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(54) Title: METHOD FOR MOUNTING A BURNER FOR FEEDING OF REACTION GAS AND FINE SOLIDS INTO IN A REACTION SHAFT SPACE OF A REACTION SHAFT OF A SUSPENSION SMELTING FURNACE AND SUSPENSION SMELTING FURNACE

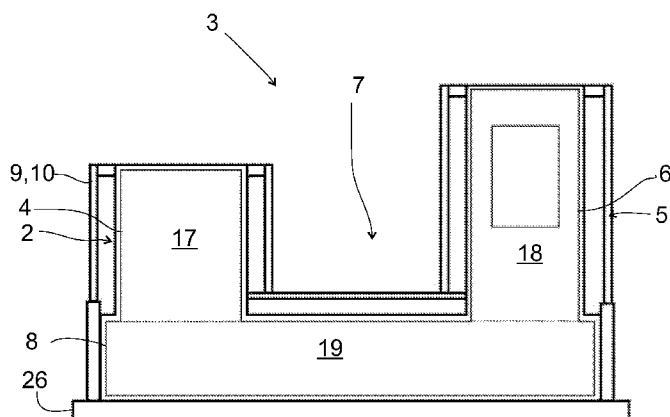


FIG 1

(57) Abstract: The invention relates to a method for mounting a burner (1), such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into a reaction shaft space (17) of a reaction shaft (2) of a suspension smelting furnace (3) and to a suspension smelting furnace (3). The suspension smelting furnace (3) comprising a reaction shaft (2), an uptake shaft (5), a lower furnace (7), a burner (1) such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into a reaction shaft space (17) of the reaction shaft (2) of the suspension smelting furnace (3), and a reaction shaft supporting metal frame structure (9) for supporting a reaction shaft structure (4). The burner (1) is supported by the reaction shaft supporting metal frame structure (9).

METHOD FOR MOUNTING A BURNER FOR FEEDING OF REACTION GAS AND FINE SOLIDS INTO IN A REACTION SHAFT SPACE OF A REACTION SHAFT OF A SUSPENSION SMELTING FURNACE AND SUSPENSION SMELTING FURNACE

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Field of the invention

The invention relates to a method for mounting a burner, such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into in a reaction shaft space of a reaction shaft of a suspension smelting furnace as defined in the preamble of independent claim

10 1.

The invention also relates to a suspension smelting furnace as defined in the preamble of independent claim 9.

The straightness of a burner, such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into in a reaction shaft space of a reaction shaft of a suspension smelting furnace is important in order to achieve even distribution of the feed of reaction gas and fine solids in the reaction shaft and in order to achieve a well-directed flame at the vertical center line of the reaction shaft space.

Traditionally the burner has been mounted at the top of the reaction shaft of the suspension smelting furnace so that the burner has been supported by the reaction shaft structure of the reaction shaft. A problem with such supporting is that because of thermal expansion of the reaction shaft structure of the reaction shaft, the straightness of the burner shifts as a result of thermal expansion of the reaction shaft structure of the reaction shaft.

Objective of the invention

The object of the invention is to provide a method for mounting a burner, such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into in a reaction shaft space of a reaction shaft of a suspension smelting furnace and a suspension smelting furnace, where the thermal expansion of the reaction shaft structure of the reaction shaft has no or at least less effect on the straightness of the burner than in a traditional suspension smelting furnace.

Short description of the invention

The method for mounting a burner, such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into a reaction shaft space of a reaction shaft of a suspension smelting furnace of the invention is characterized by the definitions of independent claim 1.

Preferred embodiments of the method are defined in the dependent claims 2 to 8.

The suspension smelting furnace of the invention is correspondingly characterized by the

definitions of independent claim 9.

Preferred embodiments of the suspension smelting furnace are defined in the dependent claims 10 to 16.

The invention is based on supporting the burner of the suspension smelting furnace at the reaction shaft supporting metal structure for supporting a reaction shaft of a suspension smelting furnace. The reaction shaft supporting metal structure may be a part of a suspension smelting furnace supporting metal frame structure for supporting a reaction shaft structure of the reaction shaft of the suspension smelting furnace, for supporting an uptake shaft structure of an uptake shaft of the suspension smelting furnace, and for supporting a lower furnace structure of a lower furnace of the suspension smelting furnace. By supporting the burner in this manner, thermal expansion of the shaft structure of the reaction shaft will not have effect on the straightness of the burner. By supporting the burner in this manner, centralizing of the burner with respect to the reaction shaft space of the reaction shaft is additionally easier.

