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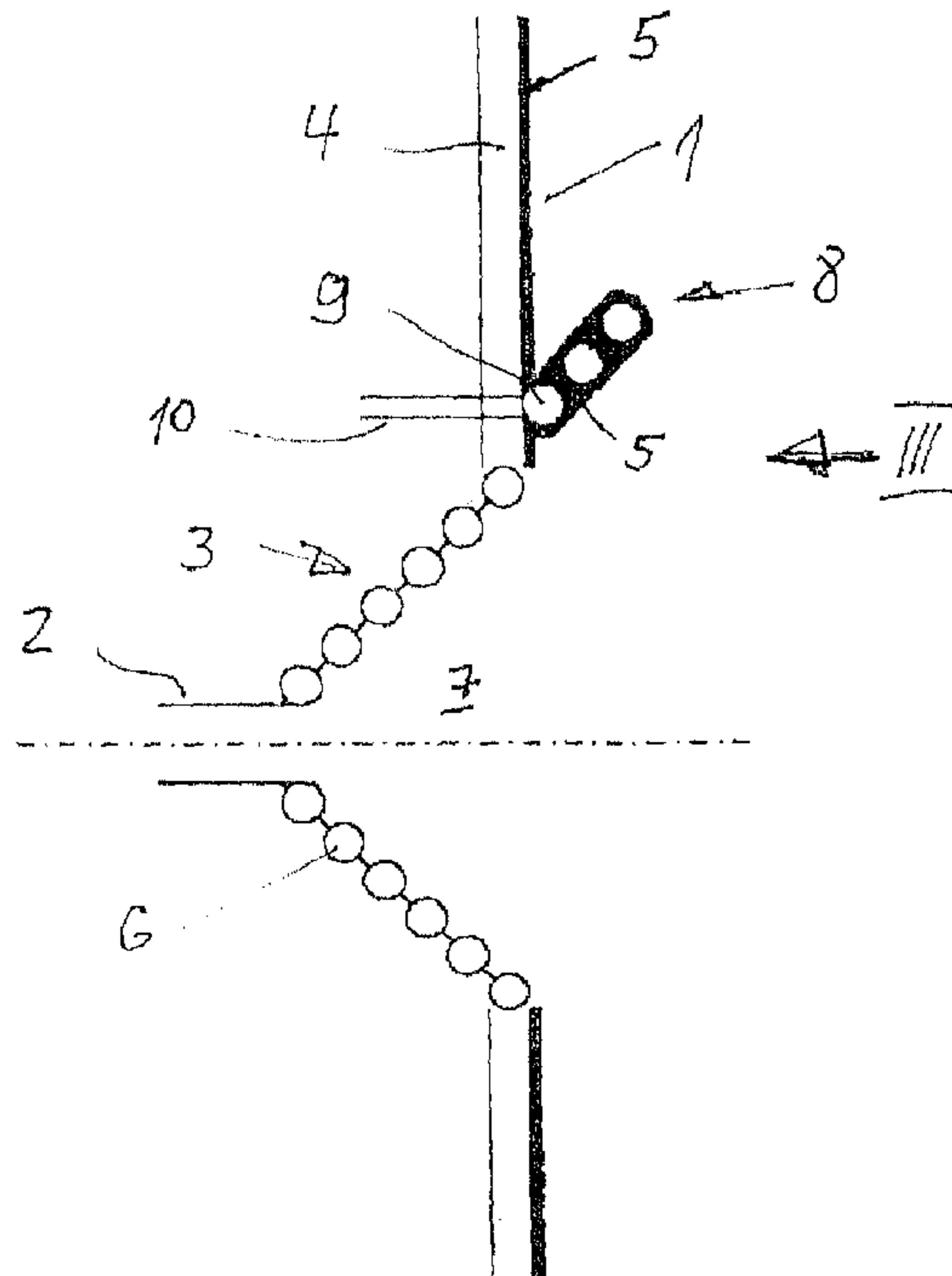
(72) **Inventeurs/Inventors:**
DOSTAL, JOHANNES, DE;
KUSKE, EBERHARD, DE

(73) **Propriétaire/Owner:**
THYSSENKRUPP UHDE GMBH, DE

(74) **Agent:** FETHERSTONHAUGH & CO.

(54) **Titre : CANAL A SCORIE SUR DES BRULEURS PERMETTANT D'ASSURER UNE PROTECTION CONTRE L'ECOULEMENT DE SCORIE**

(54) Title: SLAG RUNNER ON BURNERS FOR PROTECTION AGAINST DRIPPING SLAG



(57) Abrégé/Abstract:

The aim of the invention is to design a slag runner on burners or burner recesses for providing protection against dripping slag produced when ash-containing, finely divided fuels are gasified within a gasifier such that the burner outlets or the burner recesses

(57) Abrégé(suite)/Abstract(continued):

are safely prevented from getting clogged with slag. Said aim is achieved by the fact that the slag runner (8) is formed by a plurality of pipe elbows (9) through which cooling medium flows and which form a runner surface that faces the interior of the gasifier, extends at an angle from the gasifier wall (1), and shields the burner (2) or the burner recess (7) in the top region in the direction of gravity in the mounted position, said runner surface forming a substantially acute angle (a) relative to the burner wall (1).

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(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): **UHDE GMBH** [DE/DE]; Friedrich-Uhde-Strasse 15, 44141 Dortmund (DE).

(72) Erfinder; und

(75) Erfinder/Anmelder (nur für US): **DOSTAL, Johannes** [DE/DE]; Hoher Wall 32, 44137 Dortmund (DE). **KUSKE, Eberhard** [DE/DE]; Balhorngasse 3, 59494 Soest (DE).(74) Anwalt: **DABRINGHAUS & MEINKE**; Rosa-Luxemburg-Strasse 18, 44141 Dortmund (DE).

