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

(11) Publication number: **0 198 237**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **86103501.2**

(51) Int. Cl.4: **B22D 41/08**

(22) Date of filing: **14.03.86**

(30) Priority: **20.03.85 GB 8507277**

(43) Date of publication of application:
22.10.86 Bulletin 86/43

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: **GR-STEIN REFRACTORIES LIMITED**
Genefax House Tapton Park Road
Sheffield S10 3FJ(GB)

(72) Inventor: **Forster, James Kenneth**
Kentmere House Market Place
Wolsingham Co. Durham DL13 3AE(GB)
Inventor: **Tucker, Eric George**
22 The Close Shotley Bridge
Consett Co. Durham(GB)

(74) Representative: **Houghton, David et al**
Hulse & Co. Cavendish Buildings West Street
Sheffield, S1 1ZZ(GB)

(54) Refractory component.

(57) In a slide gate valve for a ladle/tundish two refractory members are provided each with an aperture, one fixed and with the aperture in line with an aperture in the bottom of the vessel, and the other slidably mounted to allow the discharge of molten metal from the vessel when the apertures in the refractory members are aligned. Particularly with the bottom slidable member, conventionally it is formed from a refractory plate against which abutts a separate collector nozzle. The object of the invention is to provide an improvement to such a member, which objective is met by a construction comprising a preformed apertured member serving as an exposed plate, and a second member formed as a casting around said apertured member, the second member being formed with an integral nozzle the bore of which is in alignment with the aperture in the said apertured member.

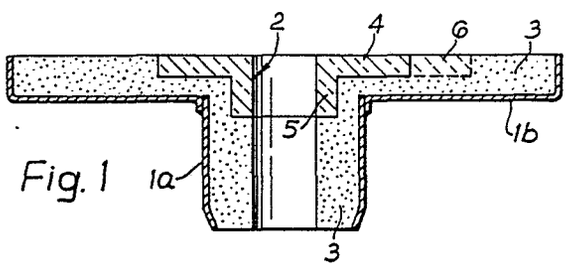

Fig. 1

EP 0 198 237 A1

REFRACTORY COMPONENT

This invention relates to a refractory component of a slide gate valve.

A slide gate valve is a teeming control mechanism for use on a ladle/tundish and essentially comprises two apertured plates, one fixed and in line with an aperture in the bottom of the vessel and the other slidably mounted beneath the fixed plate, the metal being discharged when the two apertures are aligned with one another. The plates are made from a refractory material and conventionally each abut other refractory nozzles, an upper nozzle mounted above the stationary plate and a lower or collector nozzle mounted below the sliding plate.

This invention is directed towards an improvement in this design by providing a composite plate/nozzle component.

According to the present invention, a composite plate/nozzle component for use in a slide gate valve comprises a pre-formed apertured member serving as an exposed plate, and a second member formed as an casting around said apertured member, the second member being formed with an integral nozzle the bore of which is in alignment with the aperture in the said apertured member.

By forming the second member as a casting around the pre-formed member, and by providing the second member with an integral nozzle, what is in effect a one-piece construction is provided as distinct from the two components (plate and separate nozzle) conventionally used.

Preferably, the composite component is adopted for the sliding plate/collector nozzle in the valve assembly and the mould for the casting may be constituted by a metal cladding which is then retained in situ for use in the valve itself.

The pre-formed apertured member, which constitutes an insert, may be in the form of a ring with or without a stem (to provide additional protection along the bore) and the ring may be truly annular or, preferably, elongate with its major axis lying along the direction of movement of the sliding plate. Indeed the most beneficial structure may be an insert with an elongate head and an annular stem, and the head and/or the stem may be stepped or tapered.

The insert may comprise a shaped, e.g. moulded, and fired high integrity refractory, e.g. zircon magnesia or high purity alumina, possibly pitch impregnated, or a stoved resin bonded body whereas the castable may be a different, perhaps lower-grade, mix e.g. a refractory concrete.

The method adopted in making the component may simply comprise mounting the metal casing within a jig having a central mandrel with the 'plate' uppermost and pouring the castable into the casing whilst it is vibrated to ensure compaction. The preformed insert can then be located on the mandrel and pressed into the mix to a degree such that it lies in alignment with the top of the plate, or slightly proud, prior to curing and subsequent grinding. Alternatively the insert may be placed around a mandrel upstanding from a vibratable moulding table and the casing may then be placed over this and the castable poured in over the insert -the curing and grinding being effected as before.

In order to cater for expansion of the insert during use of the valve a parting medium, e.g. a mortar, may be spread over those surfaces thereof around which the castable will make contact.

In order that the invention may be fully understood, two embodiments thereof will now be described, by way of example, with reference to the accompanying drawing in which:-

Figure 1 is a sectional side elevation of the component with one form of insert;

Figure 2 is a sectional side elevation of the component with a different form of insert; and

Figure 3 is a plan view of Figure 2.