15 List of figures

In the following the invention will be described in more detail by referring to the figures, of which

Figure 1 shows in cut-view a suspension smelting furnace comprising a reaction shaft supporting metal frame structure that is a part of a suspension smelting furnace supporting metal frame structure for supporting the reaction shaft structure of the suspension smelting furnace, for supporting the uptake shaft structure of the suspension smelting furnace, and for supporting the lower furnace of the suspension smelting furnace,

Figure 2 is a detail view showing from above a burner that is supported on a reaction shaft supporting metal frame structure, and

Figure 3 shows as seen from one side supporting of a burner at a reaction shaft supporting metal structure for supporting a reaction shaft of a suspension smelting furnace.

Detailed description of the invention

The invention relates to a method for mounting a burner 1, such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into a reaction shaft space 17 of a reaction shaft 2 of a suspension smelting furnace 3 and to a suspension smelting furnace 3.

First the method for mounting a burner 1, such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into a reaction shaft 2 of a suspension smelting furnace 3 and some embodiments of the method and variants of the method will be described in greater detail.

The suspension smelting furnace 3 in the method is of the type comprising said reaction shaft 2. The reaction shaft 2 has a reaction shaft structure 4 limiting said reaction shaft space 17. The suspension smelting furnace 3 in the method is of the type comprising additionally an uptake

shaft 5 that has an uptake shaft structure 6 limiting an uptake shaft space 18 and a lower furnace 7 that has a lower furnace structure 8 limiting a lower furnace space 19 that is in communication with the reaction shaft space 17 of the reaction shaft 2 and in communication with the uptake shaft space 18 of the uptake shaft 5. The suspension smelting furnace 3 in the method is of the type having a reaction shaft supporting metal frame structure 9 provided at least partly outside the reaction shaft structure 4 for supporting the reaction shaft structure 4,

The method comprises a supporting step for supporting the burner 1 from the reaction shaft supporting metal frame structure 9 of the suspension smelting furnace 3.

The reaction shaft supporting metal frame structure 9 of the suspension smelting furnace 3 may be fastened to a concrete foundation 26 of the suspension smelting furnace 3.

In an embodiment of the method, the reaction shaft supporting metal frame structure 9 is a part of a suspension smelting furnace supporting metal frame structure 10 for supporting the reaction shaft structure 4 of the reaction shaft 2 of the suspension smelting furnace 3, for supporting the uptake shaft structure 6 of the uptake shaft 5 of the suspension smelting furnace 3, and for supporting the lower furnace structure 8 of the lower furnace 7 of the suspension smelting furnace 3. In this embodiment of the method, the supporting step for supporting the burner 1 from the reaction shaft supporting metal frame structure 9 of the suspension smelting furnace 3 is a supporting step for supporting the burner 1 from the suspension smelting furnace supporting metal frame structure 10 of the suspension smelting furnace 3.

The suspension smelting furnace supporting metal frame structure 10 of the suspension smelting furnace 3 may be fastened to a concrete foundation 26 of the suspension smelting furnace 3.

In an embodiment of the method, the burner 1 is in the supporting step supported from the reaction shaft supporting metal frame structure 9 of the suspension smelting furnace 3 so that a space 11 is formed between the burner 1 and the reaction shaft structure 4 of the reaction shaft 2. This embodiment of the method comprises arranging a flexible insulation 12 in the space 11 between the burner 1 and the reaction shaft structure 4 of the reaction shaft 2.

An embodiment of the method comprises using a burner 1 comprising fine solids feeding means 20 for feeding fine solids into the reaction shaft space 17 of the reaction shaft 2 of the suspension smelting furnace 3. This embodiment of the method comprises a connecting step for connecting the fine solids feeding means 20 of the burner 1 by means of a flexible connection 16 to a fine solids supplying means 13 for supplying fine solids to the fine solids feeding means 20 of the burner 1.

An embodiment of the method comprises using a burner 1 comprising reaction gas feeding means 21 for feeding reaction gas into the reaction shaft space 17 of the reaction shaft 2 of the suspension smelting furnace 3. This embodiment of the method comprises a connecting step for connecting the reaction gas feeding means 21 of the burner 1 by means of a flexible connection 16 to a reaction gas supplying means 14 for supplying reaction gas to the reaction gas

feeding means 21 of the burner 1.

