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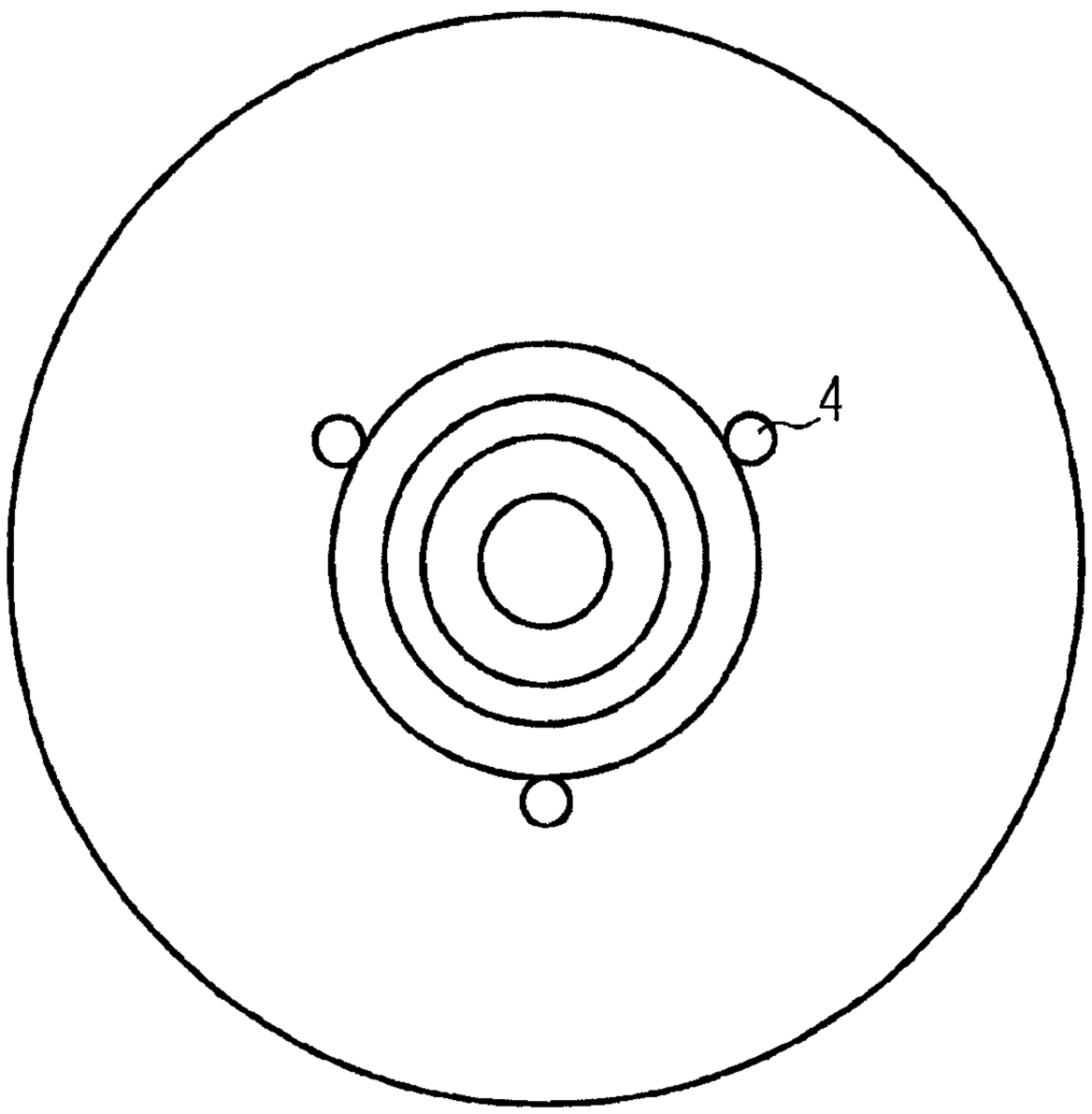
(54) Titre : BRULEUR A CHARBON PULVERISE COMPACT
(54) Title: COMPACT PULVERIZED COAL BURNER



