Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2047021 C 2001/10/02

(11)(21) 2 047 021

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 1991/07/15

(41) Mise à la disp. pub./Open to Public Insp.: 1992/02/03

(45) Date de délivrance/Issue Date: 2001/10/02

(30) Priorité/Priority: 1990/08/02 (P 40 24 520.9) DE

(51) Cl.Int.^{5}/Int.Cl.^{5} F27D 3/14

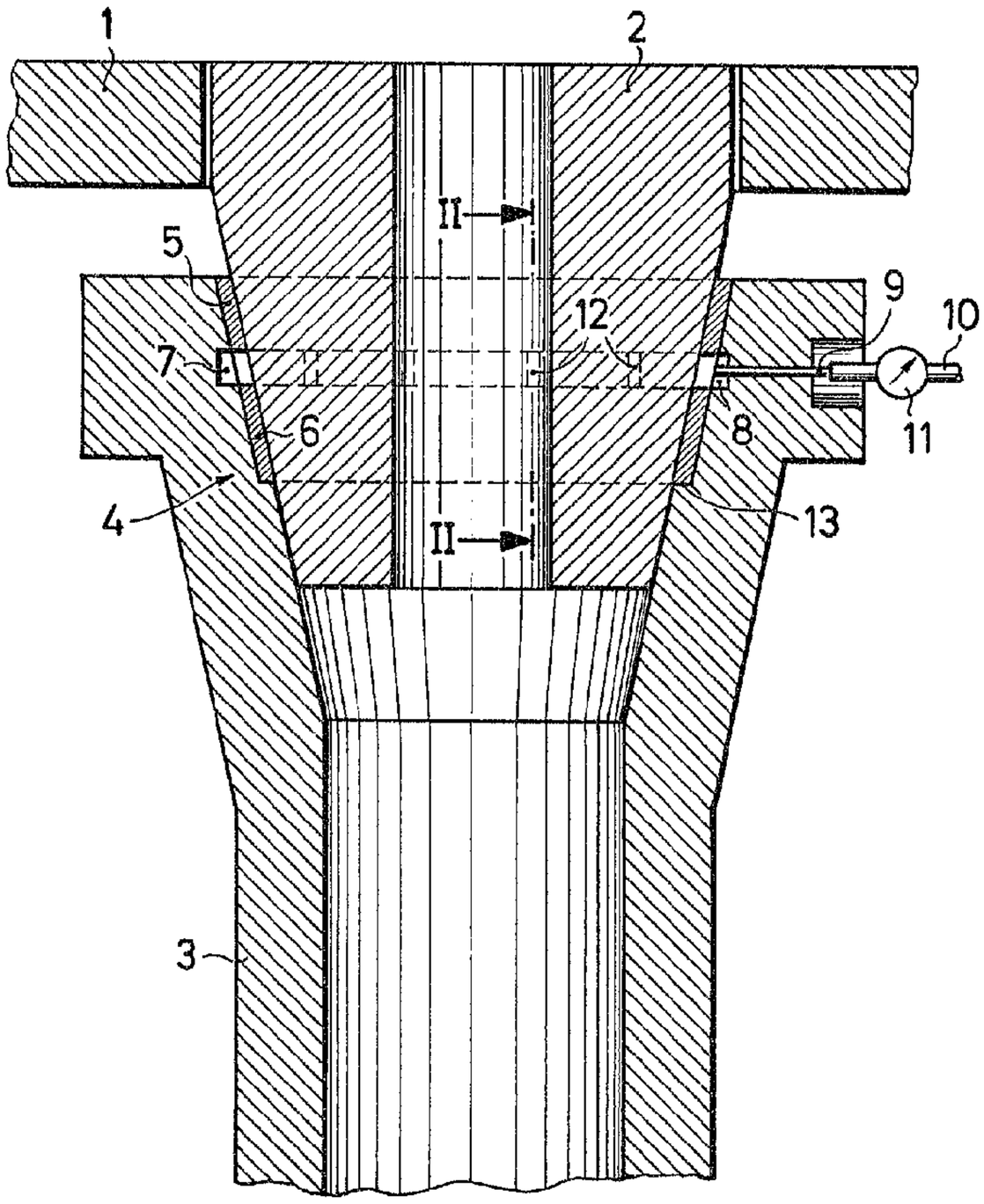
(72) Inventeurs/Inventors:
Schneider, Ulrich, DE;
Luhrsen, Ernst, DE

(73) Propriétaire/Owner:
Didier-Werke AG, DE

(74) Agent: FETHERSTONHAUGH & CO.

