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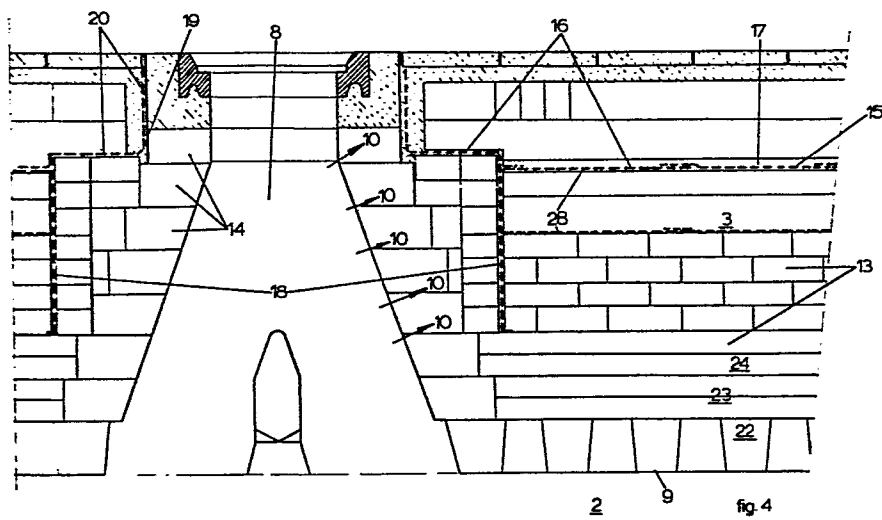
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54 **Coke oven battery.**

57 A coke oven battery (1) has horizontal coking chambers (2) and a roof (3). Vertical conduits (6,7,8) extend through the roof (3). In order to prevent leakage of gas through the roof (3) a gas tight screen (15) of metal sheet is provided in the roof (3). The screen (15) consists of substantially horizontal sections (17) extending between the vertical conduits (6,7,8) and substantially vertical sections (18) adjacent the vertical conduits (6,7,8). The vertical sections (18) have a gas-tight seal to moulded bricks (14) at the top of the vertical conduits (6,7,8) by casting in concrete a stepped portion of those sections (18) and the moulded bricks.



1.

"COKE OVEN BATTERY"

5 The present invention relates to a coke oven
battery.

 Coke oven batteries are known having a
plurality of substantially horizontal coking chambers
and an oven roof. The oven roof has a plurality of
vertical conduits e.g. for inspection, for the removal
10 of coke-oven gas, and for charging the battery. The
majority of the oven roof is constructed from masonry
and the joints between the masonry open and cracks
develop when the coke oven battery is fired and also
during operation of the battery. This leads to the
15 problem that coke oven gas produced during operation of
the battery leaks from the coking chambers in the
battery to the exterior of the battery or to the
combustion system of the battery through the open
joints and cracks in the roof.

20 Gas leakage occurs by coke oven gas, formed
during the coking process, leaking into the oven roof
from:

- (i) the coking chambers,
 - (ii) the conduits (usually called "ascension pipes")
- 25 in the oven roof for the removal of coke-oven gas;

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and/or

(iii) the charging conduits in the oven roof.

Convection of the coke-oven gas causes the temperature of the oven roof to increase and combustion
5 of the gas in the roof (such combustion being known as "inner fires") damages the brickwork. The tie rods installed in the roof become too hot and the tensile force they exert decreases, reducing their effectiveness. The upper parts of the roof usually
10 contain porous insulation bricks and the hydrocarbons in the coke-oven gas condense in these bricks, reducing their insulative effect. Coke-oven gas may also pass through the roof to the combustion system of the battery, leading to incomplete combustion and sooting
15 of the chimneys. Coke-oven gas leaking to the atmosphere causes pollution of the environment.

It is also possible for combustion gas to leak from the combustion system, especially from the inspection conduits extending vertically through the
20 oven roof, into the oven roof itself and from thence to the atmosphere.

Leakage of coke-oven and combustion gas results in less efficient and hence less economic performance and also makes operation of the battery more difficult.
25 The leakage results in degeneration of (parts of) the

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oven roof making repairs necessary.

As has been mentioned, tie rods are sometimes provided in the roof, which exert compressive forces on the lateral edges of the roof. This may reduce the amount of gas leakage but its effect is extremely limited and is useless in combatting localised leaks.

It is known from e.g. Dutch Patent Application 8101060 to coat the exterior of the lateral edges of a coke oven battery with metal foil. Such an exterior coating is impractical for use on the oven roof as it would be damaged too easily. It also could not prevent gas leakage from one part of the battery to another.

