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Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **Method of provision of a fuel**

(57) The present disclosure provides a method of providing a fuel for a plant for the combustion of a fossil fuel, such as powdered coal, comprising the step of disintegrating wood pellets in a disc refiner comprising refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom, to obtain the fuel. A corresponding system is also provided.

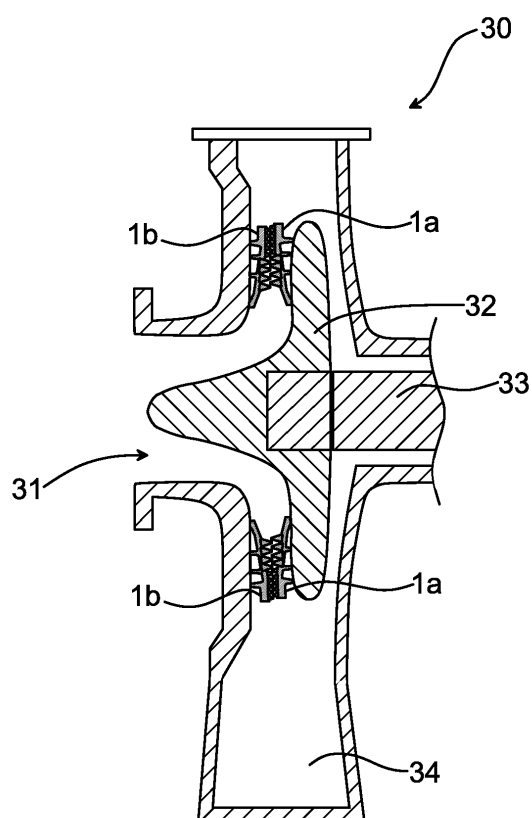


Fig. 3

DescriptionTechnical field

5 **[0001]** The present disclosure relates to the provision of a fuel for a power plant adapted to the combustion of fossil fuels.

Background

10 **[0002]** The combustion of fossil fuels in power plants is associated with a number of problems. First and foremost, the fossil fuels are obtained from non-renewable sources, and the combustion thereof thus contributes to the net emission of greenhouse gases. Also, the fossil fuels contain sulfur and other components that form pollutants when combusted. Therefore, there is world-wide need to increase the utilization of renewable sources in the production of electricity. Governments around the world address this issue in various ways. One example is the introduction of emission trading as an incentive for industries to reduce their carbon dioxide emissions from non-renewable sources. Thus, there is a
15 need in the energy industry for technologies facilitating the introduction of renewable fuels in large scale energy production.

Summary of the invention

20 **[0003]** Wood pellets are one type of renewable material that may be used as a fuel. To reduce the costs of the introduction of such a new energy source, it is important that existing power plants may be used with only minor modifications. The inventors have experienced that it is surprisingly problematic to prepare a fuel for power plants adapted to the combustion of a fossil fuel from wood pellets. The wood pellets are beneficial from a logistical point of view, but they are too big to be efficiently combusted in such power plants. Therefore, various disintegration technologies have been tested. Hammer mills may potentially provide an acceptable fuel product, but they are noisy and associated with
25 various safety concerns. Some technologies based on refining discs have also failed to show satisfactory results. Finally, the inventors found that a disc refiner having toothed discs (sometimes referred to as dispersing discs), traditionally used for the dispersion pulp of recycled paper in the paper industry, already at a low energy consumption gave a fuel product that met the criteria set by the operators of power plants adapted for the combustion of fossil fuels. Operators of coal-fired power plants were particularly interested in the "wood powder" from wood pellets as it may be co-combusted
30 with powdered coal in the plants. However, the inventors surprisingly found that the disintegration of the wood pellets worn down the refining discs to such a degree that they needed to be substituted with intervals of a couple of days instead of a couple of months as in the pulping application. In other words, wood pellets are found to be much tougher on the refining discs than expected. Without being bound by any specific scientific theory, the inventors speculate that this may be due to a coating of wood extractives that is formed on surface of the pellets during their preparation, which
35 involves heating and pressing. Subsequently, the inventors found that the solution to the wear problem they had discovered is to use discs having teeth of a harder material that are embedded in a base of a softer material in the disc refiners for the disintegration of the wood pellets.

[0004] Thus, the present disclosure provides a method of providing a fuel for a plant (adapted) for the combustion of a fossil fuel, such as powdered coal, comprising the step of:

40 disintegrating wood pellets in a disc refiner comprising refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom, to obtain the fuel.

45 **[0005]** Further, the present disclosure provides a system for the preparation of a fuel based on wood pellets, which system is integrated with a plant for the combustion of a fossil fuel, such as powdered coal, said system comprising a disc refiner comprising:

50 refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom,
an inlet for the wood pellets; and
an outlet for the fuel,
wherein the outlet of the disc refiner is connected to a combustion chamber of the plant such that the fuel may be
55 combusted therein.

[0006] The refining discs of the disc refiner may be composed of a plurality of refining disc segments.

Brief description of the figures**[0007]**

Figure 1 is a top view of a refining disc segment according to an embodiment of the present disclosure.
 Figure 2 is a simplified radial cross section view of a refining disc segment according to an embodiment of the present disclosure.
 Figure 3 is a cross-section view of a disc refiner.
 Figure 4 shows various examples of refining discs segments (a-c), of which four are needed to form a full disc (d). The teeth of 4a are widely spaced. The teeth of 4b are medium spaced. The teeth of 4c are closely spaced.
 Figure 5 shows various examples of refining discs segments (a-c), of which six are needed to form a full disc (d). The teeth of 5a are widely spaced while the teeth of 5b are closely spaced.
 Figure 6 shows various examples of refining discs segments (a-c), of which eight are needed to form a full disc (d). The teeth of 6a are widely spaced. The teeth of 6b are medium spaced. The teeth of 6c are medium+ spaced.
 Figure 7 shows the result a disintegration of pellets using segments having a tooth geometry and a teeth pattern according to embodiments of the present disclosure. The diagrams shall be interpreted as the proportion of disintegrated material that is larger than a cut-off determined by a sieve. The numbers on the x-axis are in millimeter (mm).