(54) Titre : RACCORD ENTRE LA SORTIE D'UN RECIPIENT METALLURGIQUE ET UN TUBE PROTECTEUR OU UNE TUYERE A IMMERSION

(54) Title: CONNECTION BETWEEN THE OUTLET OF A METALLURGICAL VESSEL AND A SHIELD TUBE OR IMMERSION NOZZLE



(57) Abrégé/Abstract:
The seal is to be simplified and a leak monitor is to be produced in a connection between the outlet of a metallurgical vessel and a shield tube or an immersion nozzle connected thereto. Arranged above and below an annular space, to which inert gas is supplied, are compressible sealing rings. An indicating device monitors the gas pressure prevailing in the annular space.

2047021

23843-233

CONNECTION BETWEEN THE OUTLET OF A METALLURGICAL VESSEL AND A SHIELD TUBE OR IMMERSION NOZZLE

ABSTRACT

The seal is to be simplified and a leak monitor is to be produced in a connection between the outlet of a metallurgical vessel and a shield tube or an immersion nozzle connected thereto. Arranged above and below an annular space, to which inert gas is supplied, are compressible sealing rings. An indicating device monitors the gas pressure prevailing in the annular space.

CONNECTION BETWEEN THE OUTLET OF A METALLURGICAL VESSEL AND A SHIELD TUBE OR IMMERSION NOZZLE

DESCRIPTION

The invention relates to a connection between the outlet of a metallurgical vessel and a shield tube or an immersion nozzle connected thereto, whereby the outlet and the shield tube or the immersion nozzle are connected together by a seat and provided in the region of the seat are an annular space concentric with it, with a supply line for an inert gas, and a seal.

Such a connection is described in DE 3226047 C2. The seat therein is a press fit. The desired gas seal can scarcely be ensured with such a seat. Even relatively small particles in the push fit considerably impair the gas tightness. The push fit also results in the shield tube or the immersion nozzle jamming on removal from the outlet cone and being able to break if subjected to larger forces.

A swelling fibre felt is proposed in DE 3620413 C2 for outlet valves and gas injectors on metallurgical vessels.

It is the object of the invention to simplify the sealing in a connection of the type referred to above and to achieve a monitoring of the sealing.

In accordance with the invention the above object is solved in a connection of the type referred to above if

arranged above and below the annular space there is a compressible ring as a sealing ring and if an indicating device for a gas pressure in the annular space is arranged in the supply line for the inert gas.

The sealing rings ensure the necessary seal of the seat even if there are uneven portions between the outlet and the shield tube or immersion nozzle. The sealing rings in conjunction with the gas pressure of the inert gas prevailing in the annular space ensure that the outflowing metal melt does not come into contact with air and thus does not oxidise.

The gas pressure in the annular space is monitored by the indicating device. If either the upper sealing ring or the lower sealing ring should start to leak, an indication is produced. Provided only one of the sealing rings becomes leaky there is not yet the risk that the metal melt comes into contact with air. An indication is thus produced before a condition in which both sealing rings are leaky and thus atmospheric oxygen is sucked in through the seat by the outflowing melt.

The compressible sealing rings preferably comprise ceramic fibre material. They are particularly connected together by spacer webs which bridge the annular space. It is thus possible to mount both rings as a constructional unit. They can be secured to the outlet before the application of the shield tube or immersion nozzle to it or to the shield tube or the immersion nozzle. In one embodiment of the invention both rings and optionally the spacer webs form a

one-piece annular component.

The two sealing rings can be secured to the outlet before the application of a shield tube or immersion nozzle to it or to the shield tube or the immersion nozzle.

The lower sealing ring preferably engages a step on the shield tube or immersion nozzle. The correct position of the sealing rings may thus be easily produced during assembly.

In practice, the sealing rings have a certain gas permeability. However, due to the gas over-pressure of the inert gas prevailing in the annular space this does not result in air being sucked in by the melt. In one embodiment of the invention a directed gas flow, preferably into the shield tube or the immersion nozzle, is produced by a differing gas permeability of the compressible sealing rings.