An embodiment of the method comprises using a burner 1 comprising a dispersing gas operated fine solids dispersion device 15 for directing fine solids that is fed by means of the burner 1 towards reaction gas that is fed by means of the burner 1 by feeding dispersing gas towards fine solids that is fed by means of the burner 1. This embodiment of the method comprises a connecting step for connecting the gas operated fine solids dispersion device 15 of the burner 1 by means of a flexible connection 16 to a dispersing gas supplying means 24 for supplying dispersing gas to the fine solids dispersion device 15 of the burner 1.

An embodiment of the method comprises using a burner 1 comprising an oxygen feeding means 22 for feeding oxygen containing gas such as pure oxygen into the reaction shaft space 17 at a vertical center line of the reaction shaft space 17 of the reaction shaft 2. This embodiment of the method comprises a connecting step for connecting the oxygen feeding means 22 of the burner 1 by means of a flexible connection 16 to an oxygen supplying means 23 for supplying oxygen containing gas to the oxygen feeding means 22 of the burner 1.

An embodiment of the method comprises supporting the burner 1 on the reaction shaft supporting metal frame structure 9 by means of adjustable supporting elements 25 by arranging the adjustable supporting elements 25 between the burner 1 and the reaction shaft supporting metal frame structure 9. Such adjustable supporting elements 25 can be used for centralizing the burner with respect to the reaction shaft space 17 of the reaction shaft 4.

Next the suspension smelting furnace 3 and some embodiments and variants of the suspension smelting furnace 3 will be described in greater detail.

The suspension smelting furnace 3 comprises a reaction shaft 2 that has a reaction shaft structure 4 limiting a reaction shaft space 17.

The suspension smelting furnace 3 comprises an uptake shaft 5 that has an uptake shaft structure 6 limiting an uptake shaft space 18.

The suspension smelting furnace 3 comprises a lower furnace 7 that has a lower furnace structure 8 limiting a lower furnace space 19 that is in communication with the reaction shaft space 17 of the reaction shaft 2 and in communication with the uptake shaft space 18 of the uptake shaft 5.

The suspension smelting furnace 3 comprises a burner 1 such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into the reaction shaft space 17 of the reaction shaft 2 of the suspension smelting furnace 3.

The suspension smelting furnace 3 comprises a reaction shaft supporting metal frame structure 9 for supporting the reaction shaft structure 4.

The burner 1 is supported by the reaction shaft supporting metal frame structure 9.

The reaction shaft supporting metal frame structure 9 of the suspension smelting furnace 3 may be fastened to a concrete foundation 26 of the suspension smelting furnace 3.

In an embodiment of the suspension smelting furnace 3, the reaction shaft supporting

metal frame structure 9 is a part of a suspension smelting furnace supporting metal frame structure 10 for supporting the reaction shaft structure 4 of the suspension smelting furnace 3, for supporting the uptake shaft structure 6 of the suspension smelting furnace 3, and for supporting the lower furnace structure 8 of the suspension smelting furnace 3.

5 The suspension smelting furnace supporting metal frame structure 10 of the suspension smelting furnace 3 may be fastened to a concrete foundation 26 of the suspension smelting furnace 3.

10 In an embodiment of the suspension smelting furnace 3, the burner 1 is supported by the reaction shaft supporting metal frame structure 9 of the suspension smelting furnace 3 so that a space is formed between the burner 1 and the reaction shaft structure 4. This embodiment of the suspension smelting furnace 3 comprises by a flexible insulation in the space between the burner 1 and the reaction shaft structure 4.

15 In an embodiment of the suspension smelting furnace 3, the burner 1 comprising fine solids feeding means 20 for feeding fine solids into the reaction shaft space 17 of the reaction shaft of the suspension smelting furnace 3. In this embodiment of the suspension smelting furnace 3, the fine solids feeding means 20 of the burner 1 being connected by means of a flexible connection 16 to a fine solids supplying means 13 for supplying fine solids to the fine solids feeding means 20 of the burner 1.

20 In an embodiment of the suspension smelting furnace 3, the burner 1 comprising reaction gas feeding means 21 for feeding reaction gas into the reaction shaft space 17 of the reaction shaft 2 of the suspension smelting furnace 3. In this embodiment of the suspension smelting furnace 3, the reaction gas feeding means 21 of the burner 1 being connected by means of a flexible connection 16 to a reaction gas supplying means 14 for supplying reaction gas to the reaction gas feeding means 21 of the burner 1.

