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Ofen

Four

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Description

[0001] This application claims priority of Taiwanese application no. 096210756, filed on July 2, 2007.

[0002] This invention relates to a furnace, more particularly to a furnace including a stirring rod having an inclined face for stirring a combustible material on a perforated tray.

[0003] A conventional furnace normally includes: a furnace housing; a perforated tray mounted in the furnace housing, dividing the inner space into upper and lower chambers, adapted to support a combustible material thereon, and formed with a plurality of apertures for passage of ash therethrough; a stirring rod disposed rotatably on the perforated tray for stirring the combustible material on the perforated tray; and a shaft extending through the perforated tray to connect with the stirring rod so as to drive rotation of the stirring rod using a motor.

[0004] In operation, the motor is actuated to drive rotation of the stirring rod, which results in stirring of the combustible material and ash formed from combustion of the combustible material on the perforated tray, which, in turn, results in falling of the ash through the apertures in the perforated tray to a bottom exit of the furnace.

[0005] Since there exists a gap between the perforated tray and the stirring rod, undesired accumulation of combustible material and ash in the gap is likely to occur, which can hinder rotation of the stirring rod.

[0006] U.S. Patent No. 4947769 discloses a furnace including a perforated plate, and a rotatable arm positioned on the perforated plate. The rotatable arm has a rotatable body and a flange extending vertically from the rotatable body opposite to the perforated plate for displacement of combustible materials and ash formed during the combustion of solid particulate fuel. However, since there still exists a gap between the rotatable arm and the perforated plate and a corner between the rotatable body and the flange, undesired accumulation of combustible materials and ash is also likely to occur, which adversely affects rotation of the rotatable arm.

[0007] Therefore, the object of the present invention is to provide a furnace that can overcome the aforesaid drawback associated with the prior art.

[0008] According to the present invention, a furnace comprises: a furnace housing defining an inner space therein; a perforated tray mounted in the furnace housing, dividing the inner space into upper and lower chambers, adapted to support a combustible material thereon, and formed with a plurality of apertures for passage of ash therethrough; and a stirring rod disposed rotatably on the perforated tray for stirring the combustible material on the perforated tray. The stirring rod has top and bottom ends, two opposite lateral ends, a middle portion, and opposite first and second portions, each of which extends from the middle portion to a respective one of the lateral ends. Each of the first and second portions has an inclined face that extends between the top and bottom ends of the stirring rod from the respective one of the lateral

ends toward the middle portion of the stirring rod, that is inclined relative to the perforated tray, and that faces toward the perforated tray.

[0009] In drawings which illustrate an embodiment of the invention,

Fig. 1 is a fragmentary schematic partly sectional view of the preferred embodiment of a furnace according to this invention;

Fig. 2 is an exploded perspective view of an assembly of a perforated tray and a stirring rod of the preferred embodiment;

Fig. 3 is an assembled perspective view of the assembly of the perforated tray and the stirring rod of the preferred embodiment; and

Fig. 4 is an enlarged partly sectional view of an encircled portion in Fig. 3.

Figs. 1 to 4 illustrate the preferred embodiment of a furnace 2 of this invention for burning a raw material, such as hull and shell waste of agricultural crops.

[0010] The furnace 2 includes: a furnace housing 21 defining an inner space 211 therein; a perforated tray 22 mounted in the furnace housing 21, dividing the inner space 211 into upper and lower chambers 2111, 2112, adapted to support a combustible material thereon, and formed with a plurality of apertures 222 for passage of ash therethrough; and a stirring rod 4 disposed rotatably on the perforated tray 22 for stirring the combustible material on the perforated tray 22. The stirring rod 4 has top and bottom ends 40, 41, two opposite lateral ends 42, a middle portion 43, and opposite first and second portions 46, 47, each of which extends from the middle portion 43 to a respective one of the lateral ends 42. Each of the first and second portions 46, 47 of the stirring rod 4 has an inclined face 45 that extends between the top and bottom ends 40, 41 of the stirring rod 4 from the respective one of the lateral ends 42 toward the middle portion 43 of the stirring rod 4, that is inclined relative to the perforated tray 22, and that faces toward the perforated tray 22.

[0011] Each of the first and second portions 46, 47 of the stirring rod 4 further has an outer segment 461, 471 extending from the respective one of the lateral ends 42 of the stirring rod 4, and an inner segment 462, 472 bent from the outer segment 461, 471 and extending therefrom to the middle portion 43 of the stirring rod 4 such that the outer and inner segments 461, 462 (471, 472) of each of the first and second portions 46, 47 of the stirring rod 4 form an angle of less than 180 degrees and greater than 90 degrees therebetween. Preferably, each of the first and second portions 46, 47 of the stirring rod 4 is tapered from the middle portion 43 to the respective one of the lateral ends 42 of the stirring rod 4.

