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(54) **Title:** STRAND SINTERING FURNACE AND WINDBOX FOR A STRAND SINTERING FURNACE

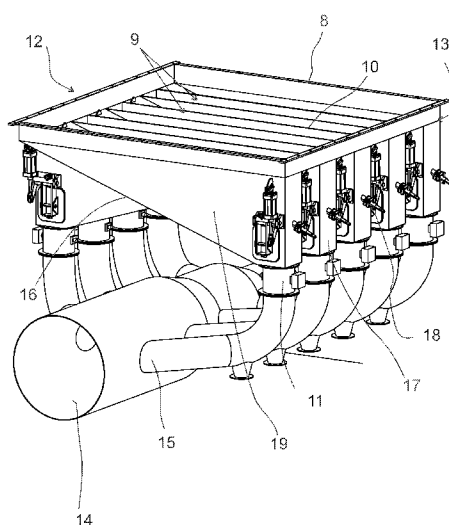


FIG 3

(57) **Abstract:** The invention relates to a strand sintering furnace and to a windbox (7) for a strand sintering furnace comprising a number of sequential process zones (1). The windbox (7) comprises sealing means (8) for sealing the windbox (7) towards a conveyer or belt (2) of the strand sintering furnace. The windbox (7) is divided into windbox sections (9), and at least one windbox section (9) of the windbox (7) is provided with a damper (11) configured to individually adjust the exhaust gas flow in said at least one windbox section (9). The windbox (7) comprises an exhaust gas collection channel (14) and a windbox channel (15) between the exhaust gas collection channel (14) and each windbox section (9) of the windbox (7). The damper (11) configured to adjust the exhaust gas flow in said at least one windbox section (9) is arranged in the windbox channel (15).



STRAND SINTERING FURNACE AND WINDBOX FOR A STRAND SINTERING FURNACE

Field of the invention

5 The invention relates to a strand sintering furnace comprising a number of sequential process zones having different temperature conditions as defined in the preamble of independent claim 1.

The invention also relates to a windbox for a strand sintering furnace comprising a number of sequential process zones having different temperature conditions as defined in the
10 preamble of independent claim 10.

In strand sintering of mineral material, a layer of material is formed on a conveyor belt in a sintering furnace, the layer being called herein a material bed. The material bed is conveyed by the conveyor belt through the process zones of the sintering furnace, which have different temperatures. During the conveyance, gas is conducted through the conveyor base and the
15 material bed when the material bed travels through the process zones. Each process zone is normally provided with a windbox configured to promote conduction of gas through the conveyor base and the material bed. The windboxes can for example be connected to suction means in order to promote conduction of gas through the conveyor base and the material bed.

Objective of the invention

20 The object of the invention is to provide an improved strand sintering furnace and an improved windbox for a strand sintering furnace.

Short description of the invention

25 The strand sintering furnace of the invention is characterized by the definitions of independent claim 1.

Preferred embodiments of the strand sintering furnace are defined in the dependent claims 2 to 9.

The windbox for a strand sintering furnace of the invention is correspondingly
30 characterized by the definitions of independent claim 10.

Preferred embodiments of the windbox are defined in the dependent claims 11 to 18.

Because the damper configured to adjust the exhaust gas flow in said at least one windbox section is provided in the windbox channel between the exhaust gas collection channel and said at least one windbox section of the windbox, several advantages are achieved. One
35 advantage is that the windbox is easy to service. Another advantage is that the windbox has a simple construction, which means that it is also inexpensive to manufacture. The invention can also be utilized when upgrading or modernizing existing windboxes.

List of figures

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

Figure 1 is a schematical illustration of a strand sintering furnace,

Figure 2 shows a first embodiment of a windbox for a strand sintering furnace,

Figure 3 shows a second embodiment of a windbox for a strand sintering furnace, and

Figure 4 shows a third embodiment of a windbox for a strand sintering furnace.

Detailed description of the invention

First the strand sintering furnace comprising a number of sequential process zones 1 having different temperature conditions and some embodiments and variants of the strand sintering furnace will be described in greater detail.