25 In an embodiment of the suspension smelting furnace 3, the burner 1 comprising a dispersing gas operated fine solids dispersion device 15 for directing fine solids that is fed by means of the burner 1 towards reaction gas that is fed by means of the burner 1 by feeding dispersing gas towards fine solids that is fed by means of the burner 1. In this embodiment of the suspension smelting furnace 3, the gas operated fine solids dispersion device 15 of the burner 1
30 being connected by means of a flexible connection 16 to a dispersing gas supplying means 24 for supplying dispersing gas to the fine solids dispersion device 15 of the burner 1.

35 In an embodiment of the suspension smelting furnace 3, the burner 1 comprising an oxygen feeding means 22 for feeding oxygen containing gas such as pure oxygen into the reaction shaft space 17 of the reaction shaft 2 at a vertical center line of the reaction shaft space 17. In this embodiment of the suspension smelting furnace 3, the oxygen feeding means 22 of the burner 1 being connected by means of a flexible connection 16 to an oxygen supplying source for supplying oxygen containing gas to the oxygen feeding means 22 of the burner 1. In an embodiment of the suspension smelting furnace 3 the burner 1 is supported on the reaction shaft

supporting metal frame structure 9 by means of adjustable supporting elements 25, which are arranged between the burner 1 and the reaction shaft supporting metal frame structure 9. Such adjustable supporting elements 25 can be used for centralizing the burner with respect to the reaction shaft space 17 of the reaction shaft 4.

5 It is apparent to a person skilled in the art that as technology advances, the basic idea of the invention can be implemented in various ways. The invention and its embodiments are therefore not restricted to the above examples, but they may vary within the scope of the claims.

Claims

1. A method for mounting a burner (1), such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into a reaction shaft space (17) of a reaction shaft (2) of a suspension smelting furnace (3),

5 wherein the suspension smelting furnace (3) in the method is of the type comprising said reaction shaft (2), wherein the reaction shaft (2) has a reaction shaft structure (4) limiting said reaction shaft space (17), and wherein the suspension smelting furnace (3) comprising additionally an uptake shaft (5) that has an uptake shaft structure (6) limiting an uptake shaft space (18), a lower furnace (7) that has a lower furnace structure (8) limiting a lower furnace
10 space (19) that is in communication with the reaction shaft space (17) of the reaction shaft (2) and in communication with the uptake shaft space (18) of the uptake shaft (5), and a reaction shaft supporting metal frame structure (9) provided at least partly outside the reaction shaft structure (4) for supporting the reaction shaft structure (4),

characterized

15 by a supporting step for supporting the burner (1) from the reaction shaft supporting metal frame structure (9) of the suspension smelting furnace (3).

2. The method according to claim 1, **characterized** by the reaction shaft supporting metal frame structure (9) being a part of a suspension smelting furnace supporting metal frame
20 structure (10) for supporting the reaction shaft structure (4) of the reaction shaft (2) of the suspension smelting furnace (3), for supporting the uptake shaft structure (6) of the uptake shaft (5) of the suspension smelting furnace (3), and for supporting the lower furnace structure (8) of the lower furnace (7) of the suspension smelting furnace (3), wherein the supporting step for supporting the burner (1) from the reaction shaft supporting metal frame structure (9) of the
25 suspension smelting furnace (3) is a supporting step for supporting the burner (1) from the suspension smelting furnace supporting metal frame structure (10) of the suspension smelting furnace (3).

3. The method according to claim 1 or 2, **characterized**

30 by supporting the burner (1) in the supporting step from the reaction shaft supporting metal frame structure (9) of the suspension smelting furnace (3) so that a space (11) is formed between the burner (1) and the reaction shaft structure (4), and

by arranging a flexible insulation (12) in the space (11) between the burner (1) and the reaction shaft structure (4)

35 4. The method according to any of the claims 1 to 3, **characterized**

by using a burner (1) comprising fine solids feeding means (20) for feeding fine solids into the reaction shaft space (17) of the reaction shaft (2) of the suspension smelting furnace (3),

and

by connecting the fine solids feeding means (20) of the burner (1) by means of a flexible connection (16) to a fine solids supplying means (13) for supplying fine solids to the fine solids feeding means (20) of the burner (1).