[0012] The furnace 2 further includes a driving unit 20 including a motor 24 with an output shaft 23 that extends through the perforated tray 22 and into the upper chamber 211 of the furnace 2. The middle portion 43 of the

stirring rod 4 is formed with a non-circular hole 31 for extension of the output shaft 23 thereinto so as to permit the stirring rod 4 to be driven by the output shaft 23 of the motor 24.

[0013] In this embodiment, the inclined faces 45 of the first and second portions 46, 47 of the stirring rod 4 are disposed respectively at two opposite sides of the stirring rod 4.

[0014] In operation, the combustible material and ash are stirred by the stirring rod 4 upon actuation of the motor 24 so as to enhance combustion of the combustible material and to permit falling of the ash through the apertures 222 in the perforated tray 22 into a bottom exit 25 of the furnace 2 for further treatment. During rotation of the stirring rod 4, the inclined faces 45 of the first and second portions 46, 47 of the stirring rod 4 push the ash to pass through the apertures 222 in the perforated tray 22, thereby facilitating removal of the ash from the perforated tray 22 and reducing the accumulated amount of the ash in a gap between the stirring rod 4 and the perforated tray 22. Moreover, the angle between the inner and outer segments 461, 462 (471, 472) of each of the first and second portions 46, 47 of the stirring rod 4 enhances stirring and circulation of the combustible material and the ash on the perforated tray 22. Furthermore, the tapered shape of each of the first and second portions 46, 47 of the stirring rod 4 reduces the contact area of the respective inclined face 45 that is in contact with the combustible material and the ash, thereby reducing the resistance to rotation of the stirring rod 4 attributed to the combustion material and the ash.

[0015] With the inclusion of the stirring rod 4 in the furnace of this invention, the aforesaid accumulation problem associated with the prior art can be considerably alleviated.

Claims

1. A furnace (2) with:

a furnace housing (21) defining an inner space (211) therein;
 a perforated tray (22) mounted in said furnace housing (21), dividing said inner space (211) into upper and lower chambers (2111, 2112), adapted to support a combustible material thereon, and formed with a plurality of apertures (222) for passage of ash therethrough; and
 a stirring rod (4) disposed rotatably on said perforated tray (22) for stirring the combustible material on said perforated tray (22), said stirring rod (4) having top and bottom ends (40, 41), two opposite lateral ends (42), a middle portion (43), and opposite first and second portions (46, 47), each of which extends from said middle portion (43) to a respective one of said lateral ends (42),

characterized by that each of said first and second portions (46, 47) having an inclined face (45) that extends between said top and bottom ends (40, 41) of said stirring rod (4) from the respective one of said lateral ends (42) toward said middle portion (43) of said stirring rod (4), that is inclined relative to said perforated tray (22), and that faces toward said perforated tray (22).

2. The furnace of Claim 1, **characterized in that** each of said first and second portions (46, 47) of said stirring rod (4) further has an outer segment (461, 471) extending from the respective one of said lateral ends (42) of said stirring rod (4), and an inner segment (462, 472) bent from said outer segment (461, 471) and extending therefrom to said middle portion (43) of said stirring rod (4).

3. The furnace of Claim 1, **characterized in that** each of said first and second portions (46, 47) of said stirring rod (4) is tapered from said middle portion (43) to the respective one of said lateral ends (42) of said stirring rod (4).

4. The furnace of Claim 1, further **characterized by** a driving unit (20) including an output shaft (23) that extends through said perforated tray (22) and into said upper chamber (2111) of said furnace (2), said middle portion (43) of said stirring rod 4 being formed with a non-circular hole (31) for extension of said output shaft (23) thereinto so as to permit said stirring rod (4) to be driven by said output shaft (23).

5. The furnace of Claim 1, **characterized in that** said stirring rod (4) further has two opposite sides, said inclined faces (45) of said first and second portions (46, 47) of said stirring rod (4) being disposed respectively at said opposite sides of said stirring rod (4).

Patentansprüche

1. Ofen (2), aufweisend:

ein Ofengehäuse (21), welches einen Innenraum (211) definiert;
 eine in diesem Ofengehäuse (21) angebrachte Lochpfanne (22), welche den Innenraum (211) in eine obere und eine untere Kammer (2111, 2112) teilt und als Halter für Brennstoff ausgelegt sowie mit einer Vielzahl von Öffnungen (222) versehen ist, durch welche Asche hindurchtreten kann; und
 eine Rührstange (4), welche drehbar auf der Lochpfanne (22) angeordnet ist, um den Brennstoff auf der Lochpfanne (22) zu bewegen, wobei die Rührstange (4) eine Oberseite und eine

Unterseite (40, 41) aufweist, zwei gegenüberliegende Stirnseiten (42), einen Mittenbereich (43), und einen ersten bzw. zweiten Bereich (46, 47), die sich gegenüber liegen und sich jeweils von dem Mittenbereich (43) zu einer Stirnseite (42) erstrecken,

dadurch gekennzeichnet, dass der erste und der zweite Bereich (46, 47) jeweils eine Schrägfläche (45) aufweisen, die sich zwischen der Ober- und der Unterseite (40, 41) der Rührstange (4) jeweils von einer Stirnseite (42) zum Mittenbereich (43) der Rührstange (4) erstrecken, welche bezüglich der Lochpfanne (22) geneigt ist und der Lochpfanne (22) zugewandt ist.

