(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 844 037 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.05.1998 Bulletin 1998/22

(51) Int. Cl.[6]: **B22C 21/08**, B22C 21/12

(21) Application number: **97120488.8**

(22) Date of filing: **21.11.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **22.11.1996 JP 327703/96**

(71) Applicant: **SINTOKOGIO, LTD.**
Nagoya-shi, Aichi Prefecture (JP)

(72) Inventor: **Naito, Masamoto**
Toyohashi-shi, Aichi Prefecture (JP)

(74) Representative:
Behrens, Dieter, Dr.-Ing.
Wuesthoff & Wuesthoff
Patent- und Rechtsanwälte
Schweigerstrasse 2
81541 München (DE)

(54) Apparatus and method for clamping cope and drag

(57) An apparatus (10) and a method for clamping a cope (8; 13) and a drag (7; 12) are disclosed. The apparatus prevents the cope from floating in molten metal when it poured in the mold space formed by the cope and drag and prevents their deformation due to the expansion of the molten metal when it solidifies. The apparatus includes a grid frame (4) extending in a horizontal plane for covering the top of the cope. The grid frame (4) has a plurality of openings (3, 3) and connecting members (5,5) mounted at opposing sides of it for engaging with engaging members (22; 11A) mounted at the drag side.

EP 0 844 037 A1

Description

Background of the Invention

Field of the Invention

This invention relates to an apparatus and method for clamping a cope and a drag to prevent the cope from floating in molten metal when it is poured in the mold space formed by the cope and drag and to prevent their deformation due to the expansion of the molten metal when it solidifies.

Description of the Prior Art

To prevent floating of a cope or deformation of a mold, conventionally the following processes have been carried out:

1) putting a weight on a cope which is placed on a drag,
2) forming a cope in an upper flask which weighs a lot, and
3) clamping, by clamps etc., an upper and a lower flask which contain a cope and a drag respectively.

In the first process a weight must be notched or formed with an opening for a sprue. Thus it cannot be used for copes that have respective sprues located at different parts. Further, the process limits the methods of molding. Still further, since the process makes the weight unbalanced, the weight may float at one side. When a heavy weight is used, it causes a push up in a mold (cope or drag). Thus a weight which weighs less than is required is used. As a result, floating of a cope or deformation of a mold occurs.

In the second process, where a heavy upper flask is used to form a cope in it, the weight of the flask works only on the peripheral part of the cope. Thus it does not work on the central part of it, allowing a deformation of the part. This will produce a defective mold.

In the third process, where an upper and lower flask are connected, the central part of a cope deforms as in the second process.

The purpose of this invention is to provide an apparatus and a method for clamping a cope and a drag to allow a sprue to be formed at a desired part and to prevent the cope from floating in molten metal.

Summary of the Invention

The method of the present invention for clamping a cope and a drag includes the steps of placing a cope on a drag, covering the top of the cope by a grid frame extending in a horizontal plane, the grid frame having a plurality of openings formed by the grid and having connecting means, and connecting the cope and drag by engaging the connecting means with engaging means which are mounted at the drag side.

The apparatus of the present invention for clamping a cope and a drag includes a grid flame extending in a horizontal plane. The grid frame has a plurality of openings formed therein by the grid. A sprue leading to a cope may be located at any desired opening. The grid frame also has connecting means at opposing sides thereof. The connecting means engage with engaging means mounted on the drag side. The engaging means may be mounted on opposing sides of a flask in which a drag is formed or on a plate or floor which supports the drag. The engaging means may be pins, while the connecting means may be members pivotally mounted on the grid frame and having hook portions at the lower end thereof for engaging with the pins.

Brief Description of the Drawings

Fig. 1 is a plan view of the apparatus of an embodiment of this invention. (In the drawing, a mold and mold-associated members are shown by imaginary lines.)

Fig. 2 is a side view of the apparatus shown in Fig. 1.

Fig. 3 is a side view taken along line III - III in Fig. 1 to explain the first embodiment of the method of the invention. (In the drawing, molds and mold-associated members are shown in actual lines.)

Fig. 4 is a side view of the apparatus, molds, and mold-asssociated members to explain a second embodiment of the method of this invention.

Description of the Preferred Embodiments

In Figs. 1 and 2 an apparatus 10 of this invention for clamping a cope and a drag is shown. The apparatus 10 has a grid frame 4 comprised of an outer frame 1 in the shape of a window frame and a cruciform member 2 securely attached to the outer frame 1. The outer frame 1 and cruciform member 2 define a plurality of openings 3 in the grid frame 4.

A pair of connecting members 5, 5 are pivotally suspended from opposing sides of the grid frame 4 such that they rotate about pivots 6, 6 in the directions shown by the double arrow.