5

5. The method according to any of the claims 1 to 4, **characterized**

by using a burner (1) comprising reaction gas feeding means (21) for feeding reaction gas into the reaction shaft space (17) of the reaction shaft (2) of the suspension smelting furnace (3), and

10 by connecting the reaction gas feeding means (21) of the burner (1) by means of a flexible connection (16) to a reaction gas supplying means (14) for supplying reaction gas to the reaction gas feeding means (21) of the burner (1).

6. The method according to any of the claims 1 to 5, **characterized**

15 by using a burner (1) comprising a dispersing gas operated fine solids dispersion device (15) for directing fine solids that is fed by means of the burner (1) towards reaction gas that is fed by means of the burner (1) by feeding dispersing gas towards fine solids that is fed by means of the burner (1), and

20 by connecting the gas operated fine solids dispersion device (15) of the burner (1) by means of a flexible connection (16) to a dispersing gas supplying means (24) for supplying dispersing gas to the fine solids dispersion device (15) of the burner (1) .

7. The method according to any of the claims 1 to 6, **characterized**

25 by using a burner (1) comprising an oxygen feeding means (22) for feeding oxygen containing gas such as pure oxygen into the reaction shaft space (17) of the reaction space (2) at a vertical center line of the reaction shaft space (17), and

by connecting the oxygen feeding means (22) of the burner (1) by means of a flexible connection (16) to a oxygen supplying means (23) for supplying oxygen containing gas to the oxygen feeding means (22) of the burner (1) .

30

8. The method according to any of the claims 1 to 7, **characterized** by supporting the burner (1) on the reaction shaft supporting metal frame structure (9) by means of adjustable supporting elements (25) by arranging the adjustable supporting elements (25) between the burner (1) and the reaction shaft supporting metal frame structure (9).

35

9. A suspension smelting furnace (3) comprising
a reaction shaft (2) that has a reaction shaft structure (4) limiting a reaction shaft space (17),

an uptake shaft (5) that has an uptake shaft structure (6) limiting an uptake shaft space (18),

a lower furnace (7) that has a lower furnace structure (8) limiting a lower furnace space (19) that is in communication with the reaction shaft space (17) of the reaction shaft (2) and in communication with the uptake shaft space (18) of the uptake shaft (5),

a burner (1) such as a concentrate burner or a matte burner, for feeding of reaction gas and fine solids into the reaction shaft space (17) of the reaction shaft (2) of the suspension smelting furnace (3), and

a reaction shaft supporting metal frame structure (9) for supporting the reaction shaft structure (4),

characterized by

the burner (1) being supported by the reaction shaft supporting metal frame structure (9).

10. The suspension smelting furnace (3) according to claim 9, **characterized** by the reaction shaft supporting metal frame structure (9) being a part of a suspension smelting furnace supporting metal frame structure (10) for supporting the reaction shaft structure (4) of the suspension smelting furnace (3), for supporting the uptake shaft structure (6) of the suspension smelting furnace (3), and for supporting the lower furnace structure (8) of the suspension smelting furnace (3).

11. The suspension smelting furnace (3) according to claim 9 or 10, **characterized** by the burner (1) being supported by the reaction shaft supporting metal frame structure (9) of the suspension smelting furnace (3) so that a space (11) is formed between the burner (1) and the reaction shaft structure (4), and

by a flexible insulation (12) in the space (11) between the burner (1) and the reaction shaft structure (4)

12. The suspension smelting furnace (3) according to any of the claims 9 to 11, **characterized**

by the burner (1) comprising fine solids feeding means (20) for feeding fine solids into the reaction shaft space (17) of the reaction shaft (2) of the suspension smelting furnace (3), and

by the fine solids feeding means (20) of the burner (1) being connected by means of a flexible connection (16) to a fine solids supplying means (13) for supplying fine solids to the fine solids feeding means (20) of the burner (1).

13. The suspension smelting furnace (3) according to any of the claims 9 to 12, **characterized**

by the burner (1) comprising reaction gas feeding means (21) for feeding reaction gas

into the reaction shaft space (17) of the reaction space (2) of the suspension smelting furnace (3), and

by the reaction gas feeding means (21) of the burner (1) being connected by means of a flexible connection (16) to a reaction gas supplying means (14) for supplying reaction gas to the reaction gas feeding means (21) of the burner (1).