Detailed description

[0008] As a first aspect of the present disclosure, there is provided a method of providing a fuel for a plant for the combustion of a fossil fuel, such as powdered coal. The method comprises the step of:

disintegrating wood pellets in a disc refiner comprising refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom. The fuel is thus obtained.

[0009] This step is sometimes referred to as step a) herein.

[0010] A plurality of refining disc segments may be arranged to form the refining discs, as illustrated in figures 4-6.

[0011] The hardness of the base material may for example be HRC 30-70, such as HRC 50-60 (Rockwell scale).

[0012] The base may for example be composed of cast iron (which normally has a hardness of HRC 30-70). The cast iron may for example be ductile iron, grey cast iron or white cast iron. Ductile iron, such as nodular cast iron, may be preferred as it is impact resistant and has a relatively high tensile strength. The grey cast iron may be preferred as it is relatively easy to form in a casting process. The white cast iron may however also be preferred as it is relatively hard (compared to other types of cast iron, such as grey cast iron) and thus relatively resistant to wear during use. The cast iron may for example comprise 1-30 % Cr (chromium), such as 5-30 % Cr, such as 10-30 % Cr, such as 15-30 % Cr. A higher Cr content makes the cast iron harder. White cast iron is one example of a cast iron that may have high Cr content.

[0013] The cast iron may also have a lower carbon content and be classified as steel.

[0014] To cast prefabricated teeth in the base has proven to be a particularly suitable fixation technique.

[0015] To facilitate the disintegration of the wood pellets, the hardness of the teeth material is preferably considerably higher than the hardness of the base material. The hardness of the teeth material may for example be at least 1000 Vickers, such as at least 1500 Vickers.

[0016] The teeth may for example be composed of a metal carbide composite. The metal carbide may for example be WC (tungsten carbide), TiC (titanium carbide), TaC (tantalum carbide) or a metal carbonitride, such as TiCN. Further, the metal carbide composite may comprise a metal alloy binder, such as Co (cobalt), Ni (nickel) or Iron (Fe). The metal carbide particles of a metal carbide composite may be evenly distributed in the metallic alloy binder. Thus, the hardness and strength of the metal carbide is combined with the toughness and plasticity of the metallic alloy binder. Such a material is frequently referred to as a cemented carbide. Cemented carbide is normally produced by powder metallurgy.

[0017] The process of casting cemented carbide teeth into cast iron follows largely common sand molding methods. To produce discs or segments of the present disclosure, the teeth may be arranged in their pattern in a sand core and the molding process may be performed in accordance with what is described in the patent application EP 0 374 116 A1 (see .g. column 3, lines 9-26 and the example). Further information on casting cemented carbide in cast iron is found in the patent application WO 92/13651 (however, in the normal case centrifugal casting is not performed in connection with the present disclosure).

[0018] As indicated above, the hardness requirements for the base material are much lower than for the teeth. A cheaper and in at least in some aspects more workable material may thus be used for the base. However, the base must be capable of fixing the teeth, and cast iron in an example of a material that generally meets this requirement.

[0019] In commercial disc refiners, the refining discs are normally ring shaped. Thus, the refining disc of the present

disclosure may have such a shape. Accordingly, a refining disc segment according to the present disclosure may have the shape of a ring segment. Examples of segments having such a curved shape are shown in figures 4-6. Thus, each segment may have a shape corresponding to $1/4^{\text{th}}$, $1/6^{\text{th}}$ or $1/8^{\text{th}}$ of a ring. However, the skilled person understands that the shape may also correspond to half a ring, a third of a ring, a fifth of a ring or any other fraction of a ring within practical limits.

[0020] In disc the refiner, the pellets to be disintegrated are normally fed centrally, i.e. to the center of the refining discs (see figure 3). As the material is disintegrated/refined, it moves outwards towards the outer circumference of the refining discs. Thus, the teeth closest to the inner edge of the refining disc/segments work the biggest pieces of material. Therefore, it may be beneficial if the teeth arranged closer to the inner edge are bigger and/or more widely spaced than the teeth arranged closer to the outer edge. This is exemplified in figures 1 and 4-6.

[0021] The teeth may have the shape of a pyramid or truncated pyramid (see e.g. figures 1 and 2). Thus, the base area of a tooth according to the present disclosure may be larger than its top area. The base area of a typical tooth may be 50-400 mm², such as 75-250 mm². Further, the height of a typical tooth may be 5-30 mm, such as 10-20 mm. Normally, at least 5 %, such as at least 10 %, such as at least 15 % of the height of a tooth according to the present disclosure is embedded in the base. Further, less than 50 % of the height is normally embedded. It is generally preferred that at least 2 mm of the height of a tooth according to the present disclosure is embedded in the base to obtain a sufficient fixation. The base area of a tooth according to the present disclosure may for example have the shape of a quadrilateral (four-sided polygonal). The top of a tooth of according to the present disclosure may for example be flat, and optionally have the shape of a quadrilateral. A tooth of the present disclosure may have one or two slits as in the refining disc segments marketed by Andritz. The person of skill in the art understands that the embodiments related to the tooth characteristics described in this paragraph not necessarily concern all teeth of the disc or segment. A disc or segment having a few teeth of differing characteristics is still encompassed by the embodiments. It is however preferred that at least the majority, such as at least 75 %, of the teeth have the characteristics of a certain embodiment.