One exemplary embodiment of the invention will be apparent from the following description. In the drawings:

Figure 1 is a longitudinal sectional view of a connection between an outlet brick and an immersion nozzle, and
Figure 2 is a sectional view of the sealing rings along the line II-II in Figure 1.

Secured to the base (1) of a metallurgical vessel is a conical outlet brick (2). Pushed over it with its

upper end (4), which broadens in a manner corresponding to the conicity of the outlet brick (2), is an immersion nozzle (3).

Disposed between the immersion nozzle (3) and the outlet brick (2) are an upper sealing ring (5) and a lower sealing ring (6). The sealing rings (5,6) are compressible and comprise ceramic fibre material.

Between the sealing rings (5,6) there is an annular space (7) which is broadened by a recess (8) in the immersion nozzle (3).

A radial passage (9) in the immersion nozzle (3) opens out into the annular space (7). Connected to it is a gas line (10) for inert gas. Arranged in the gas line (10) is an indicating device (11) for the gas pressure prevailing in the annular space (7).

The two sealing rings (5,6) are connected together by means of spacing webs (12). These extend through the annular space (7) without blocking it. The two sealing rings (5,6) and the spacing webs (12) are produced as a one-piece component from the ceramic fibre material. The lower sealing ring (6) sits on a step (13) formed in the immersion nozzle (3).

The mounting of the immersion nozzle (3) onto the outlet brick (2) occurs, for instance, as follows:

The unit comprising the upper and lower sealing rings (5,6) and the spacing webs (12) is pushed into the immersion nozzle (3) until the lower seal (6) rests on

the step (13). The spacing webs (12) then lie in the region of the recess (8) which broadens the annular space (7).

The immersion nozzle (3) is subsequently pushed onto the outlet brick (2) and secured in this position in a manner known per se. The fibre material of the sealing rings (5,6) is thus compressed. The gas line (10) may thereafter be connected.

In use, inert gas is supplied to the annular space (7). A certain over-pressure prevails at the indicating device (11), which is constituted by a pressure meter, depending on the gas permeability of the sealing rings (5,6), the compression of the sealing rings (5,6) and the reduced pressure prevailing in the immersion nozzle (3) during pouring.

If a leak occurs at the sealing ring (5) or the sealing ring (6), the gas pressure sinks and the indicating device (11) delivers an alarm signal.

27754-40

CLAIMS:

1. Connection between the outlet of a metallurgical vessel and a shield tube or an immersion nozzle connected thereto, whereby the outlet and the shield tube or the immersion nozzle are connected together by a seat, and provided in connection with the seat is an annular space concentric with it, a seal comprising an upper and lower compressible sealing ring arranged above and below the annular space, a supply line for supplying an inert gas to the annular space, and an indicating device for a gas pressure in the annular space arranged in the supply line.

2. Connection as claimed in claim 1, characterised in that the compressible sealing rings comprise ceramic fibre material.

3. Connection as claimed in claim 1, characterised in that the upper and the lower compressible sealing rings are connected together by spacer webs which bridge the annular space.

4. Connection as claimed in claim 2, characterised in that the upper and the lower compressible sealing rings are connected together by spacer webs which bridge the annular space.

5. Connection as claimed in any one of claims 1 to 4, characterised in that the compressible sealing rings are secured to the outlet before the connection of the outlet and the shield tube or immersion nozzle.

6. Connection as claimed in any one of claims 1 to 4, characterised in that the compressible sealing rings are secured in the shield tube or immersion nozzle before the

connection of the outlet and the shield tube or immersion nozzle.

7. Connection as claimed in any one of claims 1 to 4, characterised in that the lower compressible sealing ring engages a step on the shield tube or immersion nozzle.

8. Connection as claimed in any one of claims 1 to 4, characterised in that a directed gas flow is produced by differing gas permeability of the compressible sealing rings.

9. Connection as claimed in claim 8 wherein the directed gas flow is directed into the shield tube or into the immersion nozzle.

10. Connection as claimed in claim 3 or 4, characterised in that the two compressible sealing rings and the spacer webs form a one-piece annular component.