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Erklärungen gemäß Regel 4.17:

[Fortsetzung auf der nächsten Seite]

(54) Title: SLAG RUNNER ON BURNERS FOR PROVIDING PROTECTION AGAINST DRIPPING SLAG

(54) Bezeichnung : SCHLACKERINNE AN BRENNERN ZUM SCHUTZ VOR HERABFLIESSENDER SCHLACKE

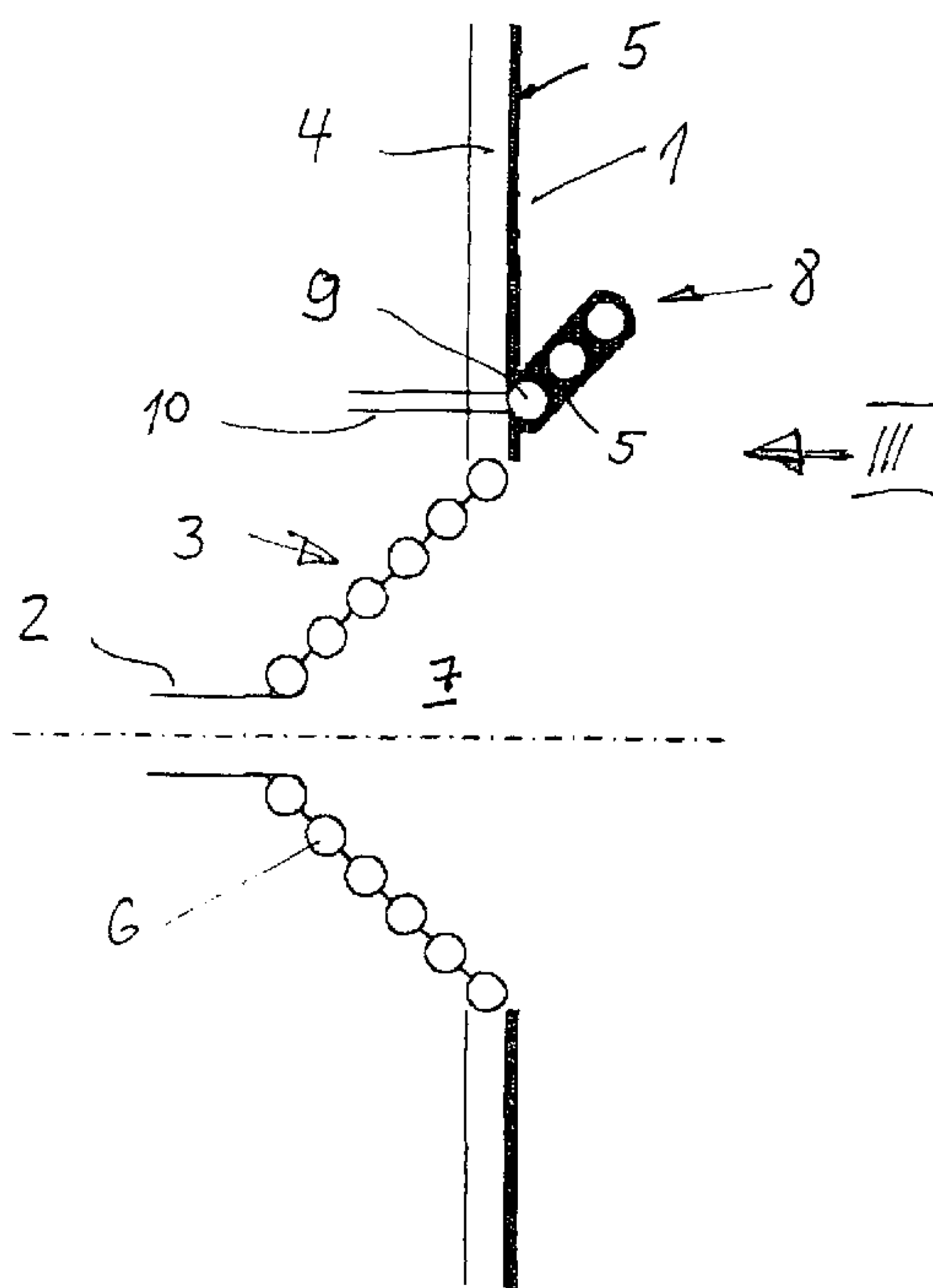


Fig. 1

(57) Abstract: The aim of the invention is to design a slag runner on burners or burner recesses for providing protection against dripping slag produced when ash-containing, finely divided fuels are gasified within a gasifier such that the burner outlets or the burner recesses are safely prevented from getting clogged with slag. Said aim is achieved by the fact that the slag runner (8) is formed by a plurality of pipe elbows (9) through which cooling medium flows and which form a runner surface that faces the interior of the gasifier, extends at an angle from the gasifier wall (1), and shields the burner (2) or the burner recess (7) in the top region in the direction of gravity in the mounted position, said runner surface forming a substantially acute angle (α) relative to the burner wall (1).(57) Zusammenfassung: Mit einer Schlackerinne an Brennern oder Brennernischen zum Schutz vor herabfließender Schlacke, die bei der Vergasung aschehaltiger feinzerteilter Brennstoffe innerhalb eines Vergasers anfällt, soll ein sicherer Schutz der Brennerausgänge bzw. der Brennernischen vor Zusetzen mit Schlacke bereitgestellt werden. Dies wird dadurch erreicht, dass die Schlackerinne (8) von einer Mehrzahl von von Kühlmedium durchflossenen Rohrbögen (9) gebildet ist, die in der Montagelage eine in das Innere des Vergasers weisende, zur Vergaserwand (1) schräge, den Brenner (2) bzw. die Brennernische (7) in Schwerkrafttrichtung am oberen Bereich abschirmende Rinnenfläche bilden, die zur Brennerwand (1) einen im Wesentlichen spitzen Winkel (α) ausbildet.

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- hinsichtlich der Berechtigung des Anmelders, ein Patent zu beantragen und zu erhalten (Regel 4.17 Ziffer ii)
 - hinsichtlich der Berechtigung des Anmelders, die Priorität einer früheren Anmeldung zu beanspruchen (Regel 4.17 Ziffer iii)
 - Erfindererklärung (Regel 4.17 Ziffer iv)
 - vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eingehen (Regel 48 Absatz 2 Buchstabe h)
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- mit internationalem Recherchenbericht (Artikel 21 Absatz 3)

"Slag runner on burners for protection against dripping slag"

The invention is directed at a slag runner on burners or on burner niches for protection against dripping slag, which occurs during the gasification of fine-particle fuels that contain ash, within a gasifier.

In the gasification of such fuels, slag occurs on the walls, and flows away in the direction of gravity, so that it can happen that the exit openings of the burners become clogged, at least in certain regions. Such slag occurs, for example, in the entrained gasification of fine-particle fuels that contain ash, for example in the case of fuels in the form of dust (< 0.5 mm), for example coal, petroleum coke, biological waste, or biological fuels, or in the case of liquid atomized fuels such as oil, tar, refinery residues, or the like, whereby the gasification takes place with gasification media that contain oxygen, and under elevated pressure, at temperatures above the melting point.