[0022] A refining disc segment according to the present disclosure typically weighs 1-15 kg and has an area of 100-1000 cm².

[0023] In some disc refiners, two discs facing each other are arranged such that a row of teeth of one disc run between rows of teeth of another disc when the one disc rotates relative the other. To facilitate such rotation of one disc relative another, the teeth of the discs may be arranged in concentric rows (see the rows in figures 1 and 4-6).

[0024] The disc refiner of the present disclosure may thus comprise a first and a second disc composed of discs or segments according to any one of the embodiments described above, wherein said first and second discs are arranged such that the teeth of the first disc face the teeth of the second disc. As described above, two whole refining discs may be arranged to face each other. Alternatively, a plurality of refining disc segments may be arranged to form two full discs that face each other. In the disc refiner construction, the second disc may be fixed and the first disc may be rotatably arranged such that it may rotate in respect of the first disc. The rotatable disc may be connected to a rotatable shaft. The shaft may be movable in the direction of its elongation such that the gap between the teeth of the first disc and the teeth of the second disc may be adjusted. Accordingly, the degree of disintegration of the wood pellets may be controlled: the narrower the gap the finer the disintegrated product. An embodiment of a disc refiner is illustrated in figure 3.

[0025] The method of the present disclosure may further comprise the steps of:

- b) transporting the fuel from step a) to a combustion chamber of the plant; and
- c) combusting the fuel from step b) in the combustion chamber.

[0026] In step c), the fuel may be combusted alone or together with coal, such as powdered coal, and/or oil, such as heavy fuel oil and/or natural gas. As an example, the fuel from step a) may constitute 5-90 % (w/w) of the total amount of fuel combusted in the plant. The fuel from step a) may be mixed with powdered coal and/or oil in the combustion chamber, or in a mixing zone arranged upstream of the combustion chamber.

[0027] The outlet of the combustion chamber is normally connected to a boiler, which in turn may be connected to a generator for the production electricity.

[0028] The fuel may for example be transported to the combustion chamber by means of blowing. Fans may be arranged to accomplish this.

[0029] According to one embodiment of the method, the disc refiner is pressurized such that the fuel is blown to the combustion chamber (e.g. blown out of the disc refiner, through a transportation connection and into the combustion chamber). However, the fuel may also be blown to an intermediate storage. A fan may be connected to the inlet of the disc refiner for the generation of the overpressure therein. In such an embodiment, the overpressure in the disc refiner may be 0.05-5 bar.

[0030] The wood pellets may be fed into the disc refiner by means of a screw device. Thus, the fan may alternatively be connected to such a screw device.

[0031] The overpressure in the disc refiner may for example be obtained by feeding air to it. It may be beneficial to

use air since air it is often anyway supplied to the downstream combustion. However, air may also be associated with safety problems because its oxygen content may cause explosions. Thus, it may be desirable to feed an inert gas to the disc refiner instead. An abundant inert gas at the power plant site may be the exhaust gases resulting from the combustion. Thus, in one embodiment, cooled and optionally purified exhaust gases are fed to the disc refiner to obtain the overpressure. Here, it should however be pointed out that the risk of explosions is relatively low when disc refin-
ers are used, in particular in comparison with the use of hammer mills.

[0032] As a second aspect of the present disclosure, there is provided a system for the preparation of a fuel based on wood pellets, which system is integrated with a plant for the combustion of fossil fuel, such as powdered coal. The system comprises a disc refiner comprising:

refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom,
an inlet for the wood pellets; and
an outlet for the fuel,

wherein the outlet of the disc refiner is connected to a combustion chamber of the plant such that the fuel may be combusted therein.

[0033] The various embodiments of the first aspect described above apply *mutatis mutandis* to the second aspect. Some embodiments of the second aspect are however anyway described and briefly discussed below.

[0034] According to an embodiment of the second aspect an in-feeder comprising a screw is connected to the inlet of the disc refiner.

[0035] Also, a fan may be connected to the inlet of the disc refiner or the in-feeder such that an overpressure may be created in the disc refiner and in the connection to the combustion chamber. The overpressure may drive the fuel into the combustion chamber.

[0036] According to an embodiment of the second aspect, the system further comprises a connection between an exhaust gas outlet of the combustion chamber and the inlet of the disc refiner or the in-feeder such that cooled and optionally purified exhaust gases may be supplied to the disc refiner. Thus, at least one heat exchanger is normally arranged in the connection. Exhaust gas purification devices, such as ash separators, desulfurizers and NO_x-reduction units may also be arranged in the connection.

[0037] Wood pellets are often produced as a byproduct of sawmilling or other wood transforming activities. The wood pellets are relatively dense and may have a water content of below 10 % (w/w). The wood pellets may be produced by compressing wood material which has been disintegrated, e.g. by means of a hammer mill or a disc refiner, to a dough-like mass. The mass is subsequently squeezed through a die having the diameter of the desired product. The high pressure required to squeeze the material through the die increases the temperature of the wood. The temperature increase plastifies some wood components to create a stickiness that holds the pellet together. The pellets of the present disclosure may meet the requirements of DIN 51731 or Ö-Norm M-7135.