The present invention seeks to eliminate, or at least reduce, the problem of gas leakage in the oven roof. It does this by providing a gas-tight screen in the roof. The screen has substantially horizontal sections extending between the vertical conduits in the roof, and substantially vertical sections adjacent the vertical conduits. The substantially horizontal sections limit the spread of gas from the coking chambers and the substantially vertical sections limit the spread from the conduits. The substantially vertical sections also help to stop gas leakage to the combustion systems.

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The screen is preferably made of a plurality of metal sheets.

The substantially vertical sections of the screen should preferably be designed so that they extend to a point at or adjacent the top of the oven roof. In order to prevent leakage from the top of the screen near the openings of the conduits, the top of the substantially vertical sections should preferably be constructed so that they form a gas-tight seal with moulded bricks which restrict the conduits. This may be achieved by casting in concrete a stepped portion of the vertical sections to the moulded bricks.

Where there are a plurality of closely spaced conduits, a simple screen construction may be obtained by combining the vertical sections near to these conduits to form a common vertical screen section.

In order to improve the gas-tight sealing of the screen, the substantially horizontal sections preferably comprise two separate horizontal layers spaced vertically apart.

Where the oven roof consists from bottom to top of a number of courses of silica and/or chamotte bricks, and several courses of refractory insulation bricks, at least the substantially horizontal sections of the screen should preferably be installed in the

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section containing the porous refractory insulation bricks.

Preferably tie rods are provided in the roof, such that the screen is between them and the coking chambers. This prevents gas leaking to the tie rods to reduce the risk of their tensile stress being reduced by overheating.

An embodiment of the invention will now be described, by way of examples with reference to the accompanying drawings in which:

Figure 1 is an elevation of a coke-oven battery on the oven roof;

Figure 2 shows a vertical transverse section of the oven roof according to arrow II-II in Figure 1;

Figure 3 shows a vertical longitudinal section along the line III-III in Figure 1;

Figure 4 shows a vertical transverse section of the part marked IV in Figure 2, on a larger scale;

Figure 5 shows a vertical longitudinal section of the part marked V in Figures 3 in a larger scale, and

Figure 6 shows a vertical longitudinal section along the line VI - VI in Figure 1.

In Figs. 1, 2 and 3 a coke-oven battery has horizontal coking chambers 2 and an oven roof 3. The

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temperature in the coking chambers 3 during operation of the battery is approximately 800°C. The oven roof 3 is in most cases designed as a brickwork structure, and is approximately 1 metre thick. Combustion walls 4 are provided between adjacent coking chambers 2, each wall 4 comprising a number of combustion chambers 5. During operation, the temperature in the combustion chambers 5 is approximately 1350°C. A large number of vertical inspection conduits 6 are provided in oven roof 3, which conduits open into the combustion chambers 5. At least one ascension conduit 7 for coke-oven gas is provided in the oven roof 3 for each coking chamber. In most coke-oven batteries a plurality e.g. four, charging conduits 8 are also provided in the oven roof for coking coals. Inspection conduits 6 and charging conduits 8 are sealed with covers during operation.

During operation coke-oven gas penetrates open joints and cracks in oven roof 3 (see Figure 2) at arch 9, ascension conduit 7 and charging conduits 8, in the direction shown by arrows 10. This gas seeks an exit to the atmosphere through the oven roof, in the direction of arrows 11, or finds its way, under certain conditions through the inspection conduits 6 to the combustion system, as shown by arrows 12. Under other conditions combustion gas also penetrates the oven roof

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at inspection conduit 6 in the direction of arrows 27, whereupon the combustion gas also seeks an exit to the atmosphere in the direction of arrows 11.

In Figures 4 and 5 the present invention is shown in a common oven roof design, namely one in which the roof consists of a brickwork structure 13 in which are provided vertical inspection conduits 6 and charging conduits 8, formed by moulded bricks 14. Many variants of the embodiment of the invention according to the example are conceivable to the skilled man, all of which lie within the scope of the present invention.

A gas-tight screen 15 is installed between the vertical conduits 6, 7 and 8 in the oven roof. The screen 15 comprises substantially horizontal and substantially vertical sections 17 and 18 respectively formed from metal sheets 16, the substantially horizontal sections 17 extend between the conduits, and the substantially vertical sections 18 are adjacent the conduits 6, 7 and 8.

The metal sheets 16 are installed in the joints of brickwork 13. A good structure for example, is one in which the metal sheets are 0.05-0.25 mm thick, and consist of oxidation-resistant alloy steel foil, the material of which has the following composition: 15-30% Cr, 5-25% Ni and 0-10% Mo. Sheets of fixed dimensions

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or sections which are taken up from a coil, in widths of 60 or 90 cm, for example, are used for producing screen sections 17,18. The sheets are installed so that they overlap.

