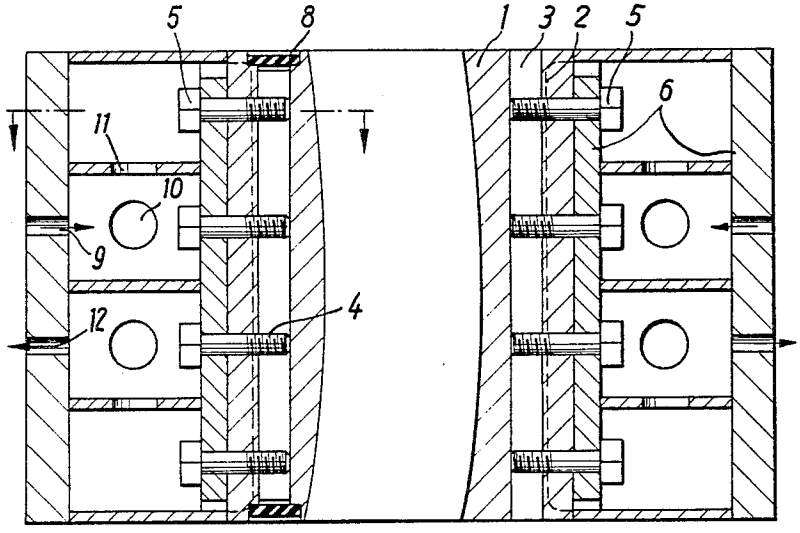
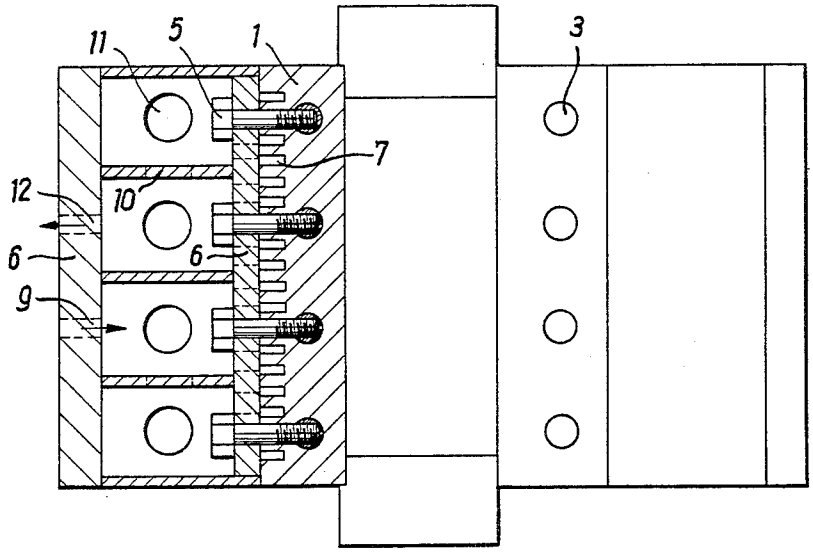


Fig. 2



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LIQUID-COOLED PLATE MOLD FOR CONTINUOUS CASTING OF HIGH-MELTING METALS

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U.S. Cl. 164—283 6 Claims

ABSTRACT OF THE DISCLOSURE

A plate mold for continuous casting of high-melting metals wherein the mold walls are connected with a support by means of bolts. The connections are made by way of tapped bars or rods disposed in the mold walls so that warping of the molds is prevented and the bolts do not loosen.

The invention relates to plate molds especially for high-melting metals which are continuously cast. Molds used for this purpose are described by E. Herrmann in "Handbuch des Stranggiessens" (Handbook of Continuous Casting), Aluminum-Verlag, Dusseldorf, Germany, 1958, pp. 640–641, and consist of a mold wall, commonly made of copper, a cooling system and a support structure. The mold wall is connected to the support structure by means of bolts which are directly screwed into the copper or other metal plate. During operation, the wall facing the liquid metal to be cast expands to a greater extent than the cold parts of the support structure. This expansion is limited by the bolts. Consequently, high shear stresses occur at the locations at which the bolts are screwed into the plate which lead to plastic deformation of the threads. This, in turn, has the consequences that the bolts are not secure even after short periods of operations and that the mold wall warps so that faults occur in the cast pieces and the working life of the mold is severely limited.

It is the object of the invention to extend the working life of the molds by lessening the shearing forces, prevention of the warping of the mold walls, and secure seating of the bolts.

This is carried into effect by providing bore holes in the mold wall, preferably in the direction of the cast. Round bars with threaded tap holes are inserted in these bore holes, the threads corresponding to those of the fastening bolts. The round bars are of a material which has higher strength characteristics than the metal from which the mold wall is made. For instance, they are made of steel.

In a preferred embodiment, these round bars are disposed rotatably in the mold wall. However, they also may be welded to the wall at their upper and lower ends. Both embodiments attain a secure seat of the bolts and preclude warping of the mold wall. Moreover, the use of these tapped bars has the effect that, upon expansion of the plate, the bars twist and the forces generated do not act on the screwed connection.

The invention now will be more fully explained with reference to the accompanying drawing. However, it should be understood that this is given merely by way of illustration, and not of limitation, and that it is intended to cover all variations and modifications which do not depart from the spirit and the scope of the invention as hereinafter claimed.

In the drawing,

FIG. 1 is a curved mold, shown as a side elevation in section;

FIG. 2 is a plan view, partly in section, of the mold shown in FIG. 1.

Referring now to these drawings, mold wall 1 has a plurality of bore holes 2, in parallel to the wall facing the cooling liquid. Round bars 3 are inserted rotatably and have a diameter corresponding to the bore holes 2. The bore holes are closed by covers or caps 8 which are soldered watertight to mold wall 1 (left side of FIG. 1).

According to another embodiment, the round bars 3 are welded to mold wall 1 at their upper and lower ends (right side of FIG. 1).

The round bars 3 have internal threads 4 into which the bolts 5 are screwed, and these bolts 5 connect the mold wall 1 with the support structure 6. Water or other coolant is introduced into the mold in the direction shown by the arrows. The coolant enters through opening 9, flows through the openings 10 and 11, is conducted through the channels 7 within mold wall 1, and leaves through the opening 12.

The invention is applicable to straight and curved molds.

I claim as my invention:

1. In a plate mold for continuous casting of high-melting metals having a mold wall, cooling means and a support structure, said wall and structure being connected by bolts, the improvement which comprises a plurality of tapped round bars inserted in said wall, the taps being threaded to accommodate said bolts, and the connection being made by way of said bars.

2. The mold as defined in claim 1, wherein said round bars are of a metal having higher strength characteristics than said mold wall.

3. The mold as defined in claim 2, wherein said mold wall is of copper, and said round bars are of steel.

4. The mold as defined in claim 1, wherein said round bars are rigidly connected to said mold wall.

5. The mold as defined in claim 1, wherein said round bars are disposed rotatably in said mold wall.

6. A plate mold for continuous casting of high-melting metals comprising a copper mold wall; a support structure; a plurality of tapped round steel bars disposed within said mold wall; a bolt assigned to each said bar having a thread corresponding to the tap and connecting said mold wall to said support structure; and cooling means disposed within said mold.

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