For protection of a burner niche, DE 36 13 508 A1 discloses a pipe piece that projects out of the pipe wall, through which piece cooling water flows, and which piece forms an arch above the burner exit. In this connection, this pipe elbow is rammed

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with refractory materials, at least in part, but it is not entirely surrounded with ramming materials, so that overheating of this pipe elbow can occur. Also, a film of slag dripping down is merely shifted partway into the gasifier from the burner orifice, but not effectively and completely prevented.

A similar solution is shown by WO 2008/119753 A1, with the same disadvantages as described above.

Other disadvantages of the known solutions consist in that the oxygen that exits from the burner can be deflected in the wall direction, so that very hot flames ($> 2000^{\circ}\text{C}$) can damage the wall they flow against. In addition, the flow of circulating water through the protective shield can lead to total failure of the system, particularly if the protective shield according to the state of the art is damaged in some way. Also, the known embodiment of slag diversion is particularly not very helpful if larger amounts of slag occur. No sharp tear-off edge for the slag is provided, nor is sufficient deflection provided.

The task of some embodiments of the invention consists in making available reliable protection of the burner exits or the burner niches to prevent them from becoming clogged with slag.

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This task may be accomplished, according to some embodiments of the invention, with a slag runner of the type indicated initially, in that the slag runner is formed by a plurality of pipe elbows through which cooling medium flows, which elbows, 5 in the installed position, form a runner surface that faces into the interior of the gasifier, stands at a slant relative to the gasifier wall, and shields the burner or the burner niche at the upper region, in the direction of gravity, which surface configures an essentially acute angle relative to the 10 burner wall.

In some embodiments of the invention, a cooled slag runner is made available, which may ensure reliable deflection of the slag around the burner orifice even when larger amounts of slag occur.

15 In some embodiments, there is provided a slag runner on burners or burner niches for protection against dripping slag, which occurs during the gasification of fine-particle fuels that contain ash, within a gasifier, wherein the slag runner is formed by a plurality of pipe elbows through which cooling 20 medium flows, which elbows, in the installed position, form a runner surface that faces into the interior of the gasifier, stands at a slant relative to the gasifier wall, and shields the burner or the burner niche at the upper region, in the direction of gravity, which surface configures an essentially 25 acute angle relative to the burner wall.

According to the invention, it can be provided that the pipe elbows that form the slag runner are formed by a pipe piece whose inflow and outflow penetrates the gasifier wall and is connected with the latter in gas-tight manner.

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With this construction, it is possible to provide the slag runner with its own cooling circuit, so that even very high temperatures are made possible, without any damage taking place. If damage occurs, the gasifier walls remain intact, for the remainder, and also, the slag runner can be installed and removed separately, without disturbing the rest of the construction.

The invention also provides that the pipe elbows that form the slag runner are formed by cooling pipe sections of the gasifier wall, which are bent out into the gasifier chamber, bent around, and bent back into the wall plane of the gasifier chamber, whereby it can also be provided that at least some of the pipe regions that form the slag runner are partly bent out behind the gasifier wall and bent back into the surface of the gasifier wall.

A practical different embodiment of the invention consists in that the pipe elbows that form the slag runner are formed by a part of the burner muffle, which is pushed into the interior of the gasifier by the corresponding amount. In this way, the region of the burner muffle pushed into the gas space directly forms the slag runner for slag that runs down the gasifier wall.

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The invention also provides that the pipe elbows that form the slag runner are preferably configured to be pinned and rammed in refractory manner.

As was already mentioned initially, it can be practical to assign a separate coolant inflow and coolant outflow to the pipe elbows of the slag runner, as the invention also provides. A different embodiment consists in integrating the pipe elbows of the slag runner into the cooling circuit of the burner muffle, or, depending on the method of construction, integrating the pipe elbows of the slag runner into the cooling circuit of the gasifier.

Further characteristics, details, and advantages of the invention are evident from the following description and using the drawing. This shows, in

Fig. 1 a schematic section through a gasifier wall, with burner muffle and slag runner according to the invention,

Fig. 2 another embodiment of the slag runner, in a representation similar to that in Fig. 1,

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Fig. 3 a top view approximately according to Arrow III in Fig. 1,

Fig. 4 a top view approximately according to Arrow IV in Fig. 3,

Fig. 5 another modified exemplary embodiment of the slag runner according to the invention, in a top view of a gasifier wall that is indicated, and

Fig. 6 a side view approximately according to Arrow VI in Fig. 5.

In a wall 1 of a gasifier, not shown in any detail here, an indicated burner 2 is provided within a burner muffle, designated in general with 3, whereby the burner wall 1 has cooling pipes 4 that are provided with a refractory ramming 5, whereby the burner muffle 3 is also provided with pipes 6 that serve for its cooling and can represent an integral part of the gasifier piping, if applicable.

The slag runner according to the invention, designated in general with 8, is positioned above the burner orifice designated with 7, in the direction of gravity; this slag runner

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is formed from cooling pipes 9, whereby here, as well, the cooling pipes 9 are surrounded by the refractory ramming 5.

Pipe elbows of cooling pipes 9 may form a runner surface that faces into the interior of the gasifier, which surface configures an essentially acute angle α relative to the burner wall 1.

In the example of Fig. 1, the slag runner 8 is positioned somewhat above the burner orifice 7, while in the example of Fig. 2, it lies directly within the alignment of the piping of the burner muffler 3. The inflow or outflow of cooling medium, in each instance, is designated with 10 in Fig. 1 and 2, in each instance, whereby the flow passage of these elements through the burner wall 4 is structured in gas-tight manner, something that was not shown in any detail in the figure.

In Fig. 2, it is also indicated that of course, the pipes of the burner orifice 7 can also be rammed to be refractory, with ramming mass 5'. Also, the slag runner 8 can represent a part of the burner muffler, to the extent that the burner muffler is pushed into the combustion chamber of the gasifier by a corresponding amount, so that approximately the first three cooling pipe elbows form the front edge of the burner muffler, then directly form the slag runner.