(57) Abrégé/Abstract:
In the inventive burner for oxidant gasification of pulverized fuels under high pressures of e.g. 80 bar (8 MPa) and temperatures of e.g. 1200 to 1900 °C in reactors with liquid slag removal for oxygen gasification, the individual pulverized coal supply tubes (4) in the burner are embodied such that they are inclined toward the burner axis in the direction of the burner mouth, are implemented equiareally from the burner inlet up to the burner outlet, and end at the burner mouth adjacent to the oxidant outlet. Owing to the pulverized fuel feeding elements being implemented right up to the burner mouth and the instantaneous entry of the pulverized coal into the rotating oxygen stream there is no longer any areal discontinuity at the dust outlet, since here the pulverized coal stream is immediately sucked into the oxidant stream. At the outlet of the media the individual pulverized coal streams merge into a single rotating pulverized coal/oxygen stream, thereby achieving an even flame spread and stabilization.

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Abstract

Compact pulverized coal burner

In the inventive burner for oxidant gasification of pulverized fuels under high pressures of e.g. 80 bar (8 MPa) and temperatures of e.g. 1200 to 1900 °C in reactors with liquid slag removal for oxygen gasification, the individual pulverized coal supply tubes (4) in the burner are embodied such that they are inclined toward the burner axis in the direction of the burner mouth, are implemented equiareally from the burner inlet up to the burner outlet, and end at the burner mouth adjacent to the oxidant outlet. Owing to the pulverized fuel feeding elements being implemented right up to the burner mouth and the instantaneous entry of the pulverized coal into the rotating oxygen stream there is no longer any areal discontinuity at the dust outlet, since here the pulverized coal stream is immediately sucked into the oxidant stream. At the outlet of the media the individual pulverized coal streams merge into a single rotating pulverized coal/oxygen stream, thereby achieving an even flame spread and stabilization.

Fig 1

Description

Compact pulverized coal burner

The invention relates to a pulverized coal burner that is used for oxygen gasification of pulverized fuels (brown coals and/or hard coals or similar pulverized fuels) under high pressures and temperatures in reactors with liquid slag removal.

The invention relates to a burner for oxidant gasification of pulverized fuels having the features of the preamble of claim 1.

Pulverized coal burners for partial oxidation of pulverized fuels, comprising a cylindrical water-cooled housing and internal coaxially disposed annuli for supplying the pulverized fuel and the oxidant, are well known.
Located in the center of the burner is a further small gas/oxygen burner which serves as an igniter or pilot burner and is equipped with an optical flame monitoring device and a high-voltage ignition device. It is used for starting up the abovementioned pulverized coal burner, as disclosed in the patent documents DE 271038 A3 and DE 4306980 C2.

The pulverized fuel is supplied outside and inside the burner through one or more tubes. Inside the burner, the supply tube(s) is(are) run to the burner outlet in such a way that they perform at least one complete rotation about the axis and then end set tangentially adjacent to the burner outlet. At the end of the pulverized fuel tube(s) the pulverized fuel dust enters a cylindrical annulus in a tangential manner.

At the transition from the tube surface area to the annulus there is an abrupt increase in area and therefore a reduction in the pulverized fuel dust velocity.
Although increasing the number of pulverized fuel tubes inside the annulus can reduce the areal discontinuity, it cannot eliminate it.
This results in an uneven distribution of the pulverized fuel stream inside the annulus, which can cause asymmetrical flame spread with unilateral stressing of the reaction chamber.

The known burner has the following disadvantages:

1. complicated design of the tubes inside the cylindrical annulus in the burner

2. after the pulverized coal dust outlet there is an unavoidable areal discontinuity, thereby reducing the dust velocity

3. this areal discontinuity causes the downstream annulus to be unevenly filled with pulverized coal dust, resulting in differential mixing with the oxidant.

The object of the invention is to create a simple pulverized coal burner which operates reliably at pressure under pulverized coal gasification conditions. By means of structural design measures the pulverized coal burner shall be embodied so as to ensure on the one hand reliable operation with uniform flame spread during the pressurized gasification of pulverized products and on the other hand so that the burner is technologically easy to manufacture.