5 The sheets can be installed not only when constructing a new coke-oven battery, but can also be used in an existing oven roof, after parts of it have been demolished.

 The substantially vertical sections 18 extend
10 from close to the top of the oven roof. The substantially vertical sections 18 of the screen 15 prevent gas from penetrating the brickwork, past vertical screen sections 18 in the direction of arrows 10, at the vertical conduits 6,7,8. The substantially
15 horizontal sections 17 of the screen 15 prevent the conveyance to the atmosphere of gas which has penetrated oven roof 3 from arch 9 of coking chambers 2. The substantially horizontal sections 17 also prevent leakage into the atmosphere of gas which is
20 forced along the bottom of the substantially vertical sections 18 of the screen 15 past these sections and into the brickwork, for example, if these sections are affected by a high temperature. The substantially vertical sections close to inspection conduits 6 also
25 prevent the discharge of gas which has penetrated the

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brickwork underneath the substantially horizontal sections 17 of the screen 15 via the inspection conduits and into the combustion system.

In order to prevent leakage into the atmosphere at the top of the conduits 6, 7 and 8 through the brickwork between the moulded bricks 14 and the substantially vertical sections 18 of the screen 15, the substantially vertical sections 18 of the screen are arranged so that they form a gas-tight connection with moulded bricks 14, by bringing these sections into contact with the moulded bricks at point 19, and preferably casting the structure thus formed in refractory concrete. The moulded bricks at the top of the vertical conduits are, in most cases, recessed slightly in relation to the moulded bricks underneath them. Thus for a gas-tight connection with the top moulded bricks, a stepped top section 20 of the vertical sections 18 is desirable. This stepped top section 20 is considered to form part of the vertical section 18 of the screen 15, so that these sections 18 are referred to as substantially vertical sections although they may not be vertical over their entire length.

The inspection conduits 6 of a combustion wall are installed in a row as shown in Figure 1 in

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conventional coke-oven battery design, and are located close to each other. Although it is possible to install substantially vertical sections in the oven roof round each inspection conduit 6 a simple structure is obtained by combining the substantially vertical sections close to a row of inspection conduits to form two substantially vertical sections 21 close to and on each side of the row of inspection conduits 6.

In the structure according to the invention, gas which has penetrated the brickwork accumulates underneath the substantially horizontal sections 17. The penetration of this gas through one or more substantially horizontal sections as a result of defects in those sections will again cause considerable leakage. Therefore the horizontal screen sections should preferably be constructed with two separate horizontal layers 28 of metal sheets, spaced vertically apart.

In a conventional design, the oven roof comprises, from bottom to top, firstly a plurality of courses of silica bricks 22, close to the coking chambers 2 and the combustion chambers 5, possibly a plurality of courses of chamotte bricks 23 and several courses of porous refractory insulation bricks 24. As shown in Figures 4 and 5, at least the horizontal

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sections 17 of the screen 15 should preferably be installed in the part of the roof containing the porous refractory insulation bricks.

The gas-tight screen 15 shown in Figure 6 is basically the same as that shown in Figures 4 and 5, although the screen is of a much simpler design because between the vertical inspection conduits 6 and the charging conduits 8 the roof consists substantially of moulded bricks 14 only, so that there is much less room available for the screen to be installed in the roof 3. As before the screen 15 has substantially horizontal sections 17 and substantially vertical sections 18 formed from metal sheets. The screen 15 is arranged to form a gas-tight connection with the moulded bricks at the top of conduits 6 and 8. Furthermore the substantially vertical sections 18 of the screen 15 close to a row of inspection conduits are combined to form vertical sections 21 close to and on each side of the inspection conduits.

The substantially vertical sections 21 shown in Figure 6 are arranged to be substantially in line with the vertical parts of the stepped top sections 20 shown in Figure 5. Likewise the substantially horizontal sections 17 at the screen shown in Figure 6 are arranged to be substantially in line with the

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horizontal parts of the stepped top sections 20 shown in Figure 5. In this preferred embodiment of the screen the tie rods are installed in that section of the oven roof on the opposite side of the screen 15 from the coking chambers so that the tie rods 25 are protected from temperature increases due to gas leakage. The tie rods may be provided with additional protection against temperature increases by means of thermal insulating material 26 installed in the screened section of the oven roof.

In addition the stepped sections 20 of the substantially vertical sections 18 shown in Figure 5 may be provided with additional vertical parts 29 to form channels 30 (see Figure 1) for the tie rods 25 which channels extend substantially the entire length of the tie rods in the roof, the channels consisting of stepped sections 20 and additional sections 29 in Figure 5 and of sections 17, 18 and 21 in Figure 6 respectively. The additional vertical parts 29 are also provided with thermal insulating material 26, so that the tie rods are fully sealed and insulated from the oven roof.