By referring to Fig. 3 a first embodiment of the method of the invention for clamping a cope 8 and a drag 7 is now explained. A lower flask 20, which contains the drag 7, is placed on a floor or a plate 18. An upper flask 23, which contains the cope 8, is placed on the lower flask 20 so that the cope 8 mates the drag 7. The apparatus 10, shown in Figs. 1 and 2, is then put on the upper flask 23 so that the grid frame 4 covers the top of the cope 8, which is contained in the upper flask 23. Before the top of the cope 8 is covered with the grid frame 4, its level is higher (by about 3 mm) than the top of the upper flask 23. However, after the top of the cope 8 is covered with the grid frame 4, and after the grid

frame 4 is engaged with the lower flask 20 as explained below, the top becomes level with the top of the upper flask 23.

Both the upper and lower flasks 23, 20 are made of cast iron, and both are integrally formed with respective ribs 21, which run horizontally around the flask walls. The upper and lower flasks 23, 20 may be connected by connecting their ribs 21, 21 by clamps in a conventional way. Engaging members or horizontally extending pins or protuberances 22, 22 are formed at the drag side, e.g., in the embodiment shown in the drawing, on the rib 21 of the lower flask 20 at its opposing sides (only one pin 22 is shown). Alternatively, the horizontal pins 22, 22 may be mounted on the floor or plate 18 through upright members (not shown).

The connecting members 5, 5 are pushed, for example, by a pusher (not shown), so that they engage with the pins 22, 22. Thus the cope and drag are connected.

Since a plurality of openings 3, 3 are formed in the grid frame 4, a sprue is selectively formed at a desired position 15 or 15A of the cope that is located at one opening. Further, when the cope floats or deforms, its top is held down by the grid frame 4, and therefore the floating or deformation is prevented.

In the embodiment shown in Figs. 1-3 the engaging members 5, 5 are mounted on the frame 4 through pivots 6, 6. Alternatively, the engaging members 5, 5 may be separated from the pivots 6, 6 or grid frame 4, and they may be engaged with both the pivots 6, 6 and pins 22, 22 to engage the cope with the drag.

With reference to Fig. 4, a second embodiment of the method of the invention is carried out by using the apparatus 10. In this embodiment neither a cope 13 nor a drag 12 is in a flask. First, the drag 12 is placed on a plate 11, which has engaging members or pins 11A. The cope 13 is placed on the drag 12 to mate it. A jacket 14 is then put on the sides of the cope and the drag. The jacket 14 prevents them from causing each other to shift. The jacket may be eliminated when such shifting cannot occur. The apparatus 10 (i.e., the grid frame 4) is then placed on the top of the cope 13. The connecting members 5, 5 are then moved to engage with the pins 11A. Thus the cope 13 and drag 12 are connected.

Claims

1. A method of clamping a cope and a drag comprising the steps of:

   a) placing a cope (8; 13) on a drag (7; 12),
   b) covering the top of said cope by a grid frame (4) extending in a horizontal plane, said frame having a plurality of openings (3, 3) formed therein by the grid and having connecting means (5, 5); and
   c) connecting said cope (8; 13) and drag (7; 12) by engaging said connecting means (5, 5) with engaging means (22; 11A) which are mounted on corresponding portions of opposing sides of said drag at the drag side.

2. The method of claim 1, wherein said engaging means (22) are mounted on opposing sides of a flask (20) which contains said drag (7) for engaging with said connecting means (5, 5).

3. The method of claim 1, wherein said engaging means (22; 11A) are mounted on a floor or plate (18; 11) which supports said drag (7; 12).

4. The method of claim 1, wherein no flask is provided for the cope or drag, said method further comprising a step of covering the sides of said cope and drag by a jacket (14) before the step (a).

5. An apparatus for clamping a cope (8; 13) and a drag (7; 12), comprising a grid frame (4) extending in a horizontal plane for covering the top of said cope, said grid frame (4) having a plurality of openings (3, 3) formed therein by the grid and having at opposing sides thereof connecting means (5,5) for engaging with engaging means (22; 11A) mounted at the drag side.

6. The apparatus of claim 5, wherein said connecting means (5, 5) include members which are rotatably suspended from said grid frame (4) and each of which has a hook portion at the lower end thereof to engage with said engaging means (22; 11A).