[0038] The power plant of the present disclosure may be referred to as a co-firing plant. Co-firing is the combustion of two-different types of materials (e.g. disintegrated wood pellets and powdered coal and/or oil) at the same time. As indicated above, one of the advantages of co-firing is that an existing plant can be used to burn a new fuel, which may be more environmentally friendly. Biomass, e.g. in the form of wood pellets, may thus be co-fired in an existing coal plant instead of in a new biomass plant.

Detailed description of exemplary embodiments

[0039]

Figures 1 and 2 show a refining disc segment 1 according to an embodiment of the present disclosure. Six such segments may be arranged to form a full refining disc having an annular shape as shown in Fig 5a and 5c. The segment 1 has an inner edge 2 and an outer edge 3. The segment 1 comprises a base 4 and teeth 5, which are embedded and fixed in the base 4. In this particular embodiment, the teeth 5 have the shape of truncated pyramids. In the context of the present disclosure, the shape is considered to be pyramidal even though the surface plane of one side of the teeth 5 is perpendicular to the plane of the base 4. The teeth 5 are arranged in concentric rows, which allow the teeth 5 of a full disc to run between the teeth of an opposed disc when rotating in respect of the opposed disc. The distance between teeth 5 in the rows of an inner portion 6 of the segment 1 is generally greater than the distance between the teeth 5 in the rows of an outer portion 7 of the segment 1. Further, the teeth 5 closer to the inner edge 2 are bigger, i.e. have a larger base area and/or a greater height and thus a bigger volume, than the teeth 5 closer to the outer edge 3. The inner portion 6 of the segment 1 may be referred to as the pre-milling

zone, while the outer portion 7 may be referred to as the milling zone. The segment 1 has two holes 8 which allow it to be fixed in a disc refiner apparatus.

Figure 3 shows part of a disc refiner 30. The disc refiner 30 comprises a rotor 32 onto which refining disc segments 1 a are attached. The rotor 32 is connected to a rotating shaft 33. Refining disc segments 1 b are also fixedly attached opposed to the refining disc segments 1 a on the rotating body 32. The shaft 33 may be moved in the direction of its elongation so as to adjust the width of the gap between the segments 1 a, 1 b facing each other. Wood pellets, is fed into the disc refiner 30 through its inlet 31, optionally via a screw device (not shown). The material moves outwards (radially) as it is disintegrated, and the disintegrated material (the fuel) is collected in the collecting zone 34, from where it may be transported to intermediate storage or directly to combustion.

Figure 4 shows three examples 4a, 4b, 4c of refining disc segments according to embodiments of the present disclosure. The teeth closer to the inner edges of the segments are generally bigger and more widely spaced than the teeth closer to the outer edges of the segments. Four segments according to figure 4 may be arranged in a disc refiner to form one full refining disc 4d. A disc refiner having two opposing discs thus need eight segments according to figure 4. A segment according to figure 4 typically weighs 1.5-3 kg.

Figure 5 shows two examples 5a, 5b of refining disc segments according to embodiments of the present disclosure. The teeth closer to the inner edges of the segments are generally bigger and more widely spaced than the teeth closer to the outer edges of the segments. Six segments according to figure 5 may be arranged in a disc refiner to form one full refining disc 5c. A disc refiner having two opposing discs thus need twelve segments according to figure 5. A segment according to figure 5 typically weighs 5-7 kg.

Figure 6 shows three examples 6a, 6b, 6c of refining disc segments according to embodiments of the present disclosure. The teeth closer to the inner edges of the segments are generally bigger and more widely spaced than the teeth closer to the outer edges of the segments. Eight segments according to figure 6 may be arranged in a disc refiner to form one full refining disc 6d. A disc refiner having two opposing discs thus need 16 segments according to figure 6. A segment according to figure 6 typically weighs 7-10 kg.

Example

[0040] A power plant requested a wood powder (disintegrated wood pellets) according to the following specification:

Particle size	Proportion
<2.0mm	>100%
<1.5mm	>99%
<0.5mm	>55%
<0.25mm	>20%

[0041] The wood pellets are less bulky and more suitable for transport and storage than the wood powder. Thus, the wood powder is preferably produced at the site of the power plant.

[0042] The wood pellets, which had a density of 0.670 kg/dm³ and a dry matter content of 91 %, were disintegrated with a disc refiner (KRIMA Disperser, marketed by Cellwood Machinery) having refining disc segments with widely spaced teeth (marketed by Cellwood Machinery) using the following conditions:

Sample no	Temp (°C)	Disc gap (mm)	Density of product (kg/dm ³)	Motor load (Gross kW)	Average load (kW)	Flow (dm ³ /min)	Specific energy (net kWh/ton dry)
1	25	0.5	0.33	10-15	13	25	9
2	30	2.0	-	15-23	18	50	7

[0043] The run time was two minutes for both samples.

[0044] The results are presented in figure 7. Figure 7b represents the result of sample no 1, and figure 7a represent the result of sample no 2.

[0045] The results are presented in figure 7. Figure 7b represents the result of sample no 1, and figure 7a represent the result of sample no 2. The results were considered to meet the specification to a sufficient degree. Thus, disc refiners having toothed disc segments were found to successfully disintegrate the wood pellets. At a later time, it was however found that the disc segments were worn down considerably during disintegration of wood pellets. The wear problem is

solved by the introduction of teeth of harder material embedded in the base of the disc or segment as described herein.