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CLAIMS

1. A coke oven battery comprising a plurality of substantially horizontal coking chambers (2), and an oven roof (3) having a plurality of substantially vertical conduits (6,7,8) therein;
5 characterised in that the roof contains a gas-tight screen (15) the screen having substantially horizontal sections (17) extending between the conduits (6,7,8) and substantially vertical
10 sections (18) adjacent the conduits (6,7,8).
2. A coke oven battery according to claim 1 wherein the screen (15) is formed by a plurality of metal sheets (16).
3. A coke oven battery according to claim 1 or
15 claim 2, wherein substantially vertical sections (18) of the screen (15) extends to at or adjacent the top of the oven roof (3).
4. A coke oven battery according to any one of the preceding claims wherein the top of at least some of
20 the substantially vertical sections (18) of the screen (15) have a gas-tight seal to moulded bricks bounding an upper part of a corresponding vertical conduit (6,7,8).
5. A coke oven battery according to claim 4
25 wherein the gas-tight seal is formed by casting in

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concrete a stepped portion of the substantially vertical section (18) of the screen and moulded bricks of the corresponding conduit (6,7,8).

6. A coke oven battery according to any one of the preceding claims, wherein at least some of the substantially vertical conduits (6) are closely adjacent and there is at least one substantially vertical section (18) of the screen (15) common to the closely adjacent vertical conduits (6).

10 7. A coke oven battery according to any one of the preceding claims, wherein the substantially horizontal sections (17) of the screen (15) comprise at least two vertically spaced layers.

8. A coke oven battery according to any one of the preceding claims wherein the oven roof (3) comprises a plurality of courses of silica and/or chamotte bricks (22,23) and a plurality of courses of porous refractory insulation bricks (24) above the courses of silica and/or chamotte bricks (22,23) and at least the substantially horizontal portions (17) of the screen (15) are located between courses of the porous refractory insulation bricks (24).

9. A coke oven battery according to any one of the preceding claims, wherein a plurality of tie rods (25) are provided in the oven roof (3), with the screen (15)

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lying between the tie rods (25) and the coking chambers (2).

10. A coke oven battery according to claim 9, wherein the screen is arranged to form channels (30) for the tie rods (25), which channels (30) extend substantially the entire length of the tie rods (25) in the oven roof (3).

11. A coke oven battery according to claim 9 or claim 10, wherein thermal insulation material (26) is installed between the screen (15) and the tie rods (25).