This object is achieved in the case of a subject matter outlined by the features set forth in the preamble by means of the features of the characterizing portion of claim 1.

Owing to the pulverized fuel feeding elements being implemented right up to the burner mouth and the instantaneous entry of the pulverized coal into the rotating oxygen stream there is no longer any areal discontinuity at the pulverized fuel outlet, since here the pulverized fuel stream is immediately sucked into the oxidant stream. At the outlet of the media the individual pulverized coal streams merge into a single rotating pulverized fuel dust/oxygen stream, thereby achieving an even flame spread and stabilization.

In a further embodiment of the invention the width and length of the flame spread can be influenced by means of different settings of the swirl blades.

Advantageous developments of the subject matter of the application are set forth in the dependent claims.

The subject matter of the application is explained in greater detail below as an exemplary embodiment to the extent required for understanding and with reference to figures, in which:

Fig 1 shows a cross-section through the inventive compact burner comprising three supply tubes, and

Fig 2 shows a longitudinal section through the inventive compact burner.

In the figures, the same reference symbols are used to denote identical elements.

The pulverized coal burner according to the invention comprises a centrally disposed pilot burner section 1 with fuel gas and oxidant supply, a flame monitoring device and an electrical high-voltage ignition device. Disposed around said module is an annulus 2 for supplying the oxidant for the pulverized coal burner. Swirl blades 3 for swirling the oxygen stream are provided at the annular outlet port. Both modules (pilot burner section and oxidant supply) are integrated in a further module, the burner carrier 5. The entire burner carrier module is implemented with a water cooling system in the form of a wound tube coil in order to dissipate the heat acting on said module. In addition, the modules disposed in the center of the burner carrier, i.e. pilot burner section and the further oxidant supply, are also equipped with separate water cooling systems.

According to the invention provision is made for the pulverized fuel to be supplied in such a way that a plurality (n = 2, 3, …) of straight pulverized coal feeding elements are disposed between the housing wall of the burner carrier and the central oxidant supply. The pulverized coal feeding elements are concentrically arranged around the central axis of the burner with the same angular offset. In the embodiment shown in Figure 1 comprising three pulverized coal feeding elements they are concentrically arranged around the central axis of the burner with an angular offset of 120 degrees. The pulverized coal feeding elements are implemented intrinsically as straight and inclined in the direction of the burner mouth toward the burner axis, and end at the burner mouth adjacent to the oxidant outlet.

Implementing the oxidant supply using swirl blades results in a strong rotation being imparted to the discharging oxygen

stream, into which the pulverized fuel jets discharging via the straight feeding elements are sucked.

The invention comprises a compact pulverized coal burner for the gasification of pulverized fuels under high pressures of, for example, 80 bar (8 MPa) and temperatures of, for example, 1200 to 1900 °C in reactors with liquid slag removal for oxygen gasification, having a housing (5) for accommodating a centrally disposed pilot burner (1) for starting up the compact burner unit and having a gas and oxidant supply as well as an integrated flame monitoring device and a high-voltage ignition device, an annular duct (2) disposed around said pilot burner (1) for supplying the oxidant, and straight feeding elements (4) inclined toward the burner axis, characterized in that a plurality of feeding elements (4) are present and said feeding elements (4) are embodied as intrinsically straight and inclined toward the burner axis and are implemented equiareally from the burner inlet up to the burner outlet, and end at the outlet immediately adjacent to the annular oxidant supply duct at the outlet of which swirl blades are present which impart a strong rotational movement to the oxygen stream and thus, as a result of appropriate design, allow the flame geometry to be influenced.

List of reference signs

1 Pilot burner with gas and oxygen supply as well as integrated flame monitoring device and high-voltage ignition device

2 Oxidant supply for pulverized fuel

3 Swirl blades for swirling the oxidant

4 Supply tube for pulverized fuel

5 Burner carrier

Claims

1. A burner for the oxidant gasification of pulverized fuels, having
a centrally disposed pilot burner section (1),
a concentric annular duct (2) for supplying the oxidant,
a plurality of pulverized coal feeding elements (4)
concentrically disposed outside of the annular duct,
characterized in that
in the burner, the individual pulverized coal feeding elements are implemented as intrinsically straight, are inclined toward the burner axis in the direction of the burner mouth, and end at the burner mouth adjacent to the oxidant outlet.