Referring now to Figure 1 a metal mould comprises a tubular circular-section part 1(a) and secured to it e.g., by welding, an elongate housing 1-(b): Disposed within the mould is an apertured refractory insert 2 which is cast in position by a refractory castable mix 3. The insert has an elongate head 4, with or without an annular stem 5, and the aperture can be centrally located with respect to the major axis, or, as indicated, be offset along the major axis, the part 6 of the head serving in use as an additional high integrity surface for closing off the valve.

Figure 2 and Figure 3 illustrate another form of this component in so far as the insert within the mould 1(a) and 1(b) is differently shaped. In particular the head 7 is stepped around its perimeter to give additional keying within the castable 3 and the stem 8 is tapered for strength and durability.

In manufacturing these components, with reference to Figure 1, the mould is placed in the attitude shown within a jig on to a vibratable table with and upstanding mandrel for defining the aperture. The castable mix is then poured into the mould and th pre-fired insert 2 is pressed downwardly into this mix to the level shown and as previously described. With reference to Figure 2

the insert is initially placed over the mandrel upstanding from the vibratable table and the mould is then placed 'face down' over the insert in the attitude shown; the castable mix is then poured into the mould. In this latter proposal the table may be recessed slightly to accommodate the insert such that it stands slightly proud of the castable surround; this aids grinding at the next stage.

The insert, which may be pitch impregnated/stoved and shot blasted is preferably free from any surface carbon in powder form and an appropriate cement adhesive, may be applied to its exposed surfaces and allowed to dry before the application of the cement mortar covering.

The castable may have a moisture content of between say 5% and 10%.

Although the invention has been described with reference to the particular examples illustrated, it is to be understood that various modifications may be made without departing from the scope of this invention. For example the inset may be differently dimensioned or shaped, e.g., it might simply be annular in section, with or without a stem, and the head may be tapered. The head of the mould may be raised slightly with a split metal band which may subsequently be removed to enable a degree of surface grinding to be effected without diminishing the head thickness of the metal mould itself.

Although the invention has been described and illustrated with reference to new components, with this design worn inserts could readily be replaced within the original cast refractory surround, for the purpose of repair.

Claims

1. A composite plate/nozzle component for use in a slide gate valve characterised by a pre-formed apertured member (2) serving as an exposed plate, and a second member (3) formed as a casting around said apertured member, the second member being formed with an integral nozzle the bore of which is in alignment with the aperture in the said apertured member.

2. A composite component as in Claim 1, characterised in that the component constitutes a slide plate and integral collector nozzle for a slide gate valve.

3. A composite component as in Claim 1 or Claim 2, characterised in that the apertured member (2) is an annular ring.

4. A composite component as in Claim 1 or Claim 2, characterised in that the apertured member (2) is elongate and the aperture located centrally of the major axis of the member.

5. A composite component as in Claim 1 or Claim 3, characterised in that the apertured member (2) is elongate, and the aperture offset along the major axis of the member.

6. A composite component as in any one of Claims 1 to 5, characterised in that the apertured member is formed with a stem (5) the bore of which is an extension of the aperture.

7. A composite component as in Claim 6, characterised in that the outer periphery of the head of the apertured member and/or the stem is stepped or tapered.

8. A composite component as in any of Claims 1 to 7, characterised in that the component is provided with a metal casing (1a, 1b).

9. A method of making a composite component as in any of Claims 1 to 8, characterised by mounting a metal casing (1a , 1b) within a jig having a central mandrel with the "plate" uppermost, pouring a castable refractory (3) into the casing, vibrating the casing to ensure compaction of the castable locating a pre-formed insert on the mandrel and pressing the insert (2) into the mix to a degree such that it lies in substantial alignment with the top of the plate.

10. A method of making a composite component in any of Claims 1 to 8, characterised by locating a pre-formed insert (2) around a mandrel upstanding from a vibrating table placing a casing (1a, 1b) over the insert and pouring a castable refractory (3) into the casing and around the insert and the mandrel.