14. The suspension smelting furnace (3) according to any of the claims 9 to 13, **characterized**

by the burner (1) comprising a dispersing gas operated fine solids dispersion device (15) for directing fine solids that is fed by means of the burner (1) towards reaction gas that is fed by means of the burner (1) by feeding dispersing gas towards fine solids that is fed by means of the burner (1), and

by the gas operated fine solids dispersion device (15) of the burner (1) being connected by means of a flexible connection (16) to a dispersing gas supplying means (24) for supplying dispersing gas to the fine solids dispersion device (15) of the burner (1) .

15. The suspension smelting furnace (3) according to any of the claims 9 to 14, **characterized**

by the burner (1) comprising an oxygen feeding means (22) for feeding oxygen containing gas such as pure oxygen into the reaction shaft space (17) of the reaction space (2) at a vertical center line of the reaction shaft space (17), and

by the oxygen feeding means (22) of the burner (1) being connected by means of a flexible connection (16) to a oxygen supplying source for supplying oxygen containing gas to the oxygen feeding means (22) of the burner (1).

16. The suspension smelting furnace (3) according to any of the claims 9 to 15, **characterized** by the burner (1) being supported on the reaction shaft supporting metal frame structure (9) by means of adjustable supporting elements (25), which are arranged between the burner (1) and the reaction shaft supporting metal frame structure (9).

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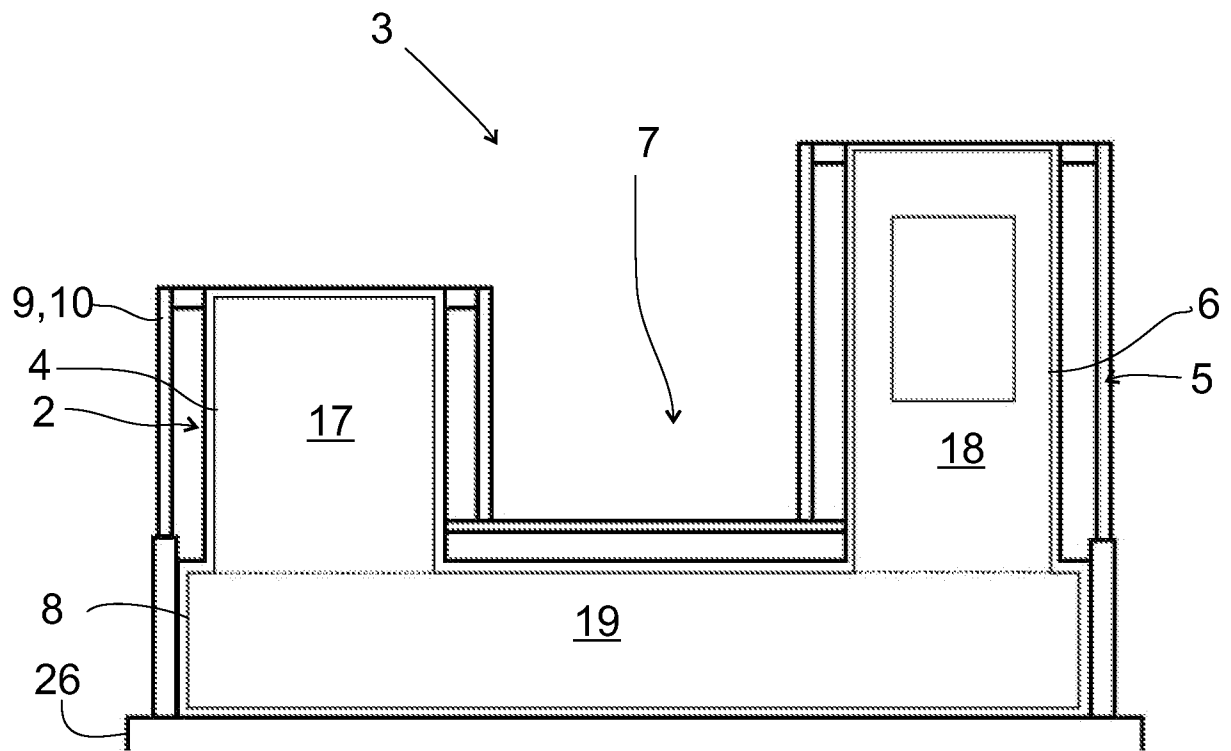