As is evident from Fig. 3, in which not only the gasifier wall 1 but also the slag runner 8 are represented without refractory ramming, in the embodiment there, the slag runner 8 is formed by

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a single pipe coil of a pipe 9, through which a cooling medium flows. Not shown in any detail are the possibilities of providing the slag runner with its own cooling circuit or of coupling it with the piping of the burner muffle 3.

5 In Fig. 5 and 6, another embodiment of the slag runner 8 is reproduced, specifically by means of formation of corresponding bends in the cooling pipes of the gasifier wall 1. In Fig. 5, in this connection, the individual pipes are identified with letters a to f, in order to characterize their course.

10 It can be seen that the cooling pipe of the gasifier wall designated with b is passed all the way to the edge of the burner orifice 7; this location is designated with b' in Fig. 5. Then, the pipe b is angled away upward at an acute angle, and is then passed back over the orifice 7 in arch
15 shape, whereby, as is evident from Fig. 5, the left pipe "b" forms a half-arch, while the pipe "b" that is on the right in the top view forms a half-arch to the right. Subsequently, the pipes "b" are bent back behind the gasifier wall 1, from there outward and downward, and then continue in the gasifier wall 1
20 again.

The gap that forms between the pipe elbows, designated with b" Fig. 5, by means of the special bending of the pipe b, is formed by a correspondingly bent cooling pipe of the gasifier wall that fills this gap and is designated with c in Fig. 5.

25 The pipes that otherwise surround the burner orifice 7 are cropped back out of the gasifier wall, to the rear, in each instance, around the burner orifice 7, and back into the gasifier wall 1.

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Of course, the exemplary embodiment of the invention described here can still be modified in many different respects without departing from the basic idea. For example, the invention is not restricted to a specific pipe elbow, also not to the number
5 of pipe elbows that form the slag runner, and the like.

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Reference Symbol List:

1	1	wall (gasifier)
2	2	burner
3	3	burner muffle
5	4	cooling pipes
5	5	refractory ramming
6	6	pipes
7	7	burner orifice
8	8	slag runner
10	9	cooling pipes slag runner
10	10	coolant inflow/outflow
	α	angle of runner surface relative to burner wall
	a to f	individual cooling pipes
15	b'	location at which individual cooling pipe b is passed all the way to the edge of the burner orifice 7
	b''	pipe elbow portion of individual cooling pipe b

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CLAIMS:

1. Slag runner on burners or burner niches for protection against dripping slag, which occurs during the gasification of fine-particle fuels that contain ash, within a
5 gasifier, wherein the slag runner is formed by a plurality of pipe elbows through which cooling medium flows, which elbows, in the installed position, form a runner surface that faces into the interior of the gasifier, stands at a slant relative to the gasifier wall, and shields the burner or the burner
10 niche at the upper region, in the direction of gravity, which surface configures an essentially acute angle relative to the burner wall.
2. Slag runner according to claim 1, wherein the pipe elbows that form the slag runner are formed by a pipe piece
15 whose inflow and outflow penetrates through the gasifier wall and is connected with the latter in gas-tight manner.
3. Slag runner according to claim 1 or 2, wherein the pipe elbows that form the slag runner are formed by cooling pipe sections of the gasifier wall, which are bent out into the
20 gasifier chamber, bent around, and bent back into the wall plane of the gasifier chamber.
4. Slag runner according to claim 3, wherein at least some of the pipe regions that form the slag runner are partly bent out behind the gasifier wall and bent back into the
25 surface of the gasifier wall.
5. Slag runner according to any one of claims 1 to 4, wherein the pipe elbows that form the slag runner are formed by a part of the burner muffle, which is pushed into the interior

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of the gasifier by a corresponding amount so that approximately the first three cooling pipe elbows form the front edge of the burner muffle, then directly form the slag runner.

6. Slag runner according to any one of claims 1 to 5,
5 wherein the pipe elbows that form the slag runner are configured to be pinned and rammed in refractory manner.

7. Slag runner according to any one of claims 1 to 6,
wherein the pipe elbows of the slag runner have a separate coolant inflow and coolant outflow assigned to them.

10 8. Slag runner according to any one of claims 1 to 7,
wherein the pipe elbows of the slag runner are integrated into the cooling circuit of the burner muffle.

9. Slag runner according to any one of claims 1 to 8,
wherein the pipe elbows of the slag runner are integrated into
15 the cooling circuit of the gasifier.

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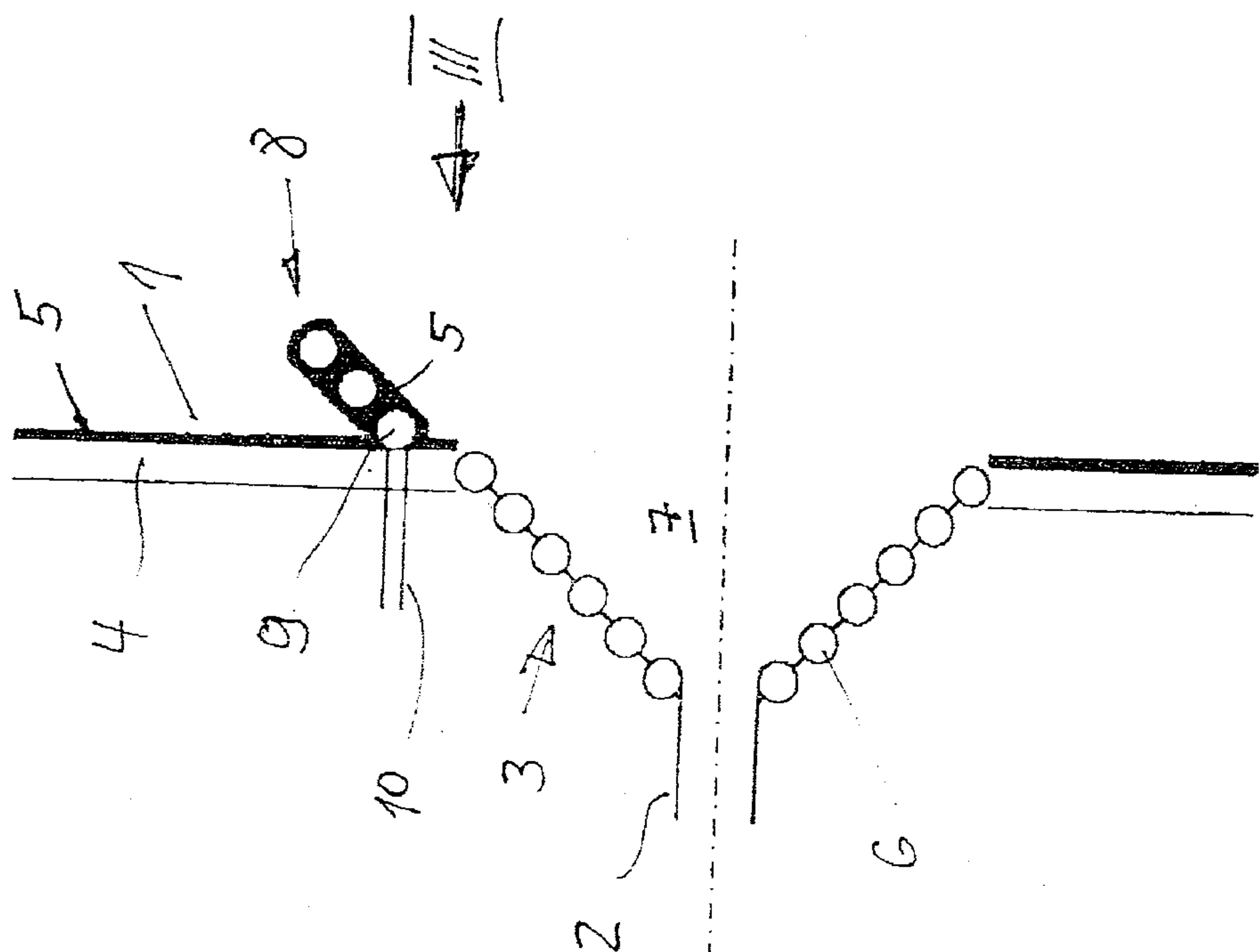