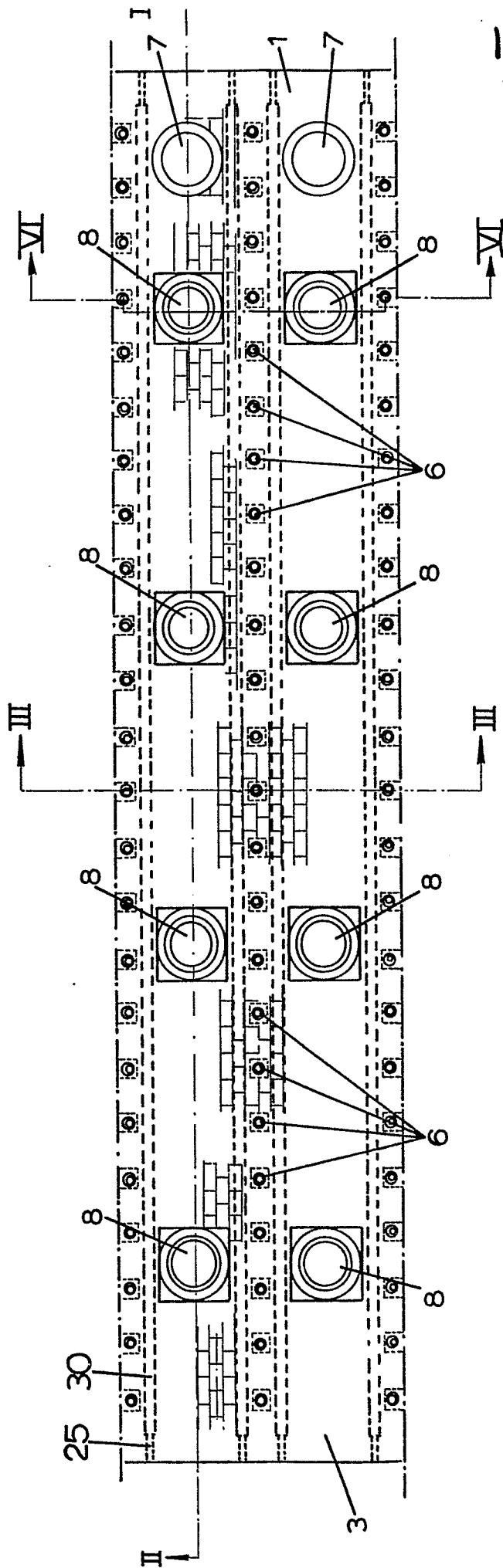


fig. 1

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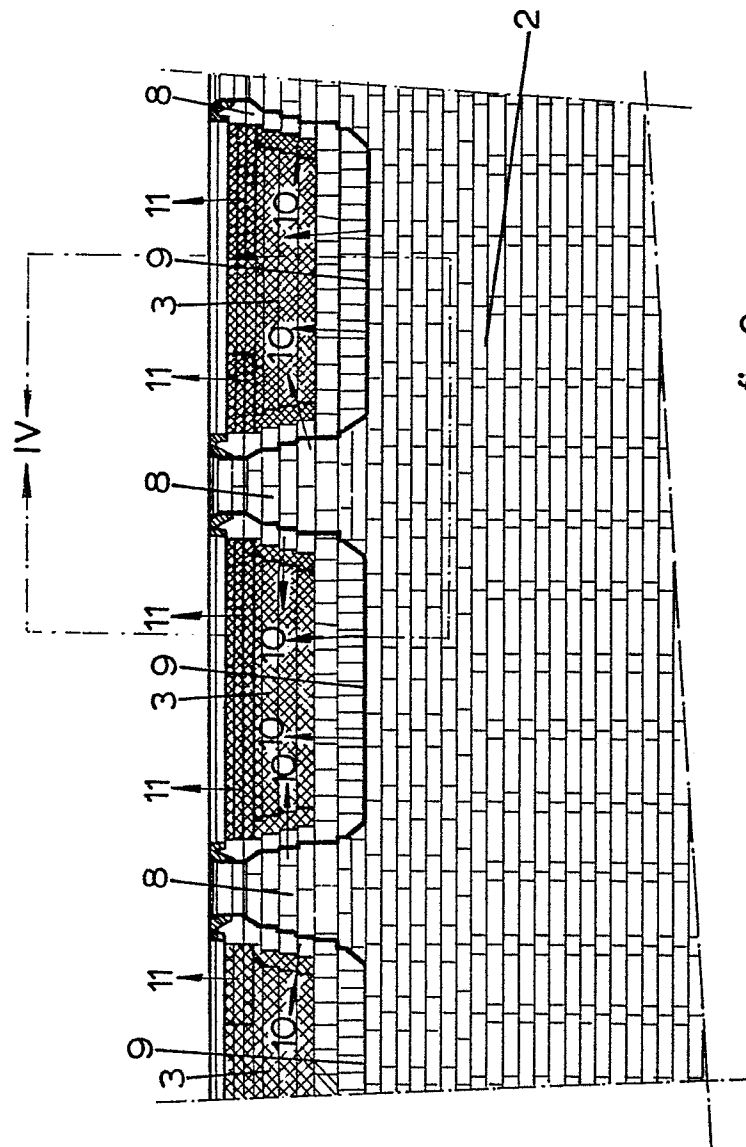