FIG 1

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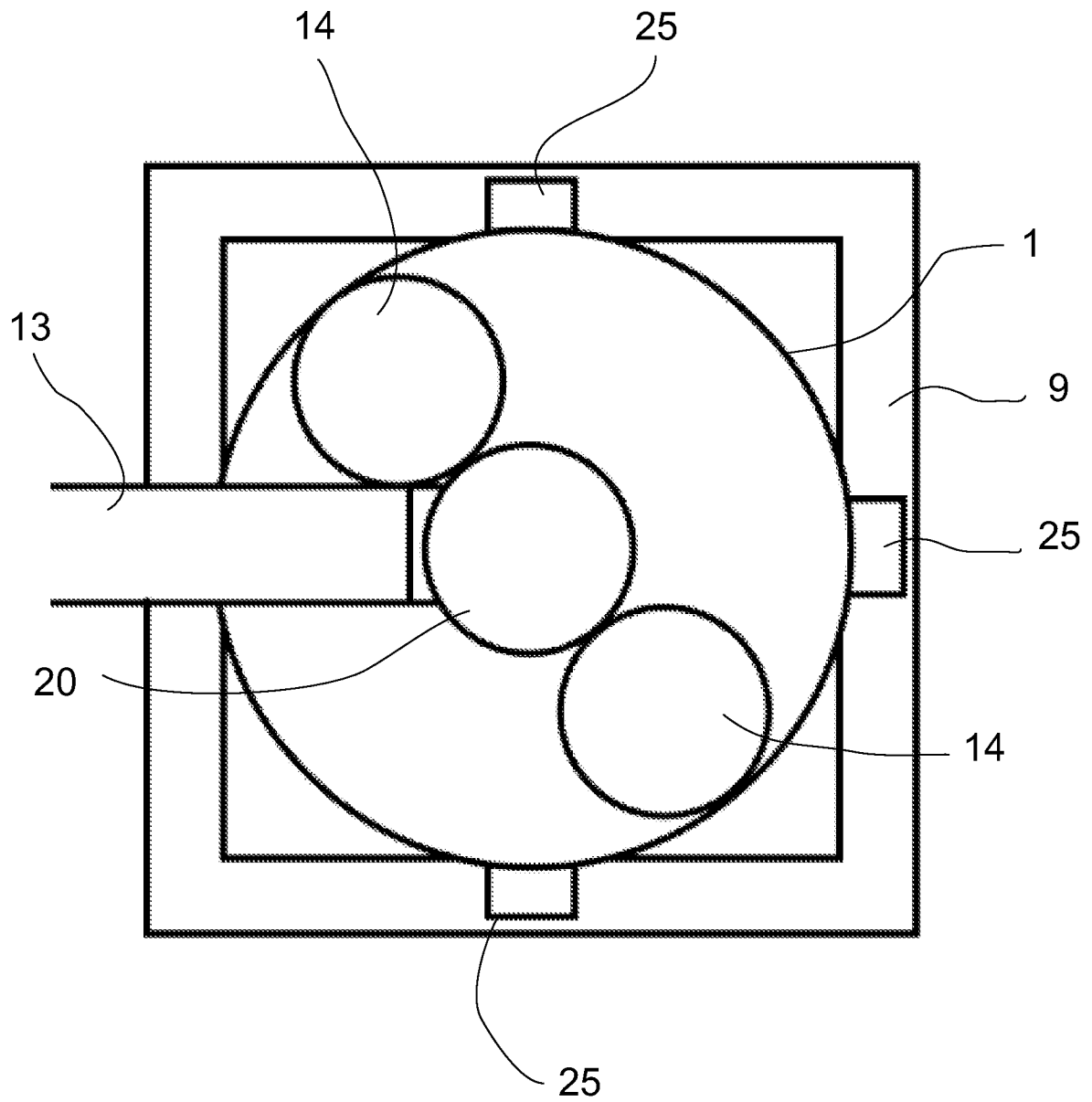