Fig. 1

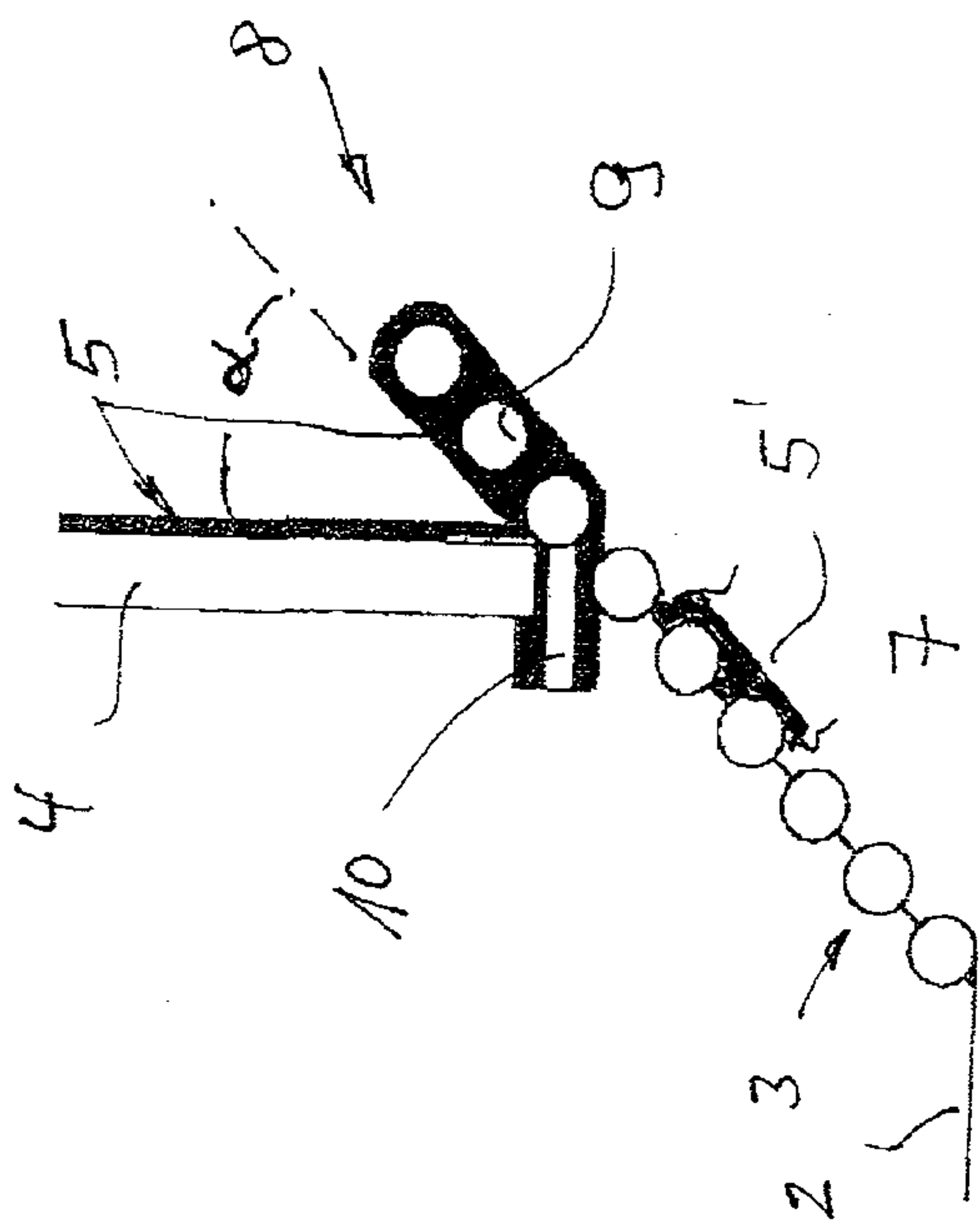


Fig. 2

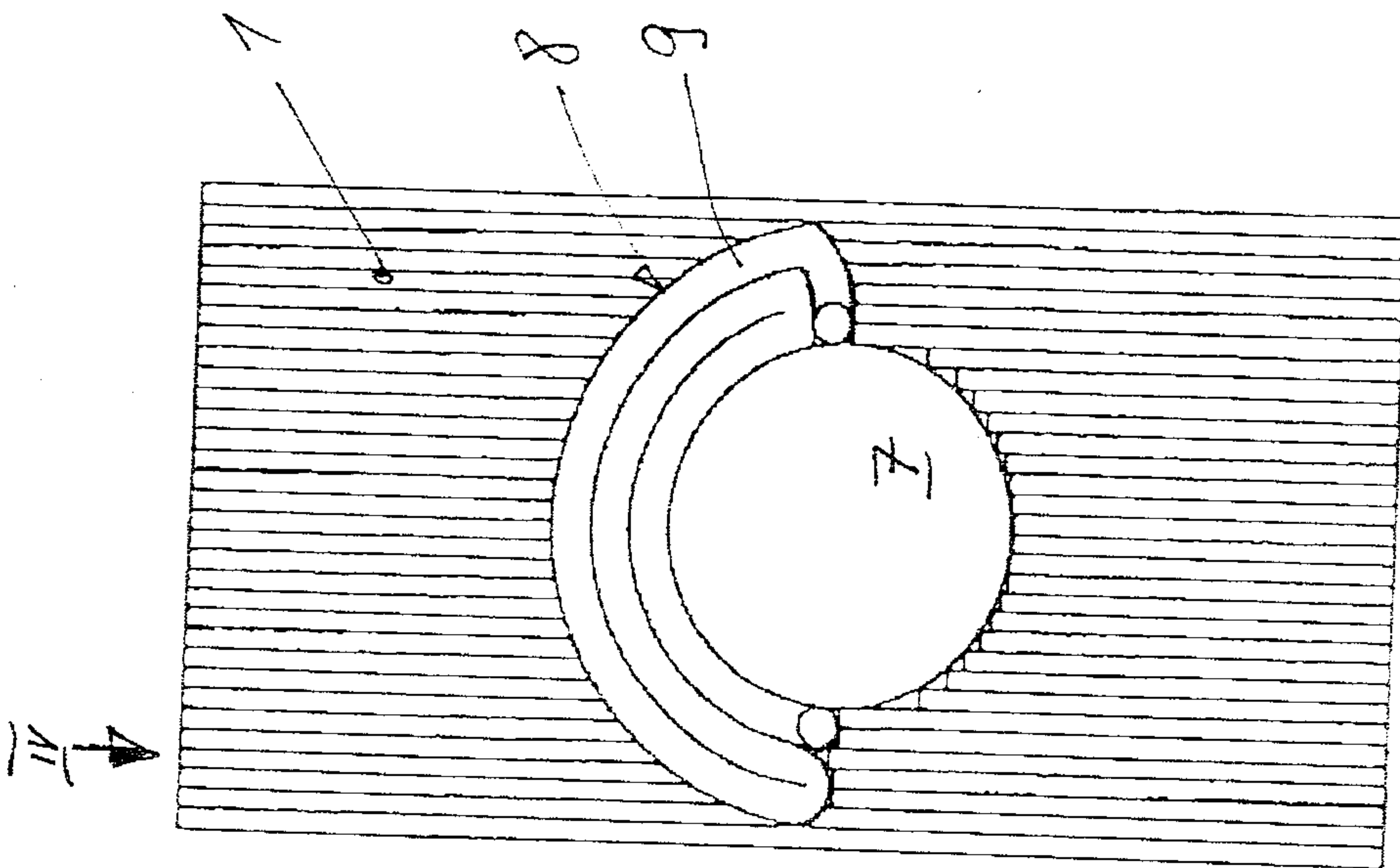