FETHERSTONHAUGH & CO.
OTTAWA, CANADA

PATENT AGENTS

2047021

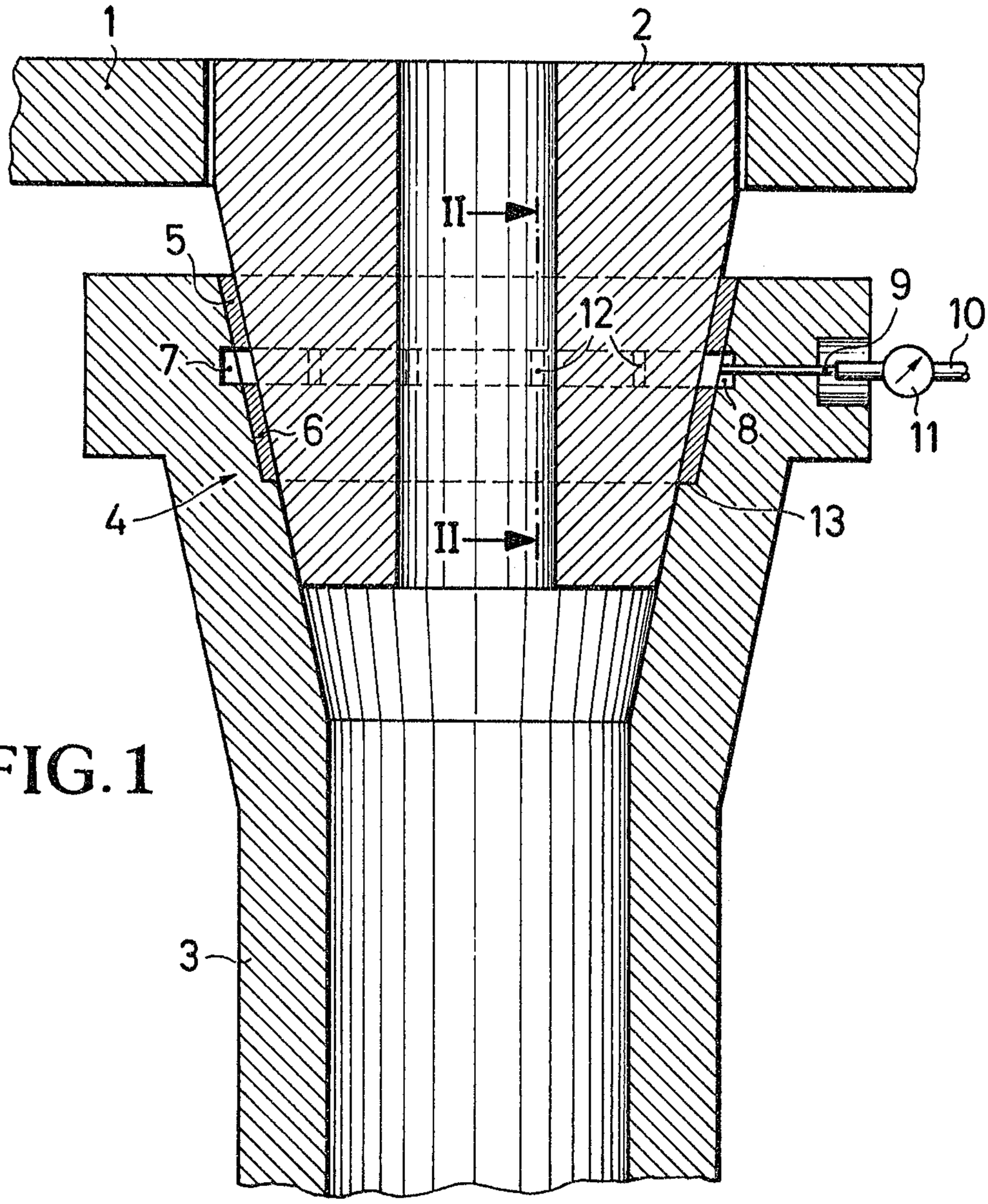


FIG. 1

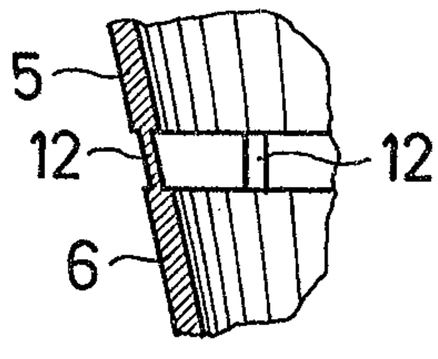