The strand sintering furnace comprising a conveyor belt 2 that is arranged as an endless loop around a deflector roll 3 and a driven roll 4 and which conveyor belt 2 is configured to convey a pellet bed (not illustrated in the figures) through said sequential process zones 1 of the strand sintering furnace, said conveyor belt 2 being gas permeable.

Each sequential process zone 1 is provided with an upper gas feeding arrangement 5 configured to conduct gas to be sucked through the pellet bed and the conveyor belt 2 to the process zone 1.

Each process zone 1 is provided with a lower exhaust gas arrangement 6 configured to conduct gas that was sucked through the pellet bed and the conveyor belt 2 away from the process zone 1.

Each lower exhaust gas arrangement 6 comprising a windbox 7 that is sealed towards the conveyor belt 2 by means of sealing means 8.

The windbox 7 is divided into windbox sections 9 by dividing wall members 10.

At least one windbox section 9 of the windbox 7 is provided with a damper 11 configured to individually the exhaust gas flow in each windbox section 9. Preferably, the windbox 7 is provided with a damper 11 configured to individually the exhaust gas flow in each windbox section 9.

The strand sintering furnace comprising an exhaust gas collection channel 14 that is configured to conduct gas from each windbox section 9 of the windbox 7,

The strand sintering furnace comprising a windbox channel 15 between the exhaust gas collection channel 14 and each windbox section 9 of the windbox 7.

The damper 11 configured to adjust the exhaust gas flow in said at least one windbox section 9 is arranged in the windbox channel 15 between the exhaust gas collection channel 14 and said at least one windbox section 9 of the windbox 7. Preferably, each windbox channel 15 between the exhaust gas collection channel 14 and said at least one windbox section 9 of the windbox 7 is provided with a damper 11 configured to adjust the exhaust gas flow in a windbox

section 9 of the windbox 7.

Each windbox section 9 has preferably, but not necessarily, a bottom 16 that is at least partly inclined and/or curved towards a first end 17 of the windbox section 9 forming a downstream end of the windbox section 9, and one windbox channel 15 of the windbox channels 15 is preferably, but not necessarily, connected to each windbox section 9 at said downstream end of the windbox section 9, as shown in figures 2 to 4. In such case, the windbox sections 9 are preferably, but not necessarily, arranged in alternating order so that the bottom 16 of every second every third, every fourth or every fifth windbox section 9 being least partly inclined and/or curved towards a first side 12 of the windbox 7 and so that the bottom 16 of every second every third, every fourth or every fifth windbox section 9 being least partly inclined and/or curved towards a second side 13 of the windbox 7, which second side 12 is on the opposite side of the windbox in relation to the first side 12.

The windbox section 9 may, as shown in the figures, be longitudinal windbox sections 9 extending in a direction of movement A of the conveyor belt 2.

Each exhaust duct has preferably, but not necessarily, a circular cross section as shown in figures 2 to 4.

The windbox sections 9 may be formed of separate windbox section modules releasable attached at the windbox 7. This makes maintenance work easier, because single separate windbox section modules 19 can be replaced.

The windbox channel 15 may be releasable attached at the windbox 7. This makes maintenance work easier, because single separate windbox channel 15 can be replaced.

At least one windbox section 9, preferably each windbox section 9, can be provided with an emergency cooling valve 18, as shown in figures 3 and 4. A purpose of the emergency cooling valve is to provide cooling gas from the outside of the windbox sections 9 of the windbox 7 in case the temperature of the conveyor belt 2 in the process zone 1 in which the windbox 7 is arranged rises too high.

At least one windbox channel 15, preferably each windbox channel 15, can be provided with an emergency cooling valve 18, as shown in figure 2.

Next the windbox 7 for a strand sintering furnace comprising a number of sequential process zones 1 having different temperature conditions and some embodiments and variants of the windbox 7 will be described in greater detail.

The windbox 7 comprises sealing means 8 for sealing the windbox 7 towards a conveyor belt 2 of the strand sintering furnace, which conveyor belt 2 is arranged as an endless loop around a deflector roll 3 and a driven roll 4 and which conveyor belt 2 is configured to convey a pellet bed through said sequential process zones 1 of the strand sintering furnace, said conveyor belt 2 being gas permeable.