Claims

- 5 1. A method of providing a fuel for a plant for the combustion of a fossil fuel, such as powdered coal, comprising the step of:
 - 10 a) disintegrating wood pellets or bio-coal pellets of torrefied wood in a disc refiner comprising refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom, to obtain the fuel.
- 15 2. The method according to claim 1, further comprising the steps of:
 - b) transporting the fuel from step a) to a combustion chamber of the plant; and
 - c) combusting the fuel from step b) in the combustion chamber.
- 20 3. The method according to claim 2, wherein the disc refiner is pressurized such that the fuel is blown to the combustion chamber.
4. The method according to any one of the preceding claims, wherein the wood pellets are fed into the disc refiner by means of a screw device.
- 25 5. The method according to any one of the preceding claims, wherein air or cooled and optionally purified exhaust gases is/are fed to the disc refiner, optionally through the screw device, to obtain an overpressure in the disc refiner.
6. The method according to any one of the preceding claims, wherein the teeth of the refining discs are arranged in concentric rows.
- 30 7. The method according to claim 6, wherein a row of teeth of one disc run between the two rows of teeth of another disc during the disintegration process.
- 35 8. A system for the preparation of a fuel based on wood pellets or bio-coal pellets of torrefied wood, which system is integrated with a plant for the combustion of a fossil fuel, such as powdered coal, said system comprising a disc refiner comprising:
 - 40 refining discs comprising a base composed of a material having a first hardness and teeth composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom,
 - an inlet for the wood pellets; and
 - an outlet for the fuel,

wherein the outlet of the disc refiner is connected to a combustion chamber of the plant such that the fuel may be combusted therein.
- 45 9. The system according to claim 8, wherein an in-feeder comprising a screw is connected to the inlet of the disc refiner.
- 50 10. The system according to claim 8 or 9, wherein a fan is connected to the inlet of the disc refiner or the in-feeder such that an overpressure may be created in the disc refiner and in the connection to the combustion chamber to drive the fuel into the combustion chamber.
- 55 11. The system according to any one of claims 8-10, further comprising a connection between an exhaust gas outlet of the combustion chamber and the inlet of the disc refiner or the in-feeder such that cooled and optionally purified exhaust gases may be supplied to the disc refiner.

Amended claims in accordance with Rule 137(2) EPC.

1. A method of providing a fuel for a plant for the combustion of a fossil fuel, such as powdered coal, comprising the step of:

- a) disintegrating wood pellets or bio-coal pellets of torrefied wood in a disc refiner (30) comprising refining discs comprising a base (4) composed of a material having a first hardness and teeth (5) composed of a material having a second hardness that is higher than the first hardness, which teeth (5) are partially embedded in the base (4) and protrude therefrom, to obtain the fuel;
- b) transporting the fuel from step a) to a combustion chamber of the plant; and
- c) combusting the fuel from step b) in the combustion chamber.

2. The method according to claim 1, wherein the disc refiner (30) is pressurized such that the fuel is blown to the combustion chamber.

3. The method according to any one of the preceding claims, wherein the wood pellets are fed into the disc refiner (30) by means of a screw device.

4. The method according to any one of the preceding claims, wherein air or cooled and optionally purified exhaust gases is/are fed to the disc refiner (30), optionally through the screw device, to obtain an overpressure in the disc refiner.

5. The method according to any one of the preceding claims, wherein the teeth (5) of the refining discs are arranged in concentric rows.

6. The method according to claim 5, wherein a row of teeth (5) of one disc run between two rows of teeth (5) of another disc during the disintegration process.

7. Plant for the combustion of a fossil fuel, such as powdered coal, comprising a system for the preparation of a fuel based on wood pellets or bio-coal pellets of torrefied wood, which system comprises a disc refiner (30) comprising:

- refining discs comprising a base (4) composed of a material having a first hardness and teeth (5) composed of a material having a second hardness that is higher than the first hardness, which teeth are partially embedded in the base and protrude therefrom,
- an inlet (31) for the wood pellets; and
- an outlet for the fuel,

wherein the outlet of the disc refiner is connected to a combustion chamber of the plant such that the fuel may be combusted therein.

8. The plant according to claim 7, wherein an in-feeder comprising a screw is connected to the inlet (31) of the disc refiner (30).

9. The plant according to claim 7 or 8, wherein a fan is connected to the inlet (31) of the disc refiner (30) or the in-feeder such that an overpressure may be created in the disc refiner (30) and in the connection to the combustion chamber to drive the fuel into the combustion chamber.

10. The plant according to any one of claims 7-9, further comprising a connection between an exhaust gas outlet of the combustion chamber and the inlet (31) of the disc refiner (30) or the in-feeder such that cooled and optionally purified exhaust gases may be supplied to the disc refiner (30).