Fig. 3

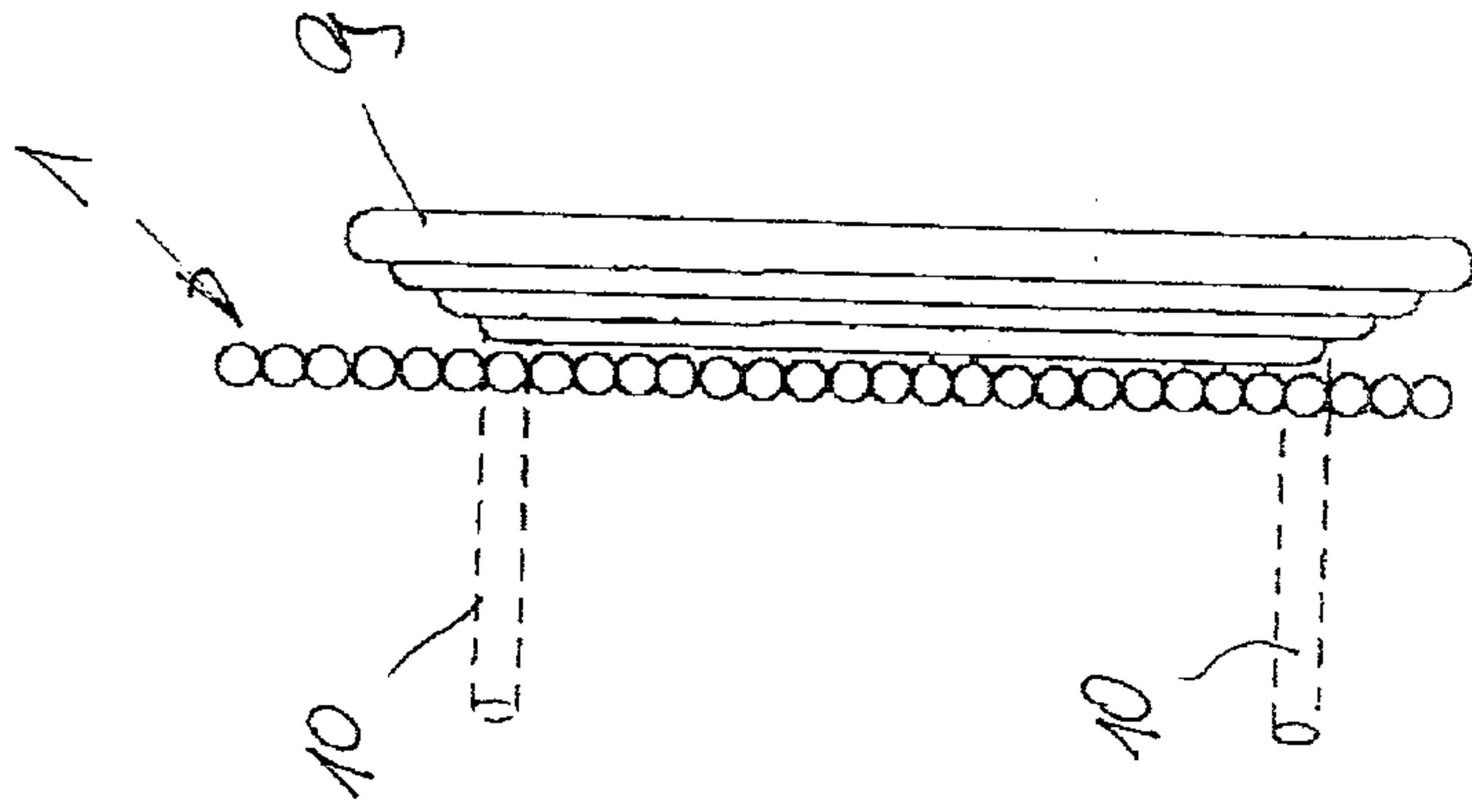


Fig. 4