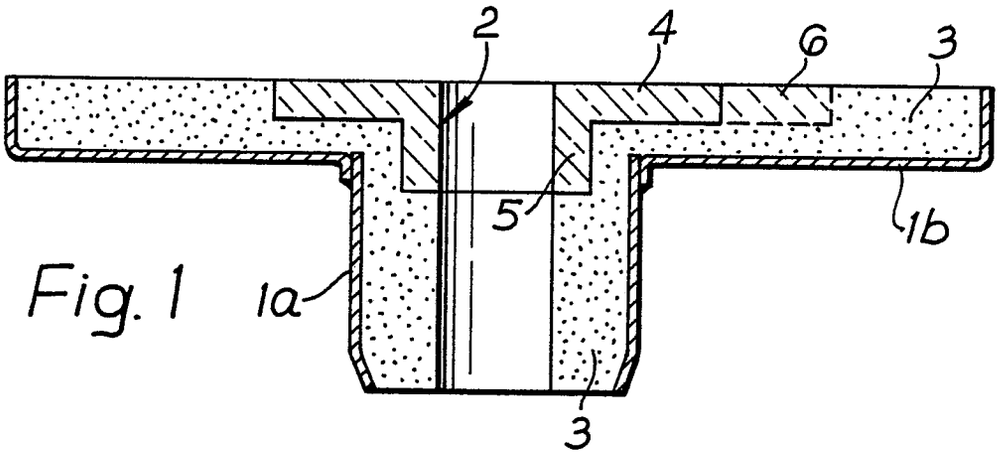

Fig. 1

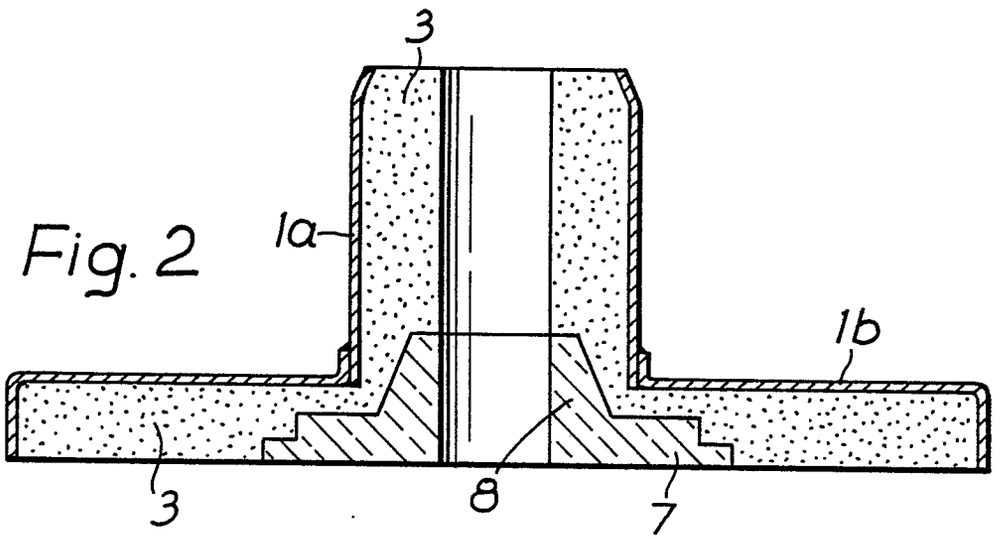

Fig. 2

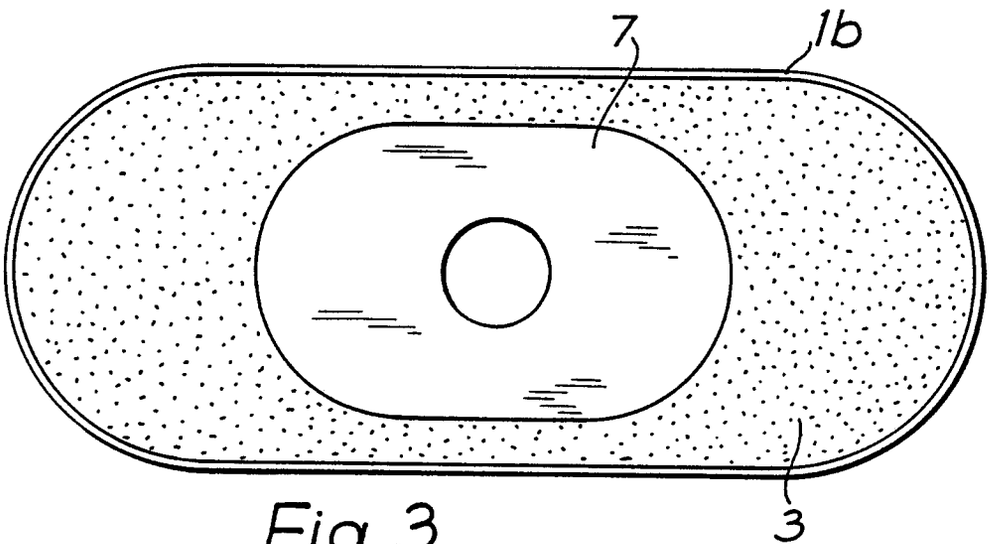

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 86103501.2

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE - A1 - 2 727 742 (DIDIER) * Totality; especially page 5, line 16 - page 6, line 10 *	1-3,8-10	B 22 D 41/08
X	EP - A1 - 0 080 248 (BRITISH STEEL CORP.) * Totality *	1,2,4,6-8	
X	DE - A - 1 935 424 (INTERSTOP) * Claim 3; fig. 1 *	1,2,5-7	
A	AT - B - 304 782 (DIDIER)		
A	DE - A1 - 2 844 951 (GENERAL RE-FRACTORIES)		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 22 D 41/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	27-05-1986	LIDL

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