fig. 2

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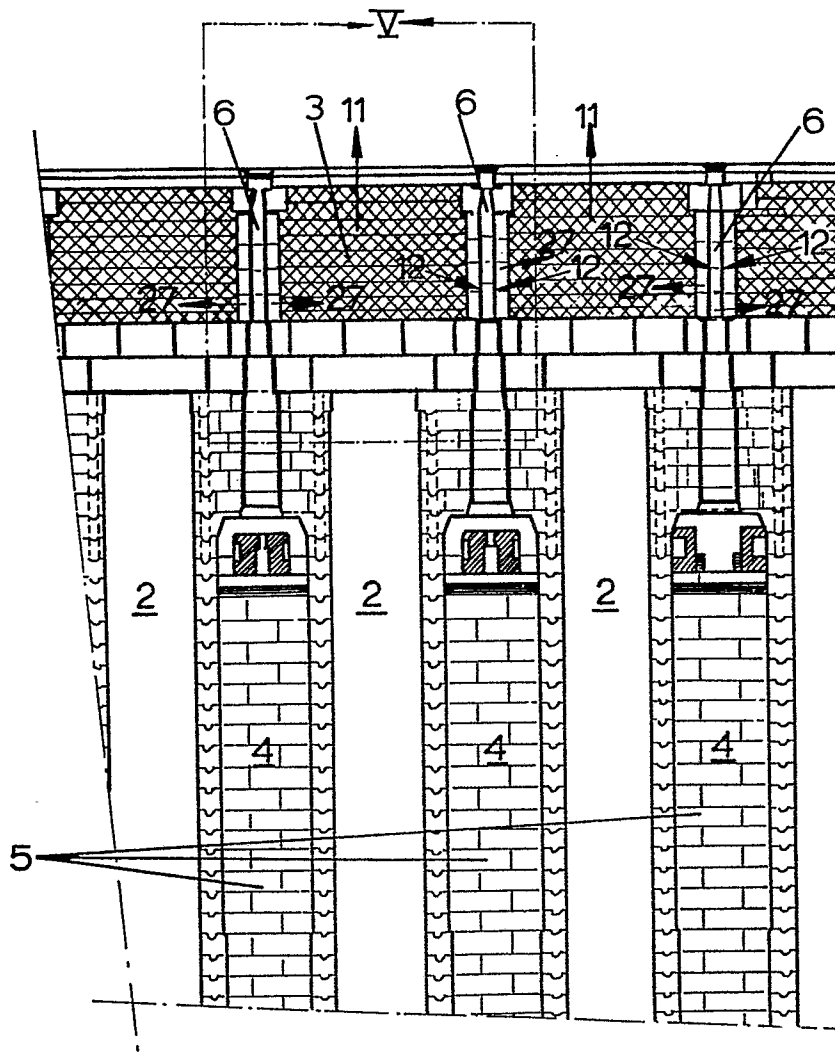


fig. 3

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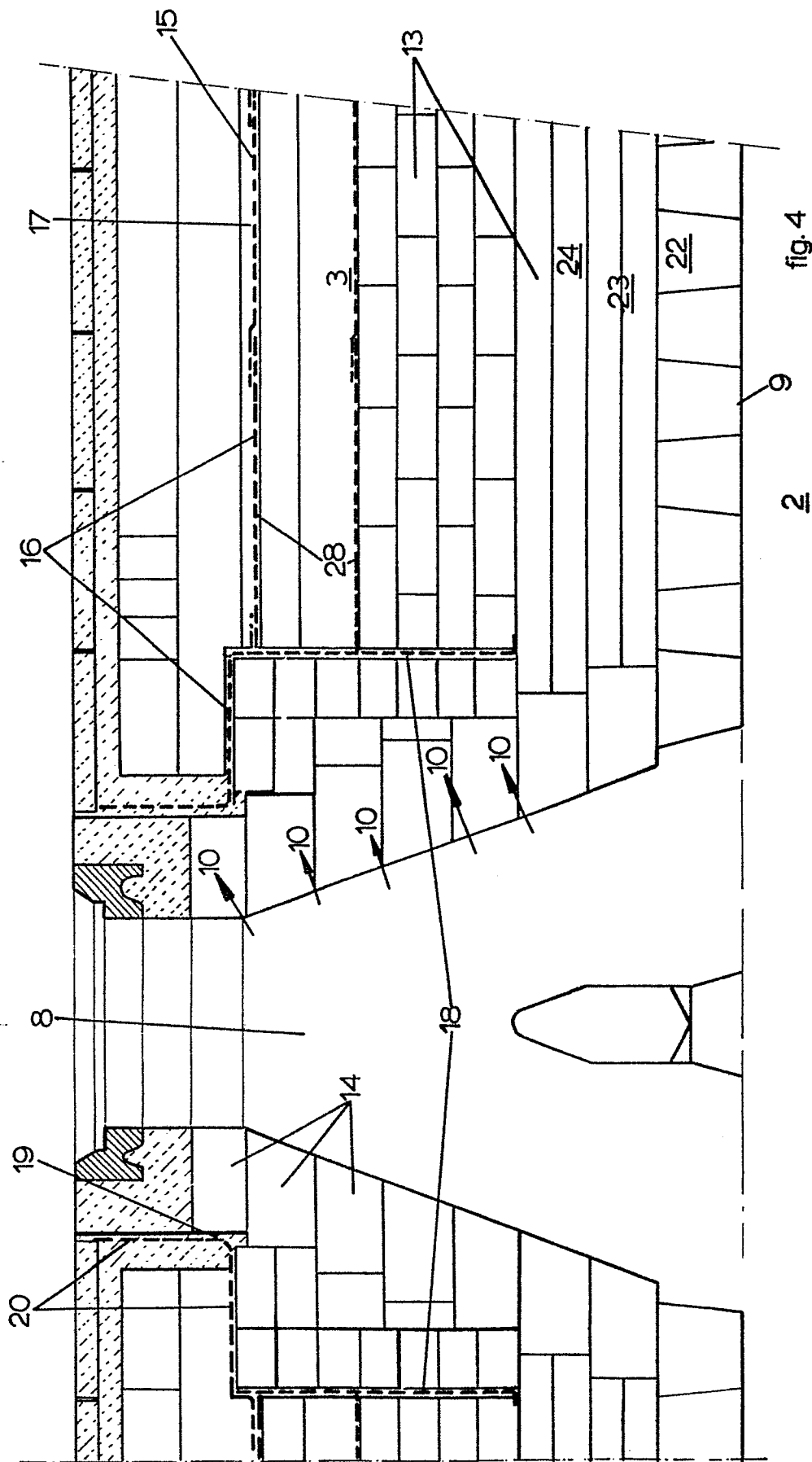