FIG. 1

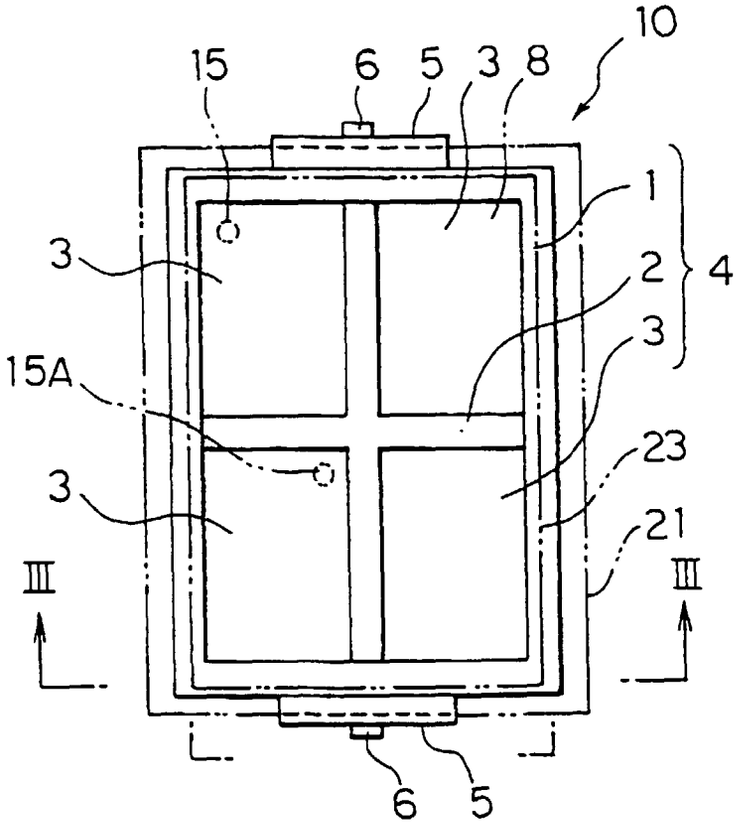


FIG. 2

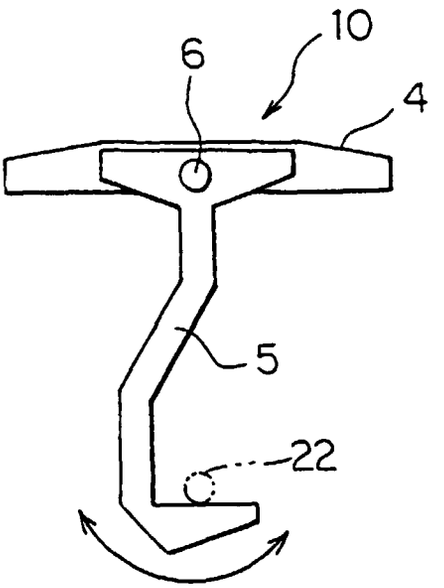


FIG. 3

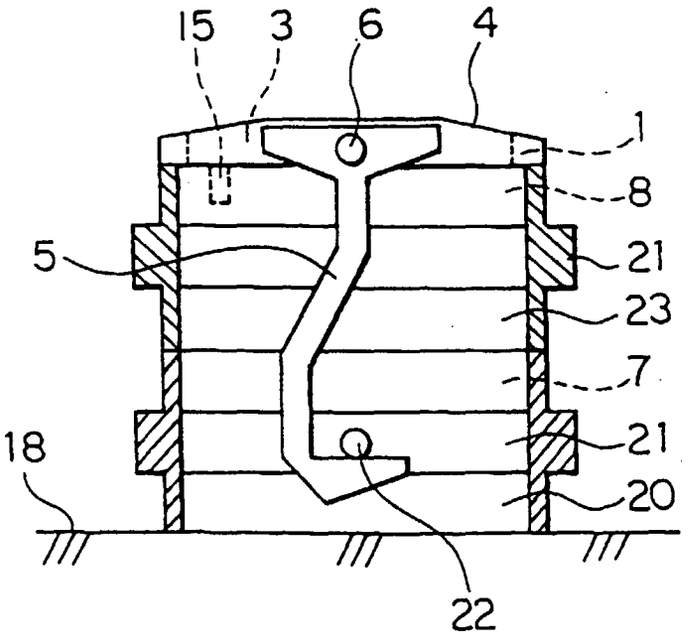
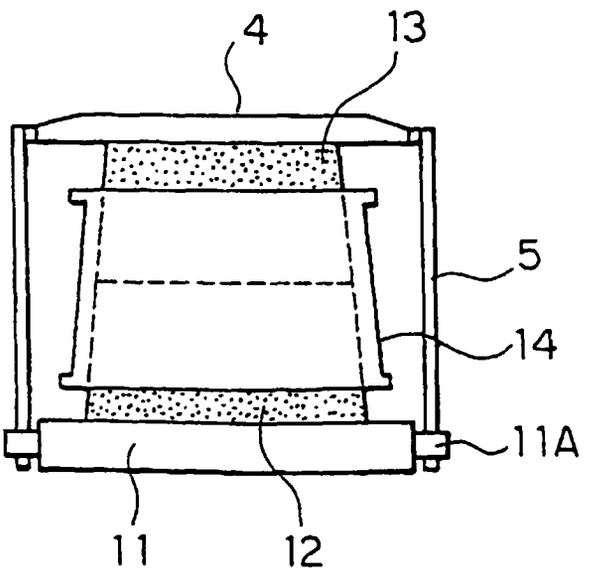


FIG. 4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 12 0488

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB 815 859 A (TIROLER ROHREN- UND METALLWERKE AKTIENGESELLSCHAFT) * figure 7 * ---	1,5	B22C21/08 B22C21/12
A	DE 11 74 944 B (BUDERUS'SCHE EISENWERKE) * figure 2 * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B22C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 February 1998	WOUDENBERG, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)