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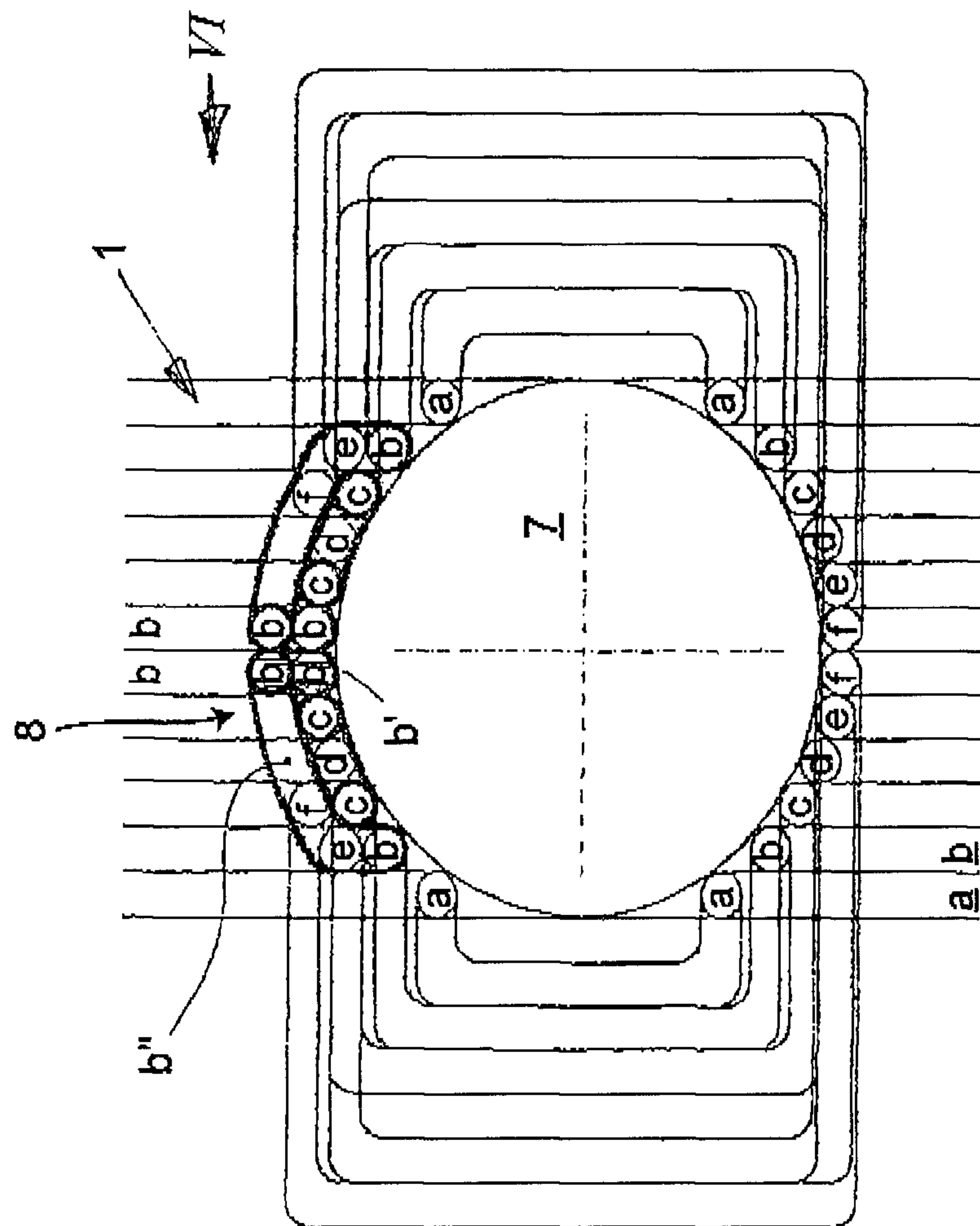