fig. 4

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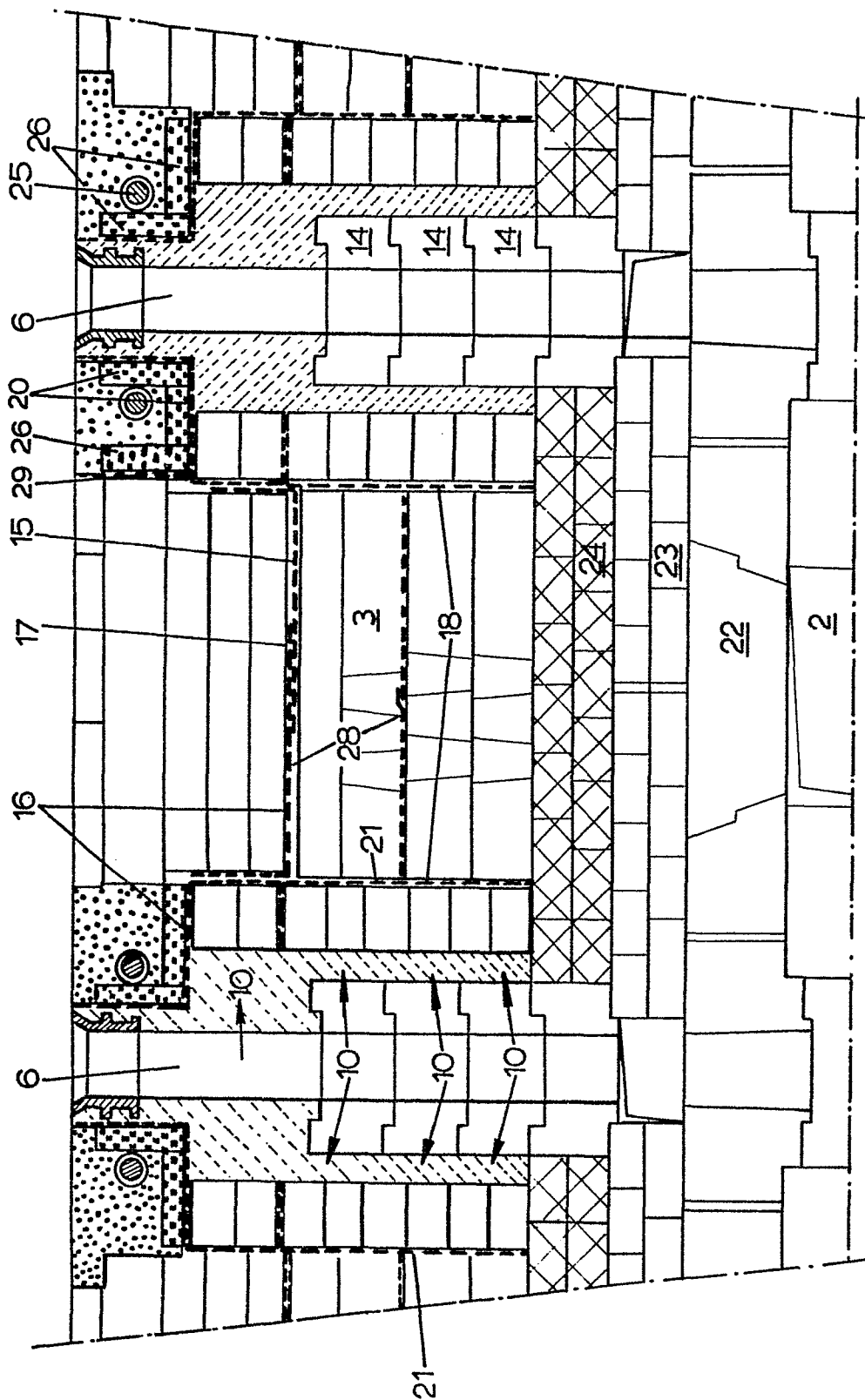