The windbox 7 is divided into windbox sections 9 by dividing wall members 10.

At least one windbox section 9 of the windbox 7 is provided with a damper 11 configured

to adjust the gas flow in said at least one windbox section 9. Preferably, the windbox 7 is provided with a damper 11 configured to individually the exhaust gas flow in each windbox section 9.

The windbox 7 comprises an exhaust gas collection channel 14 that is configured to conduct gas from each windbox section 9 of the windbox 7.

The windbox 7 comprises a windbox channel 15 between the exhaust gas collection channel 14 and each windbox section 9 of the windbox 7.

The damper 11 configured to adjust the exhaust gas flow in said at least on windbox section 9 is arranged in the windbox channel 15 between the exhaust gas collection channel 14 and said at least one windbox section 9 of the windbox 7. Preferably, each windbox channel 15 between the exhaust gas collection channel 14 and said at least one windbox section 9 of the windbox 7 is provided with a damper 11 configured to adjust the exhaust gas flow in a windbox section 9 of the windbox 7.

Each windbox section 9 has preferably, but not necessarily, a bottom 16 that is at least partly inclined and/or curved towards a first end 17 of the windbox section 9 forming a downstream end of the windbox section 9, and one windbox channel 15 of the windbox channels 15 is preferably, but not necessarily, connected to each windbox section 9 at said downstream end of the windbox section 9, as shown in figures 2 to 4. In such case, the windbox sections 9 are preferably, but not necessarily, arranged in alternating order so that the bottom 16 of every second, every third, every fourth or every fifth windbox section 9 being least partly inclined and/or curved towards a first side 12 of the windbox 7 and so that the bottom 16 of every second every third, every fourth or every fifth windbox section 9 being least partly inclined and/or curved towards a second side 13 of the windbox 7, which second side is on the opposite side of the windbox 7 in relation to the first side 12.

The windbox section 9 may, as shown in the figures, be longitudinal windbox sections 9 extending in a direction of movement A of the conveyor belt 2.

Each exhaust duct has preferably, but not necessarily, a circular cross section as shown in figures 2 to 4.

The windbox sections 9 may be formed of separate windbox section modules 19 releasable attached at the windbox 7. This makes maintenance work easier, because single separate windbox section modules 19 can be replaced also in existing windboxed for upgrading or modernization purposes

The windbox channel 15 may be releasable attached at the windbox 7. This makes maintenance work easier, because single separate windbox channels 15 can be replaced.

At least one, preferably each windbox section 9 can be provided with an emergency cooling valve 18, as shown in figures 3 and 4.

At least one, preferably each windbox channel 15 can be provided with an emergency cooling valve 18, as shown in figure 2.

It is apparent to a person skilled in the art that as technology advanced, 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 and which is described in the description or in the figures, but they may vary within the scope of the claims.

Claims

1. A strand sintering furnace comprising a number of sequential process zones (1) having different temperature conditions, wherein the strand sintering furnace comprising

5 a conveyor belt (2) that is arranged as an endless loop around a deflector roll (3) and a driven roll (4) and which conveyor belt (2) is configured to convey a pellet bed through said sequential process zones (1) of the strand sintering furnace, said conveyor belt (2) being gas permeable,

10 wherein each sequential process zone (1) being provided with an upper gas feeding arrangement (5) configured to conduct gas to be sucked through the pellet bed and the conveyor belt (2) to the process zone (1),

wherein each process zone (1) being provided with a lower exhaust gas arrangement (6) configured to conduct gas that was sucked through the pellet bed and the conveyor belt (2) away from the process zone (1),

15 wherein each lower exhaust gas arrangement (6) comprising a windbox (7) that is sealed towards the conveyor belt (2) by means of sealing means (8),

wherein the windbox (7) being divided into windbox sections (9) by dividing wall members (10), and

20 wherein at least one windbox section (9) of the windbox (7) being provided with a damper (11) configured to adjust the exhaust gas flow in said at least one windbox section (9),

characterized

by an exhaust gas collection channel (14) that is configured to conduct gas from each windbox section (9) of the windbox (7),

25 by a windbox channel (15) between the exhaust gas collection channel (14) and each windbox section (9) of the windbox (7), and

by the damper (11) configured to adjust the exhaust gas flow in said at least one windbox section (9) being arranged in the windbox channel (15) between the exhaust gas collection channel (14) and said at least one windbox section (9) of the windbox (7).