Fig. 5

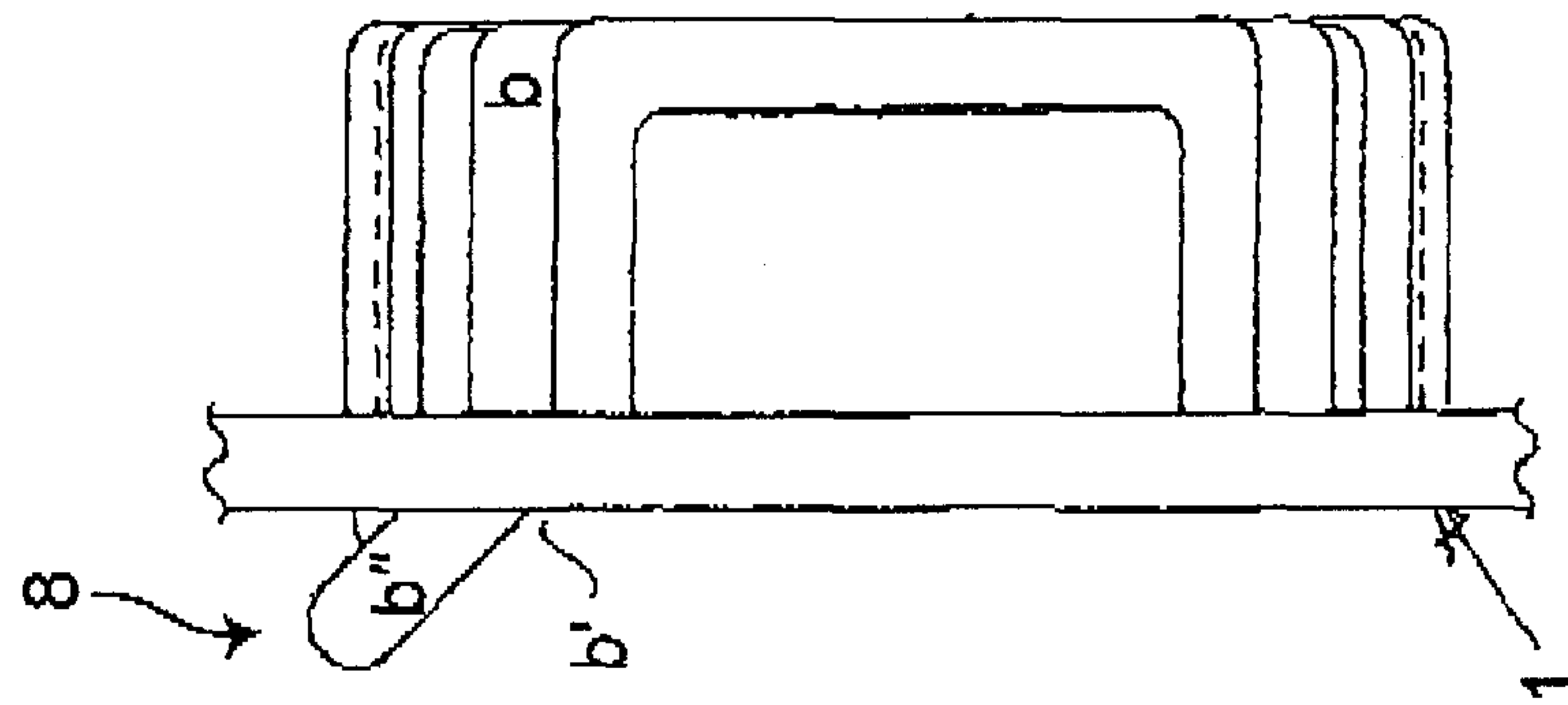
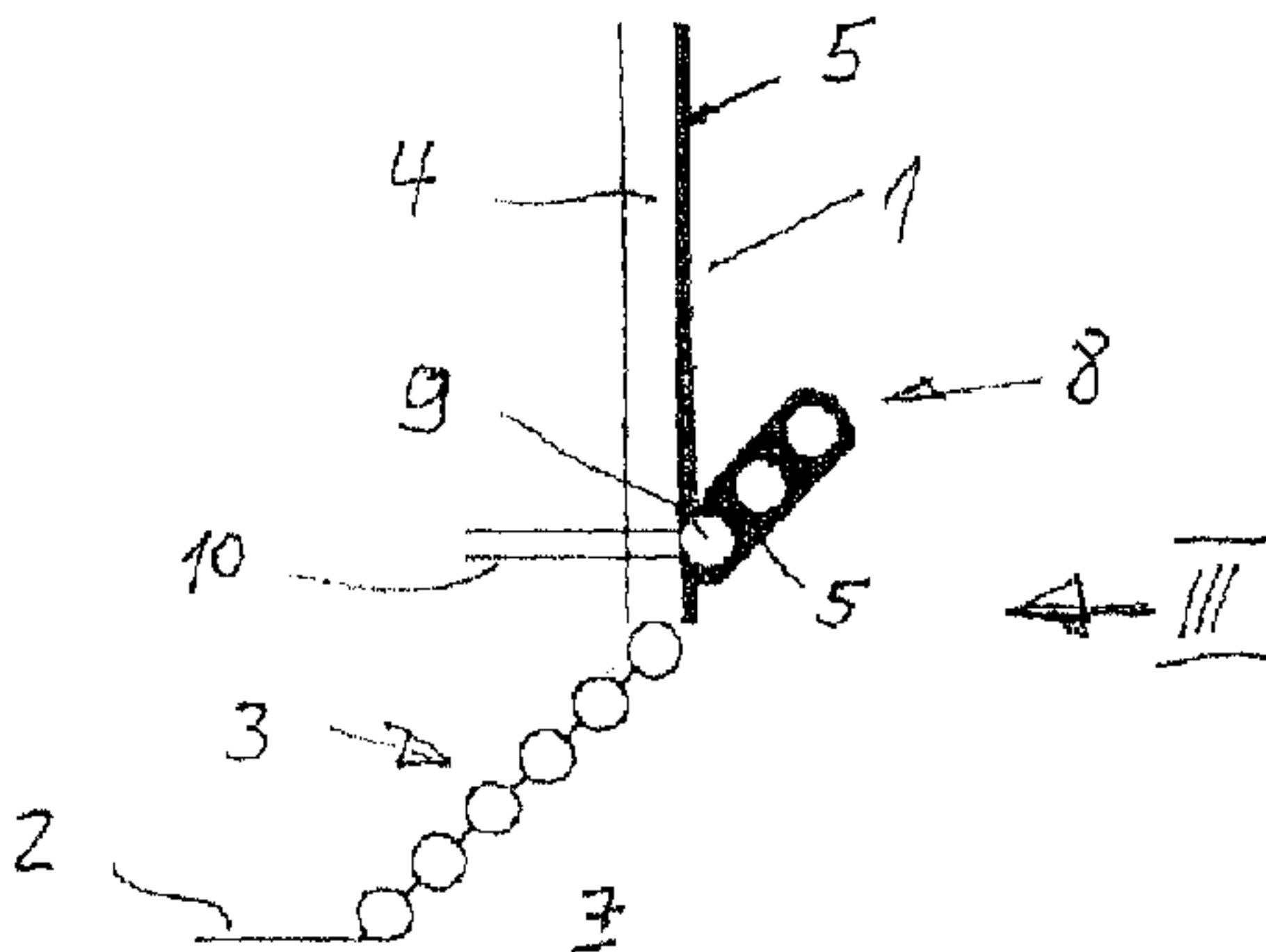


Fig. 6



Hand-drawn diagram of a mechanical assembly, showing a vertical shaft (1) and a horizontal line (4) intersecting it. A component (5) is mounted on the shaft, containing three circular elements. An arrow (8) points to this component. Below the shaft, a series of circles (3) are arranged in a diagonal line, with an arrow pointing to them. A horizontal line (2) is at the bottom left. A label '7' is near the bottom of the circle sequence. To the right, a horizontal line with three vertical strokes (III) is shown, with an arrow pointing towards it. Other labels include '9' and '10' pointing to specific parts of the assembly.