fig. 5

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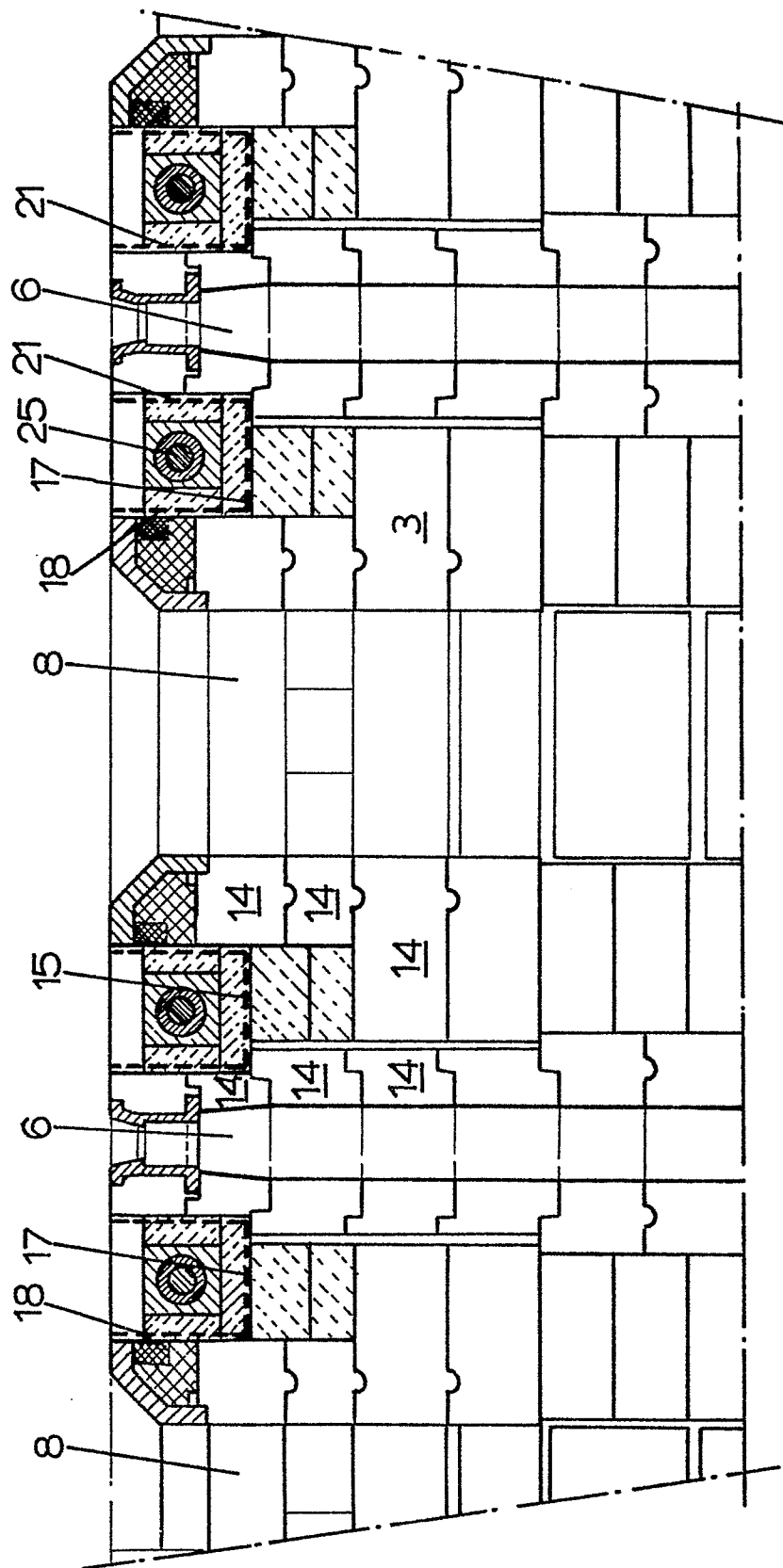


fig. 6



European Patent
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EUROPEAN SEARCH REPORT

0107878

Application number

EP 83 20 1442

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. ³)
A	EP-A-0 060 005 (ESTEL HOOGOSENS) * Claims 1-10; figures 1-7 *	1-11	C 10 B 29/06
A	US-A-2 216 983 (OTTO) * Claims 2-4, 7, 20, 23; figures 1, 2, 15, 16, 21-24 *	1-11	
A	DE-C- 512 334 (KOKSOFFENBAU UND GASVERWERTUNG)		
A	DE-C- 515 538 (KILLING et al.)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			C 10 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23-12-1983	Examiner MEERTENS J.
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