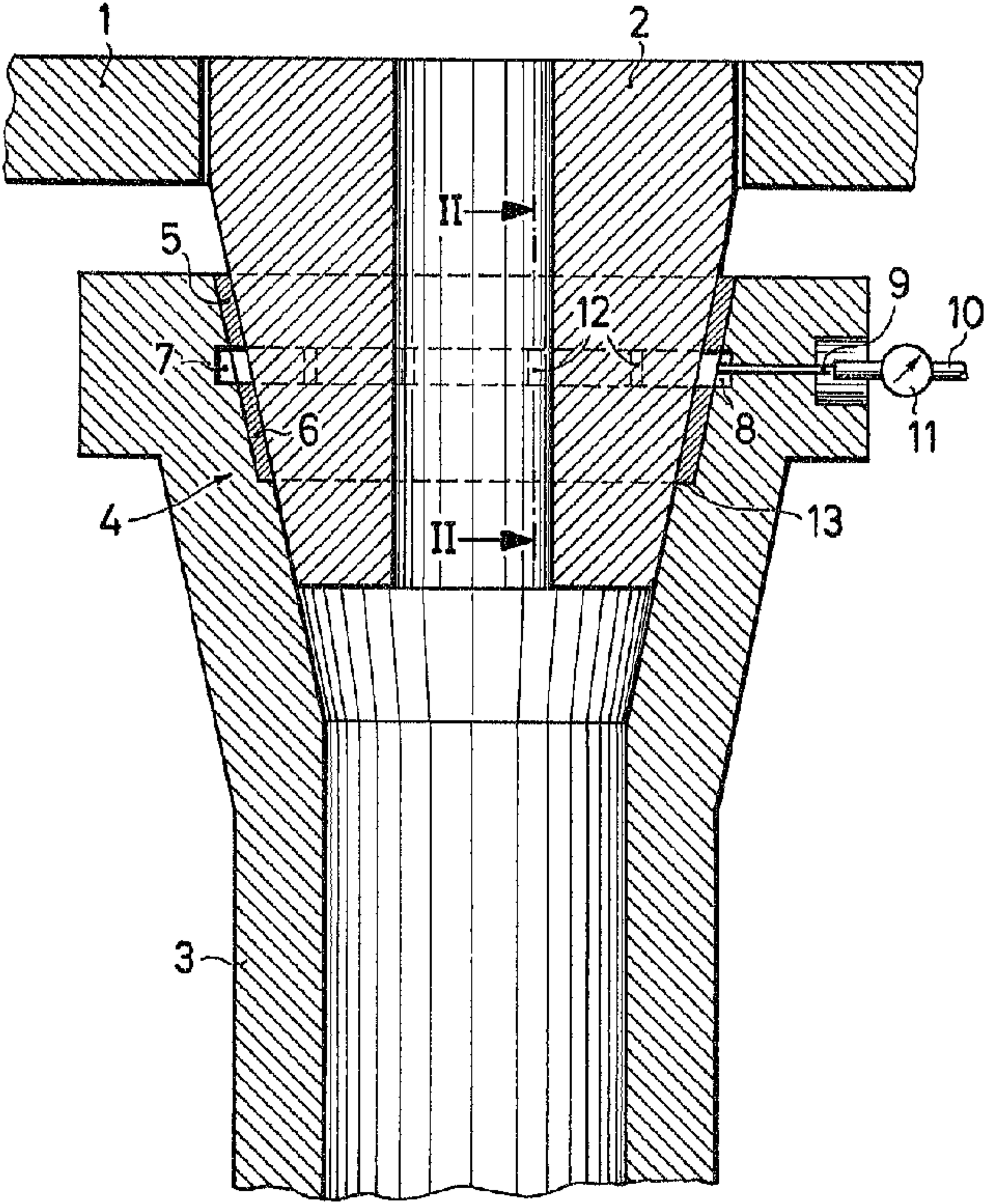


FIG. 2

Patent Agents
Fetherstonhaugh & Co.


1
2
II
5
9
10
12
7
6
8
11
4
13
II
3