30 2. The strand sintering furnace according to claim 1, **characterized**

by each windbox section (9) having a bottom (16) that is at least partly inclined and/or curved towards a first end (17) of the windbox section (9) forming a downstream end of the windbox section (9), and

35 by one windbox channel (15) of the windbox channels (15) being connected to each windbox section (9) at said downstream end of the windbox section (9).

3. The strand sintering furnace according to claim 2, **characterized** by the windbox sections (9) being arranged in alternating order so that the bottom (16) of every second windbox section

(9) being least partly inclined and/or curved towards a first side (12) of the windbox (7) and so that the bottom (16) of every second windbox section (9) being least partly inclined and/or curved towards a second side (13) of the windbox (7), which second side (13) is on the opposite side of the windbox (7) in relation to the first side (12).

5

4. The strand sintering furnace according to any of the claims 1 to 3, **characterized** by the windbox section (9) being a longitudinal windbox section (9) extending in a direction of movement of the conveyor belt (2).

10 5. The strand sintering furnace according to any of the claims 1 to 4, **characterized** by the exhaust duct having a circular cross section.

6. The strand sintering furnace according to any of the claims 1 to 5, **characterized** by the windbox sections (9) being formed of separate windbox section modules (19) releasable attached
15 at the windbox (7).

7. The strand sintering furnace according to any of the claims 1 to 6, **characterized** by the windbox channels (15) being releasable attached at the windbox (7)

20 8. The strand sintering furnace according to any of the claims 1 to 7, **characterized** by at least one windbox section (9) being provided with an emergency cooling valve (18).

9. The strand sintering furnace according to any of the claims 1 to 8, **characterized** by at least one windbox channel (15) being provided with an emergency cooling valve (18).

25

10. A windbox (7) for a strand sintering furnace comprising a number of sequential process zones (1) having different temperature conditions, wherein the windbox (7) comprising sealing means (8) for sealing the windbox (7) towards a conveyor belt (2) of the strand sintering furnace, which conveyor belt (2) is arranged as an endless loop around a deflector roll (3) and a driven roll (4) and which conveyor belt (2) is configured to convey a pellet bed through
30 said sequential process zones (1) of the strand sintering furnace, said conveyor belt (2) being gas permeable,

wherein the windbox (7) being divided into windbox sections (9) by dividing wall members (10), and

35 wherein at least one windbox section (9) of the windbox (7) being provided with a damper (11) configured to adjust the exhaust gas flow in said at least one windbox section (9) ,

characterized

by an exhaust gas collection channel (14) that is configured to conduct gas from each

windbox section (9) of the windbox (7),

by a windbox channel (15) between the exhaust gas collection channel (14) and each windbox section (9) of the windbox (7), and

by the damper (11) being configured to adjust the exhaust gas flow in said at least on
5 windbox section (9) being arranged in the windbox channel (15) between the exhaust gas collection channel (14) and said at least one windbox section (9) of the windbox (7).

11. The windbox according to claim 10, **characterized**

by each windbox section (9) having a bottom (16) that is at least partly inclined and/or
10 curved towards a first end (17) of the windbox section (9) forming a downstream end of the windbox section (9), and

by one windbox channel (15) of the windbox channels (15) being connected to each windbox section (9) at said downstream end of the windbox section (9).

15 12. The windbox according to claim 11, **characterized** by the windbox sections (9) being arranged in alternating order so that the bottom (16) of every second windbox section (9) being least partly inclined and/or curved towards a first side (12) of the windbox (7) and so that the bottom (16) of every second windbox section (9) being least partly inclined and/or curved towards a second side (13) of the windbox (7), which second side (13) is on the opposite side of
20 the windbox (7) in relation to the first side (12).