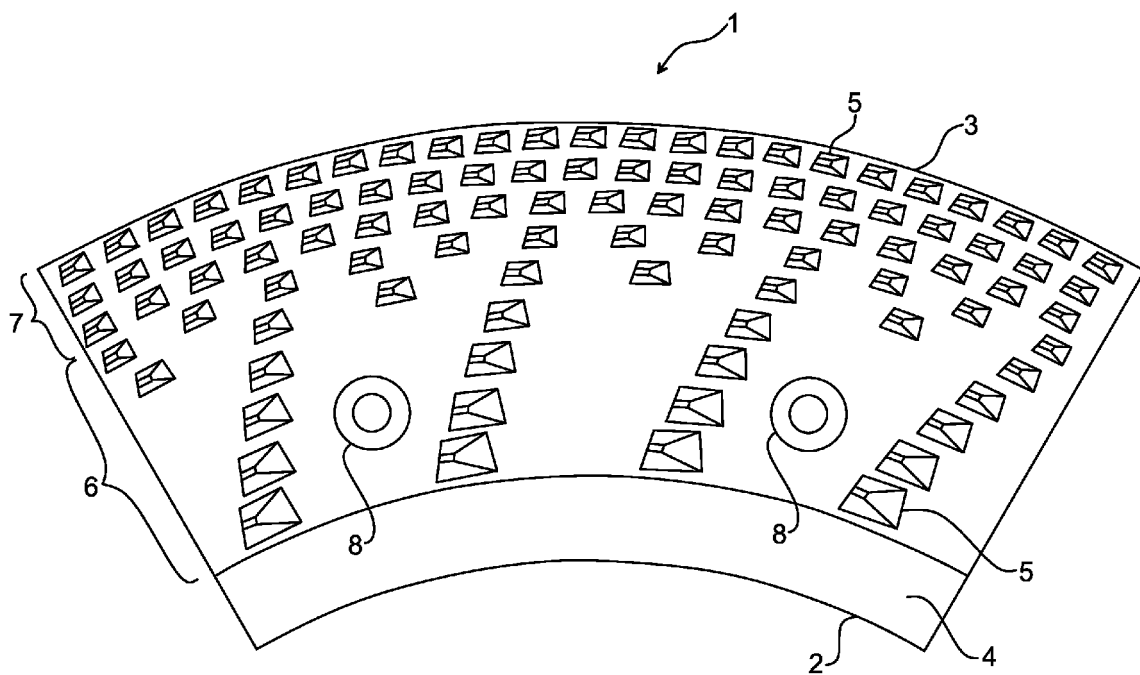


Fig. 1

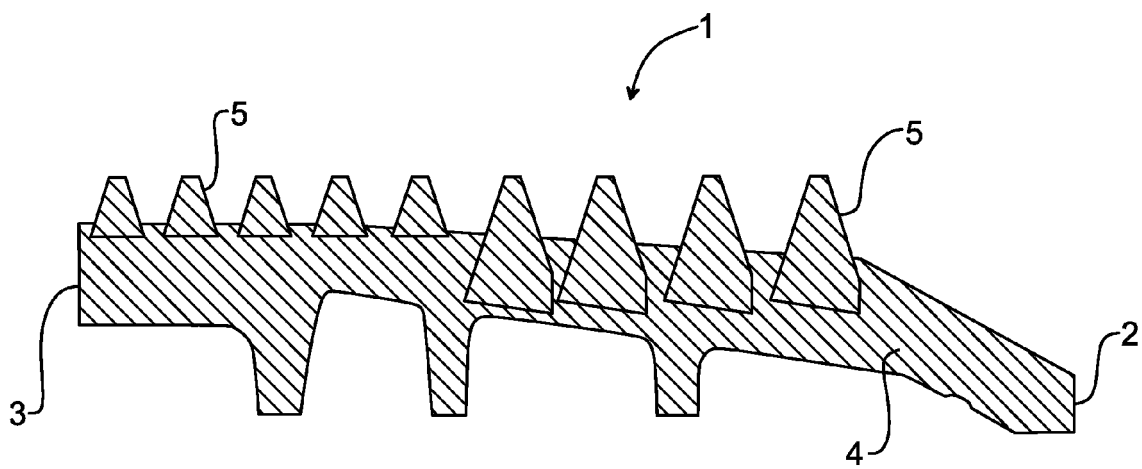


Fig. 2

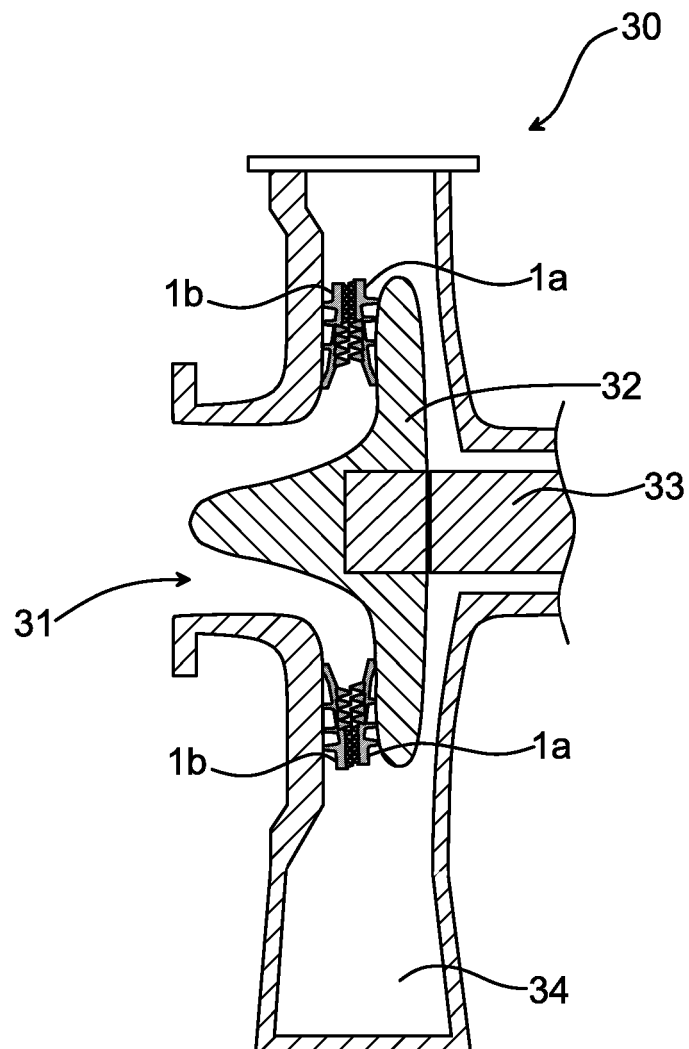


Fig. 3

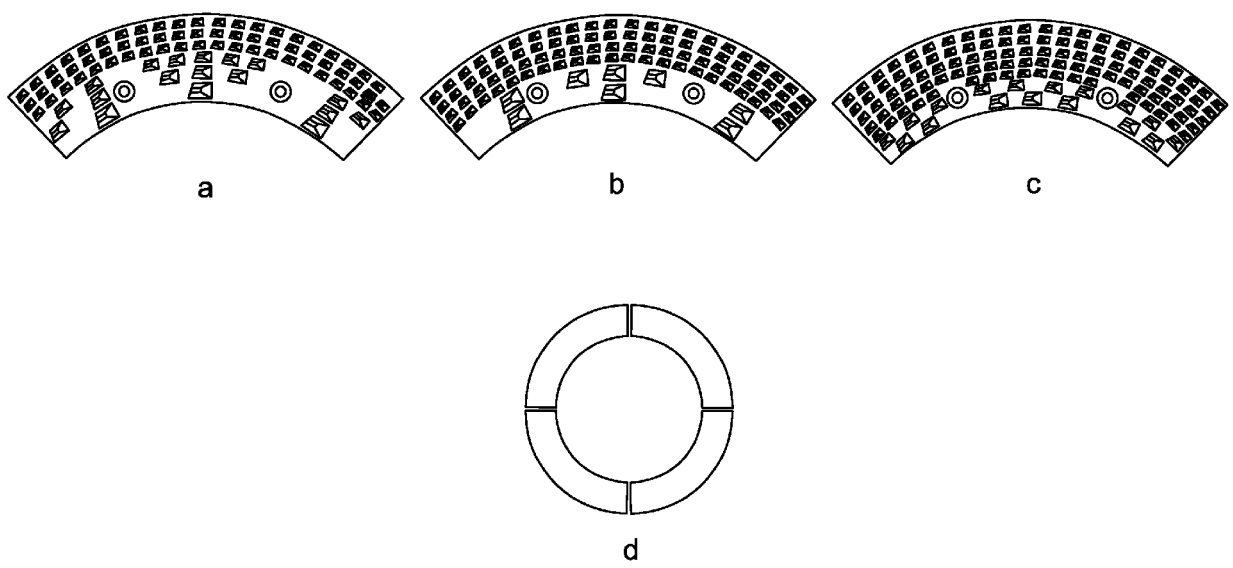


Fig. 4

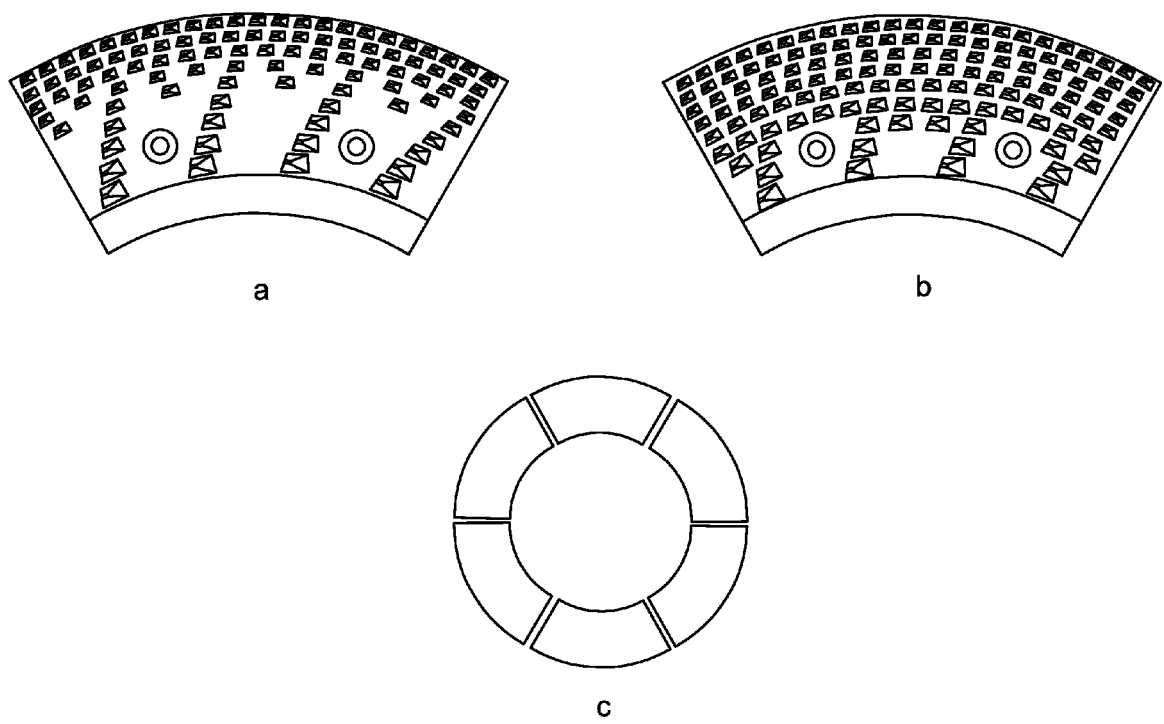


Fig. 5