FIG 2

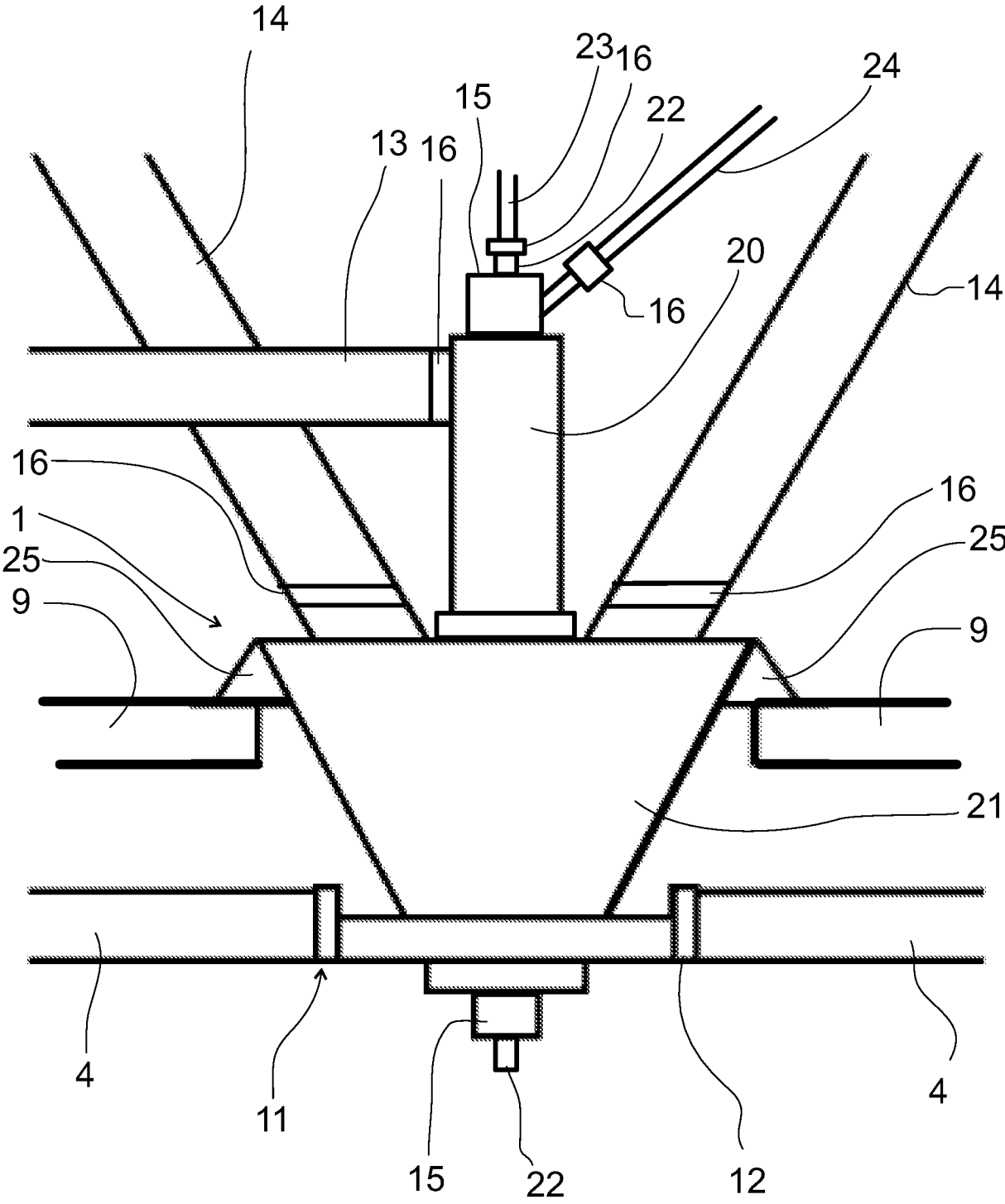


FIG 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2014/050909

A. CLASSIFICATION OF SUBJECT MATTER INV. C22B15/00 F27B3/04 F27B3/20 F27D3/00 F27D3/18 ADD.				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) F27B F27D C22B				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	WO 2009/030808 A1 (OUTOTEC OYJ [FI]; SIPILAE JUSSI [FI]; PELTONIEMI KAARLE [FI]; BJOERKLU) 12 March 2009 (2009-03-12) figure 1 page 1, line 6 - line 26 page 8, line 14 - line 18 -----	1-16		
A	WO 2009/077654 A1 (OUTOTEC OYJ [FI]; SAARINEN RISTO [FI]; HUGG EERO [FI]) 25 June 2009 (2009-06-25) the whole document -----	1-16		
X	WO 2011/048263 A1 (OUTOTEC OYJ [FI]; SIPILAE JUSSI [FI]) 28 April 2011 (2011-04-28) page 1, line 4 - line 5; figure 5 page 1, line 14 - line 18 page 6, line 9 - line 14 -----	4-7, 12-15		
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.				
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