13. The windbox according to any of the claims 10 to 12, **characterized** by the windbox section (9) being a longitudinal windbox section (9) extending in a direction of movement of the conveyor belt (2).

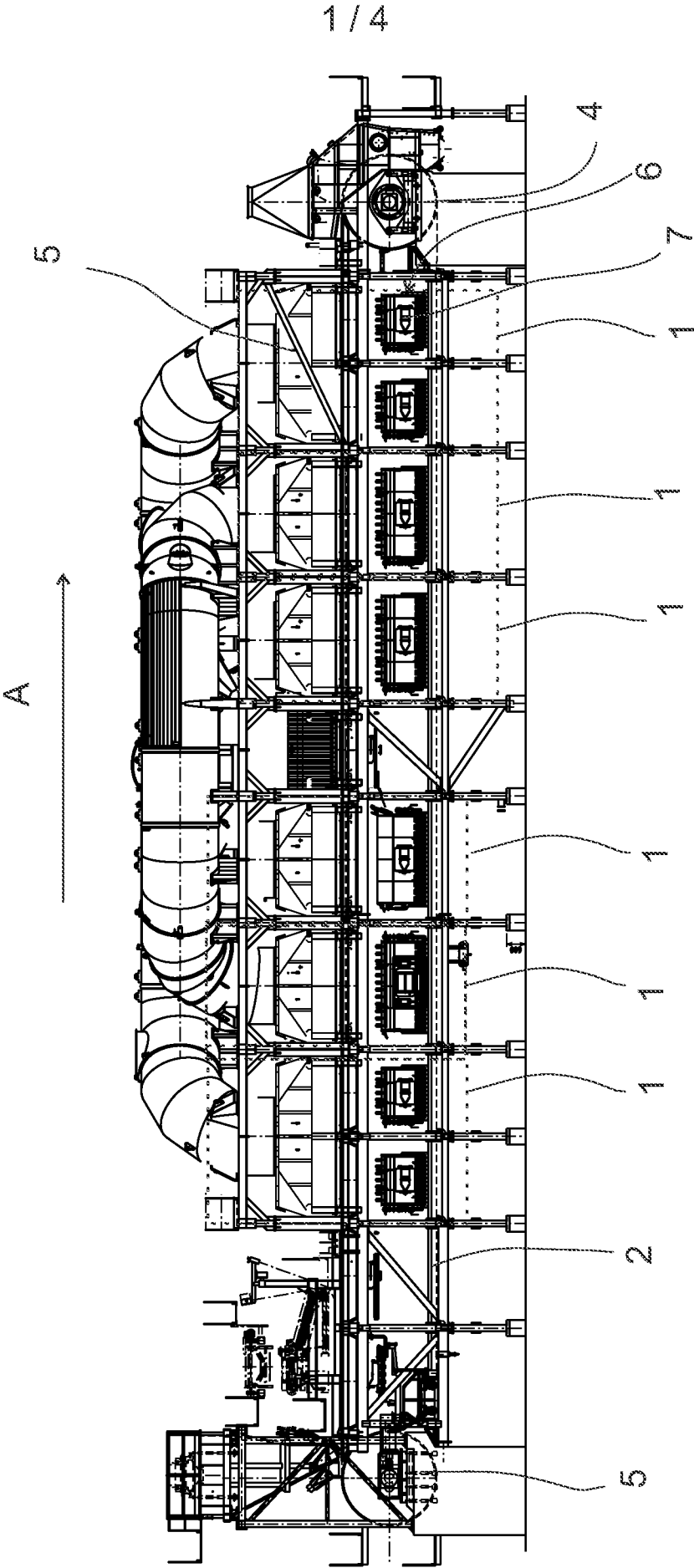
25 14. The windbox according to any of the claims 10 to 13, **characterized** by the exhaust duct has a circular cross section.

15. The windbox according to any of the claims 10 to 14, **characterized** by the windbox
30 sections (9) being formed of separate windbox section modules (19) releasable attached at the windbox (7)

16. The windbox according to any of the claims 10 to 15, **characterized** by the windbox channels (15) being releasable attached at the windbox (7).