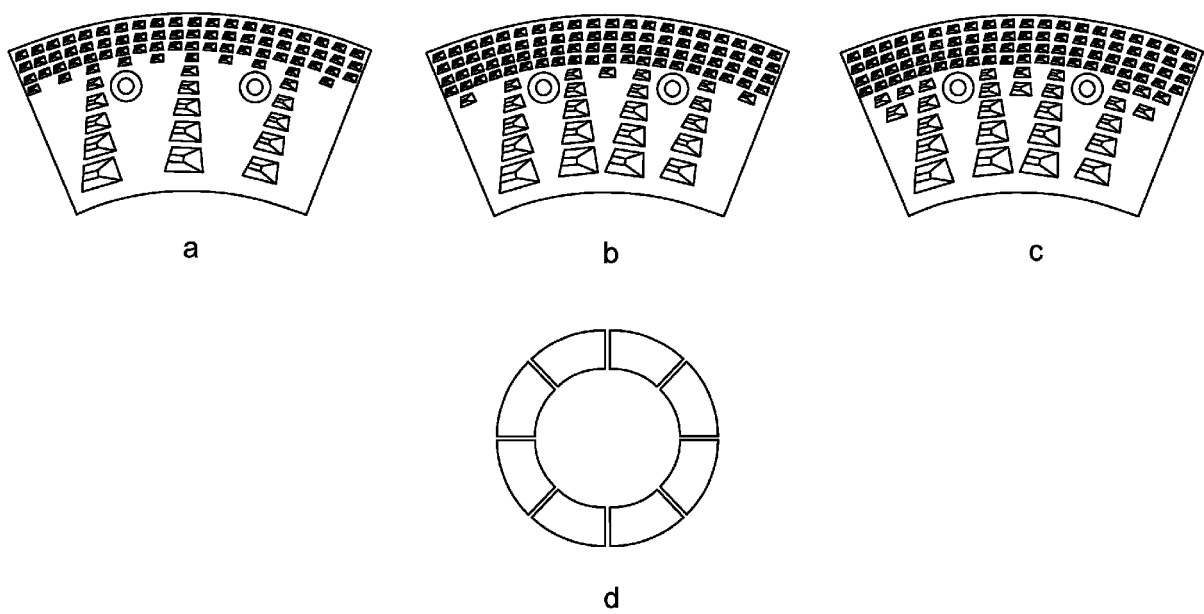
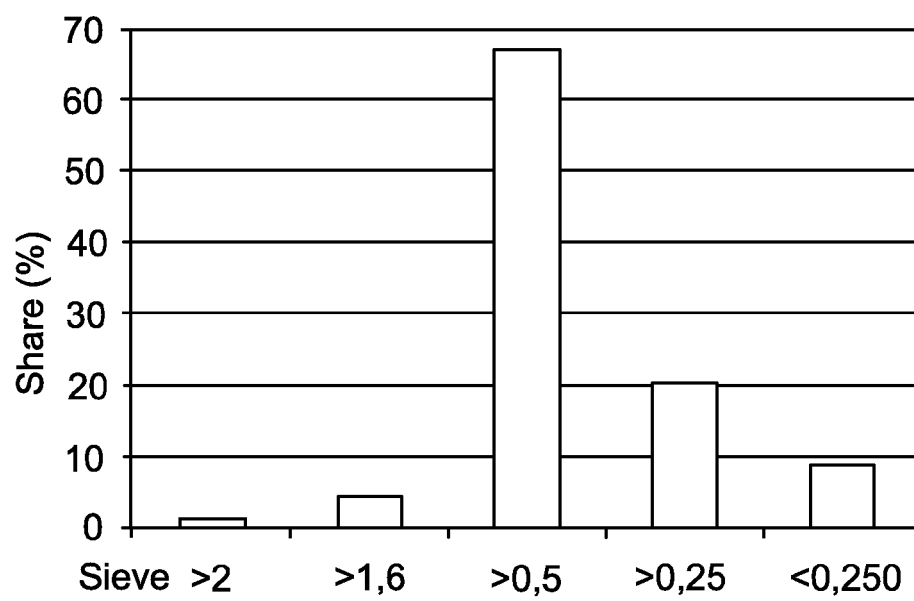
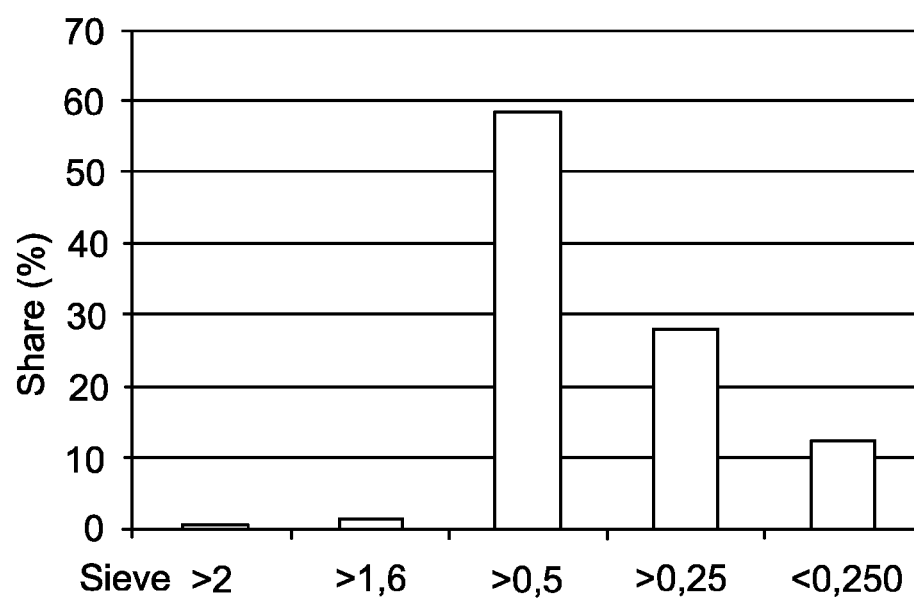


Fig. 6



a



b

Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 0996

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search Munich		Date of completion of the search 12 September 2011	Examiner Theis, Gilbert
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 16 0996

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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