2. The burner as claimed in claim 1,
characterized in that
the individual pulverized coal feeding elements are embodied as equiareal from the burner inlet up to the burner mouth.

3. The burner as claimed in one of the preceding claims,
characterized in that
the annular duct has swirl blades for imparting a strong rotational movement to the oxidant stream.

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FIG 1

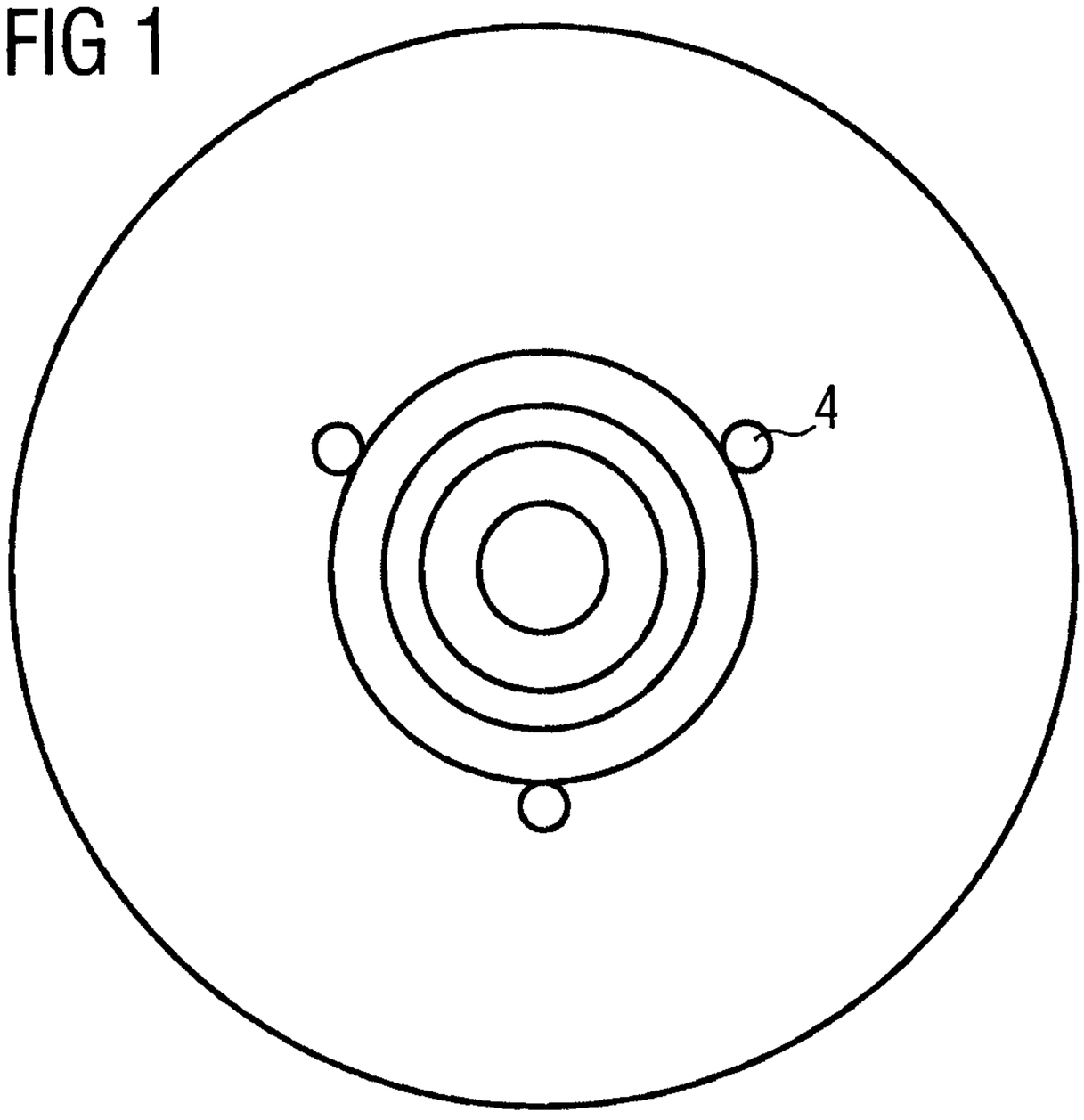
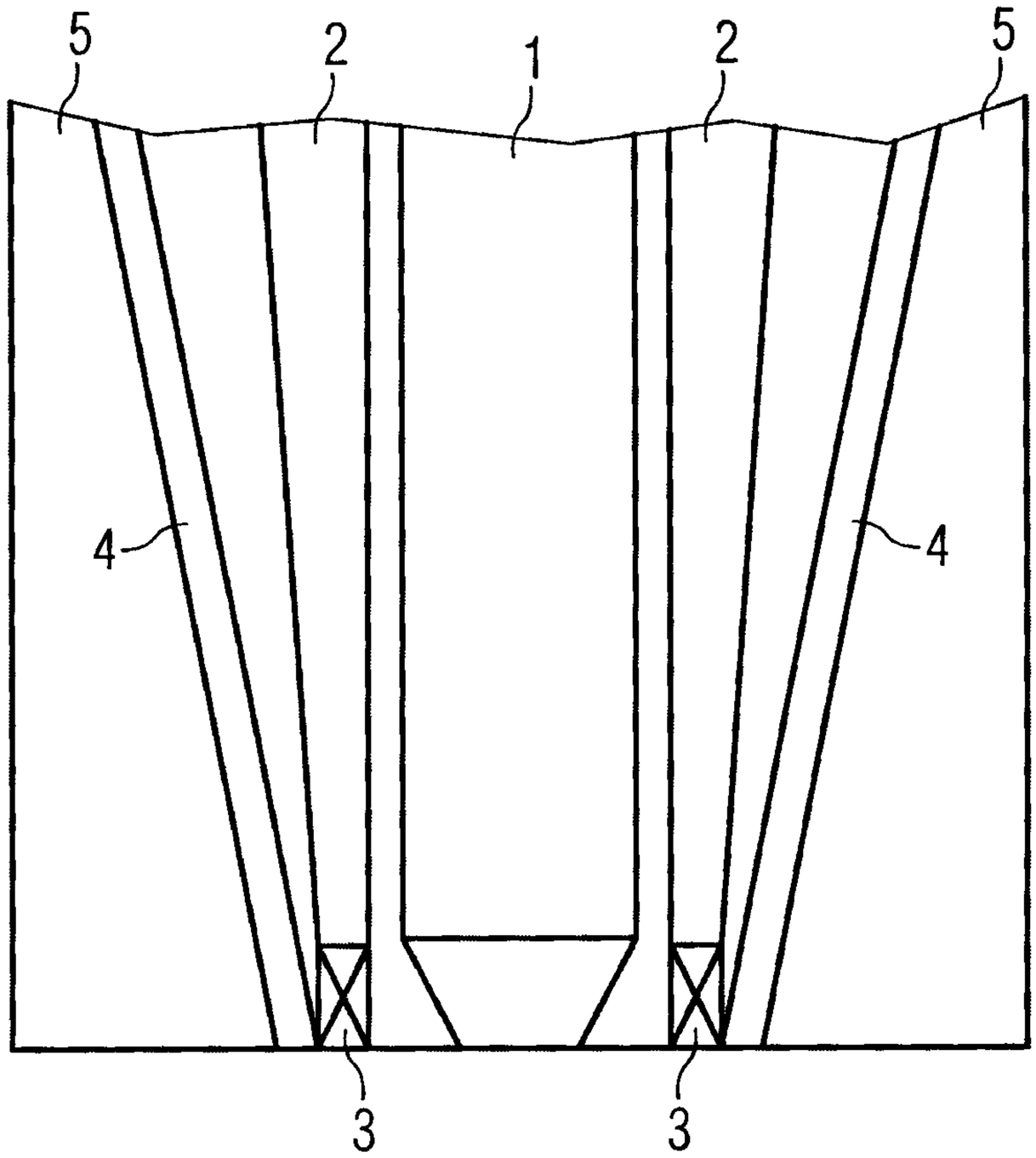
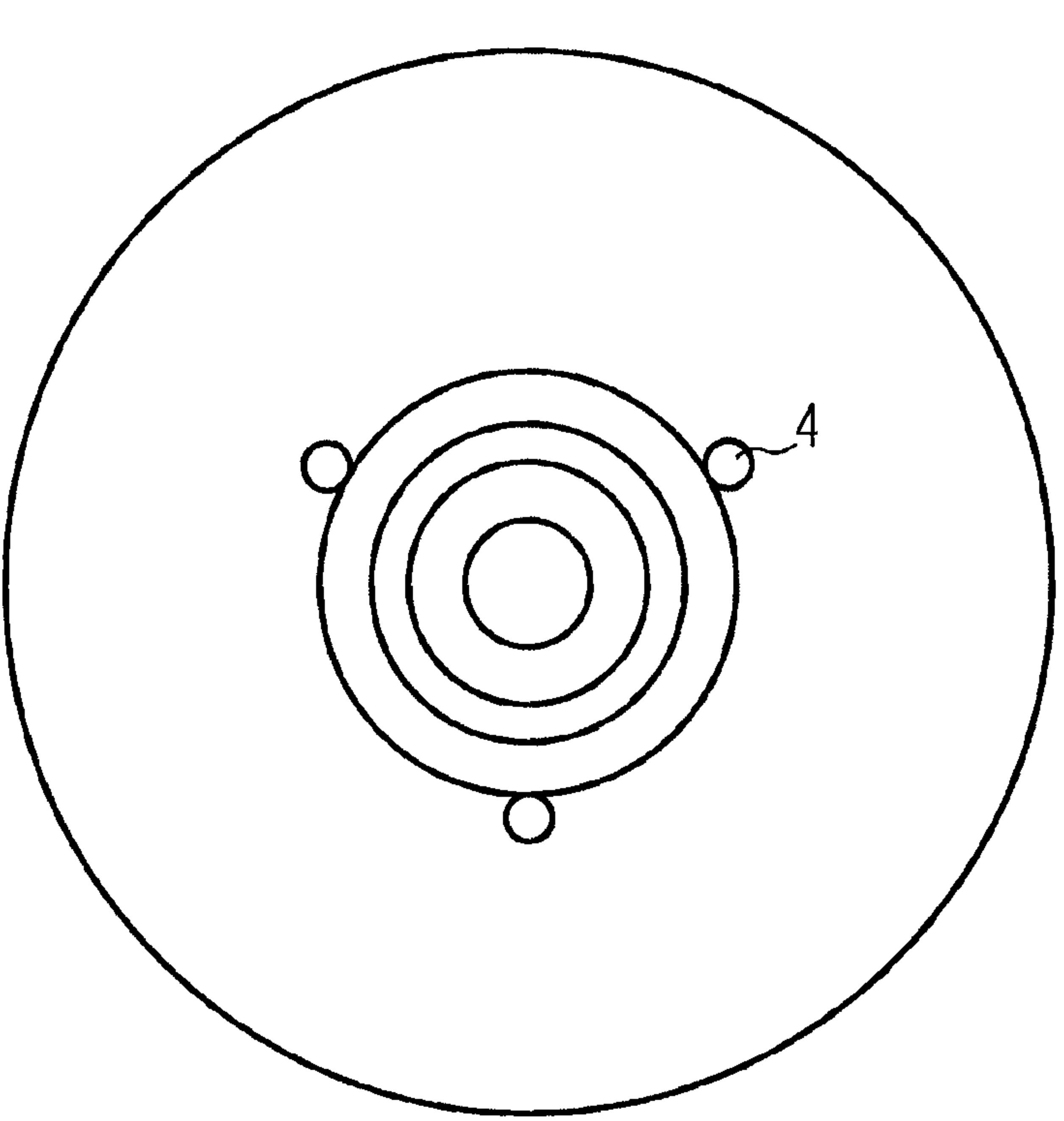


FIG 2

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