35 17. The windbox according to any of the claims 10 to 16, **characterized** by at least one windbox section (9) being provided with an emergency cooling valve (18).

18. The windbox according to any of the claims 10 to 17, **characterized** by at least one windbox channel (15) being provided with an emergency cooling valve (18).



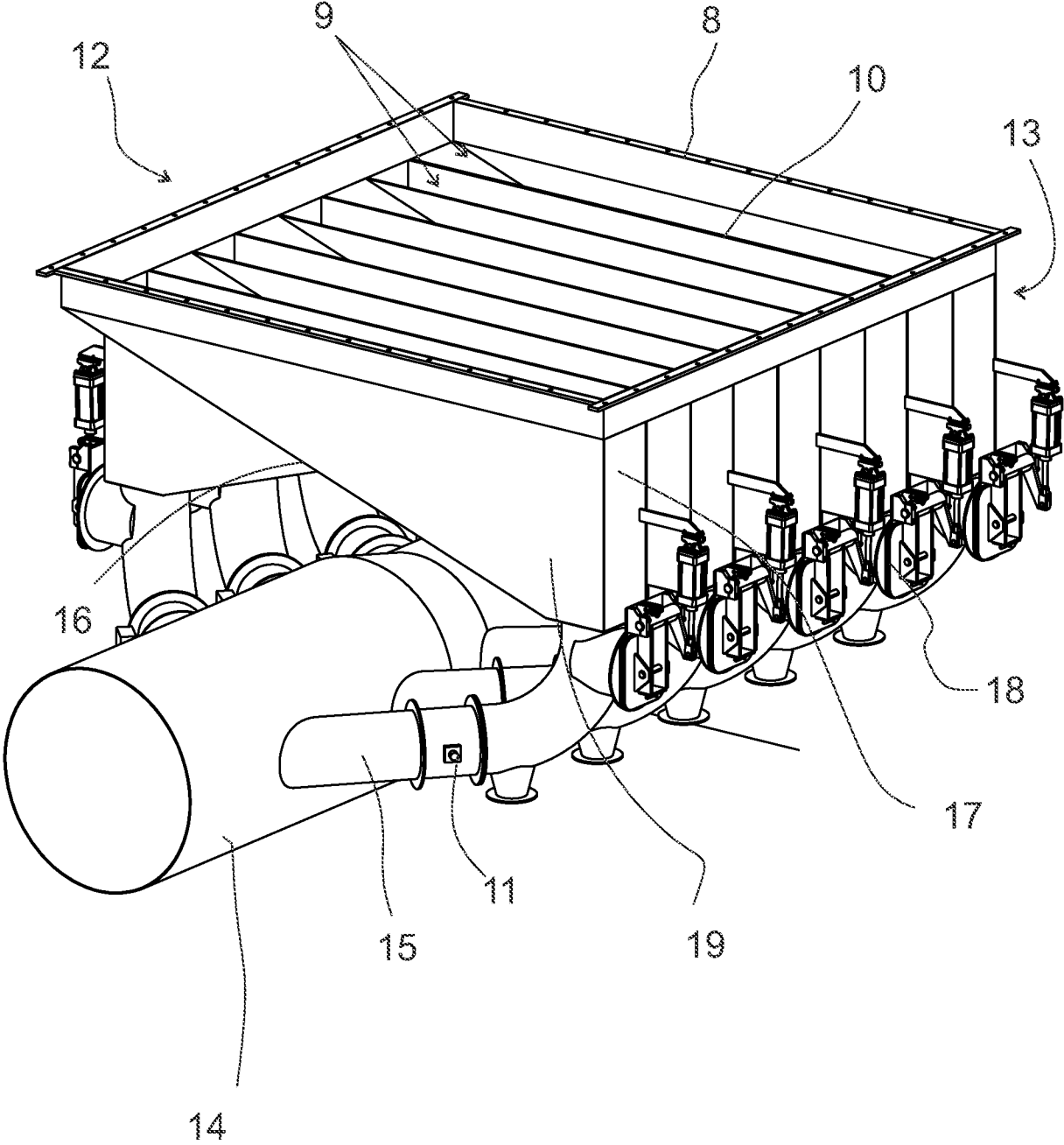


FIG 2

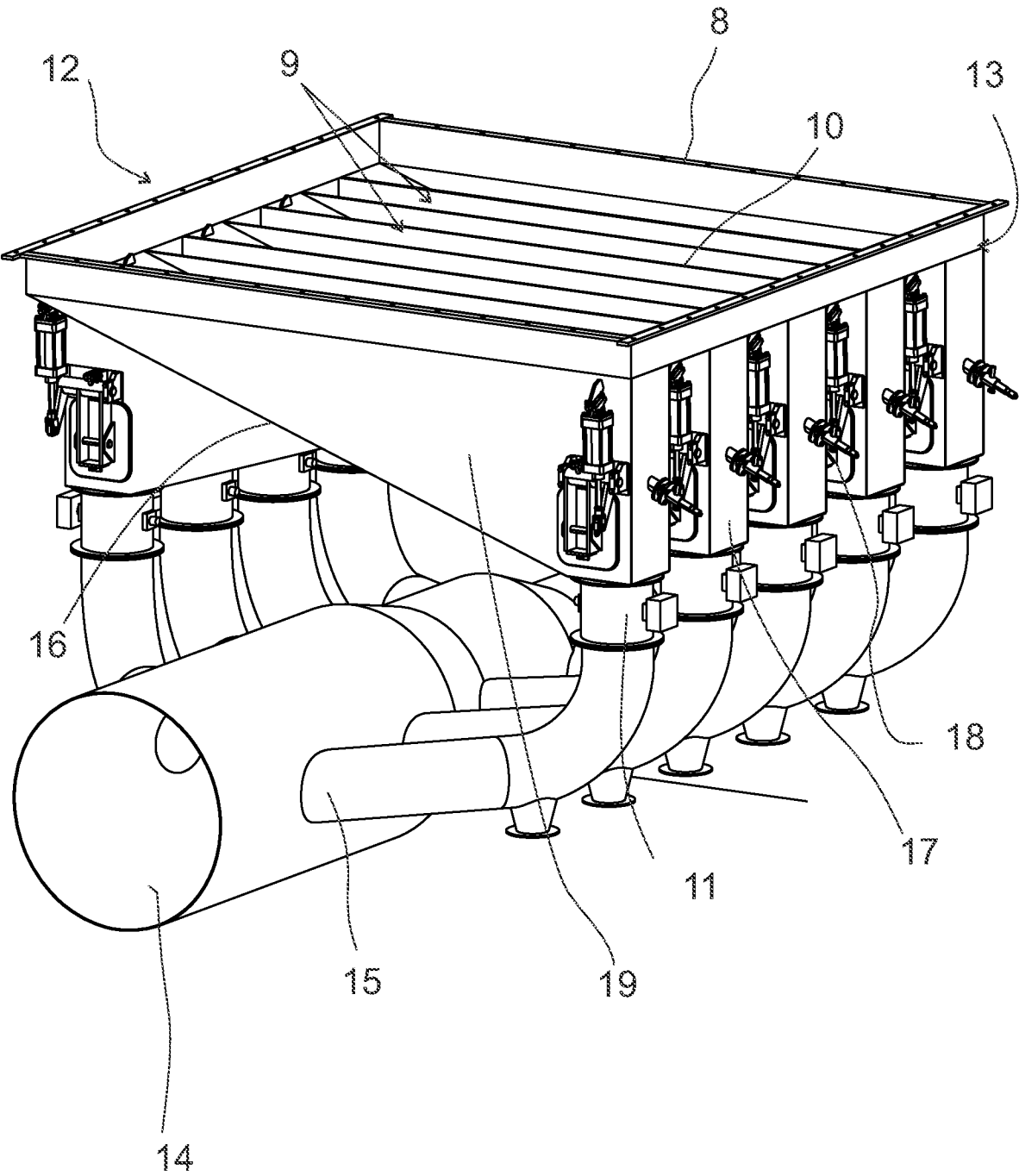


FIG 3

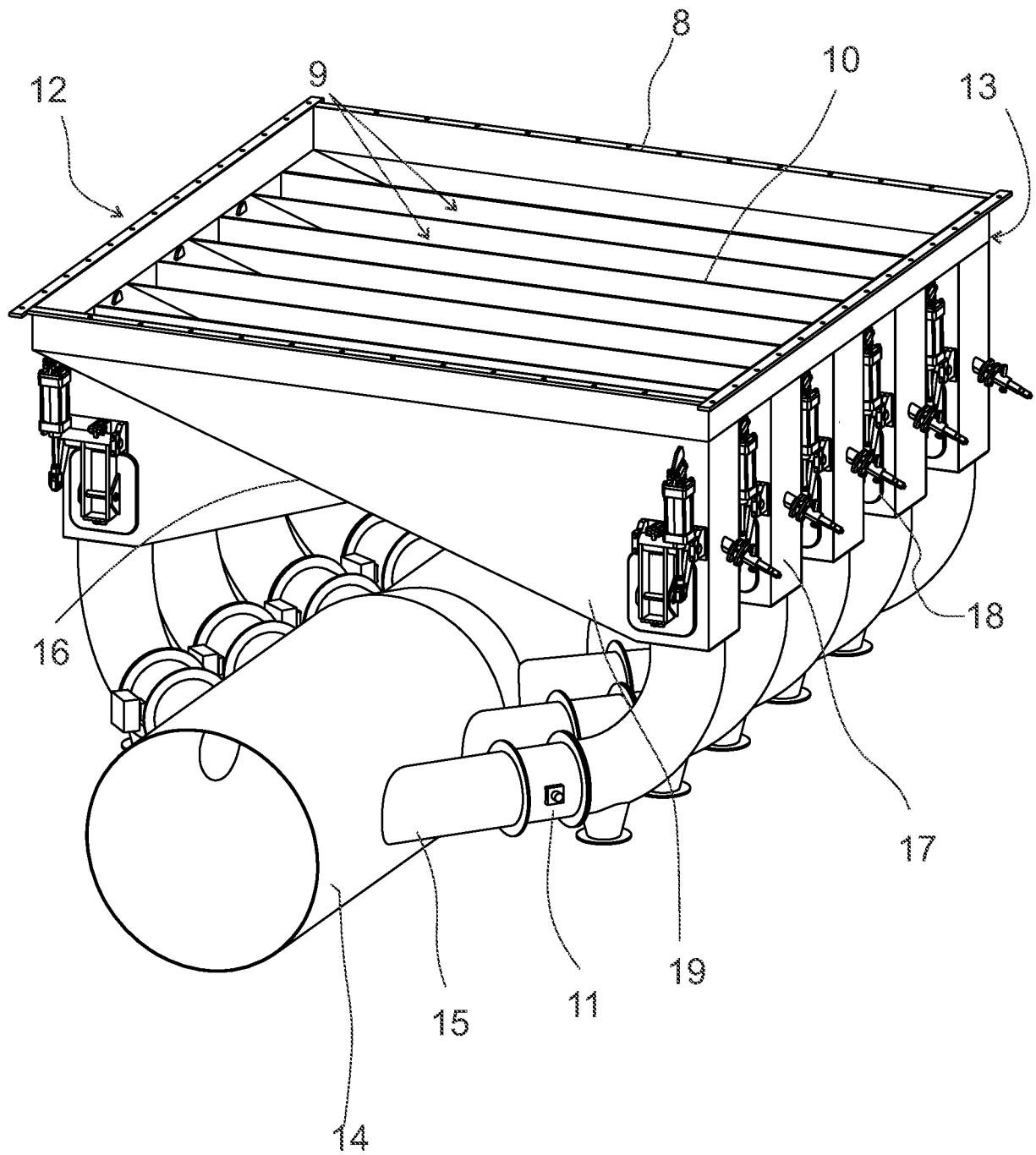


FIG 4

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. F27B21/06 C22B1/20
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 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	US 1 474 859 A (SWART WALTER G) 20 November 1923 (1923-11-20) figure 3 page 2, column 2, line 110 - page 3, column 1, line 15 -----	1-18



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1474859	A	20-11-1923	NONE