2. Ofen gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der erste bzw. zweite Bereich (46, 47) der Rührstange (4) jeweils einen äußeren Abschnitt (461, 471) aufweist, der sich von der jeweiligen Stirnseite (42) der Rührstange (4) erstreckt, sowie einen inneren Abschnitt (462, 472), welcher von dem äußeren Abschnitt (461, 471) weg gebogen ist und sich von dort zum Mittenbereich (43) der Rührstange (4) erstreckt.

3. Ofen gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sich der erste bzw. zweite Bereich (46, 47) der Rührstange (4) jeweils von dem Mittenbereich (43) zur Stirnseite (42) der Rührstange (4) verjüngen.

4. Ofen gemäß Anspruch 1, ferner **gekennzeichnet durch** eine Antriebseinheit (20) mit einer Ausgangswelle (23), welche sich **durch** die Lochpfanne (22) hindurch und in die obere Kammer (2111) des Ofens (2) hinein erstreckt, wobei der Mittenbereich (43) der Rührstange (4) mit einem nicht runden Loch (31) ausgebildet ist, in welchem die Ausgangswelle (23) eingesteckt ist, um den Antrieb der Rührstange (4) **durch** die Ausgangswelle (23) zu ermöglichen.

5. Ofen gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Rührstange (4) ferner zwei gegenüberliegende Seiten aufweist, wobei die Schrägfläche (45) des ersten bzw. des zweiten Bereichs (46, 47) der Rührstange (4) jeweils an gegenüberliegenden Enden der Rührstange (4) angeordnet sind.

Revendications

1. Four (2) comprenant :

une enveloppe de four (21), celle-ci en définissant l'espace intérieur (211) ;
un plateau perforé (22) disposé dans ladite enveloppe (21), divisant ledit espace intérieur

(211) en chambres supérieure et inférieure (2111, 2112), conçu à cet égard de telle sorte à y soutenir un matériau combustible et pourvu de nombreuses ouvertures (222) permettant le passage de la cendre ; et

un agitateur (4) disposé de sorte à être rotatif sur ledit plateau perforé (22) pour brasser le matériau combustible sur ledit plateau perforé (22), ledit agitateur (4) présentant des extrémités supérieure et inférieure (40, 41), deux extrémités latérales opposées l'une à l'autre (42), une section centrale (43), ainsi que les première et deuxième sections opposées l'une à l'autre (46, 47), chacune d'entre elles s'étendant de ladite section centrale (43) à l'une desdites extrémités latérales respective (42), **caractérisé en ce que** chacune desdites première et seconde section (46, 47) présentant une face inclinée (45) s'étendant entre lesdites extrémités supérieure et inférieure (40, 41) dudit agitateur (4) et l'une desdites extrémités latérales respective (42) jusqu'à ladite section centrale (43) dudit agitateur (4), est inclinée en fonction dudit plateau perforé (22) et tournée vers ledit plateau perforé (22).

2. Four selon la revendication 1, **caractérisé en ce que** chacune desdites première et seconde section (46, 47) dudit agitateur (4) présente de plus une partie extérieure (461, 471) à partir de l'une desdites extrémités latérales respective (42) dudit agitateur (4), ainsi qu'une partie intérieure (462, 472) courbée à partir de ladite partie extérieure (461, 471) et s'étendant de là jusqu'à ladite section centrale (43) dudit agitateur (4).

3. Four selon la revendication 1, **caractérisé en ce que** chacune desdites première et seconde section (46, 47) dudit agitateur (4) est conique à partir de ladite section centrale (43) jusqu'à l'une desdites extrémités latérales respective (42) dudit agitateur (4).

4. Four selon la revendication 1, **caractérisé en outre en ce qu'il** présente une unité d'entraînement (20) comprenant un arbre de sortie (23) traversant ledit plateau perforé (22) et ladite chambre supérieure (2111) dudit four (2), ladite section centrale (43) dudit agitateur (4) étant pourvu d'une cavité non circulaire (31) pour y accueillir l'extension dudit arbre de sortie (23) afin de permettre au dit agitateur (4) d'être entraîné par ledit arbre de sortie (23).

5. Four selon la revendication 1, **caractérisé en ce que** ledit agitateur (4) comporte de plus deux côtés opposés, lesdites faces inclinées (45) desdites première et seconde sections (46, 47) dudit agitateur (4) étant disposées respectivement aux dits côtés opposés dudit agitateur (4).

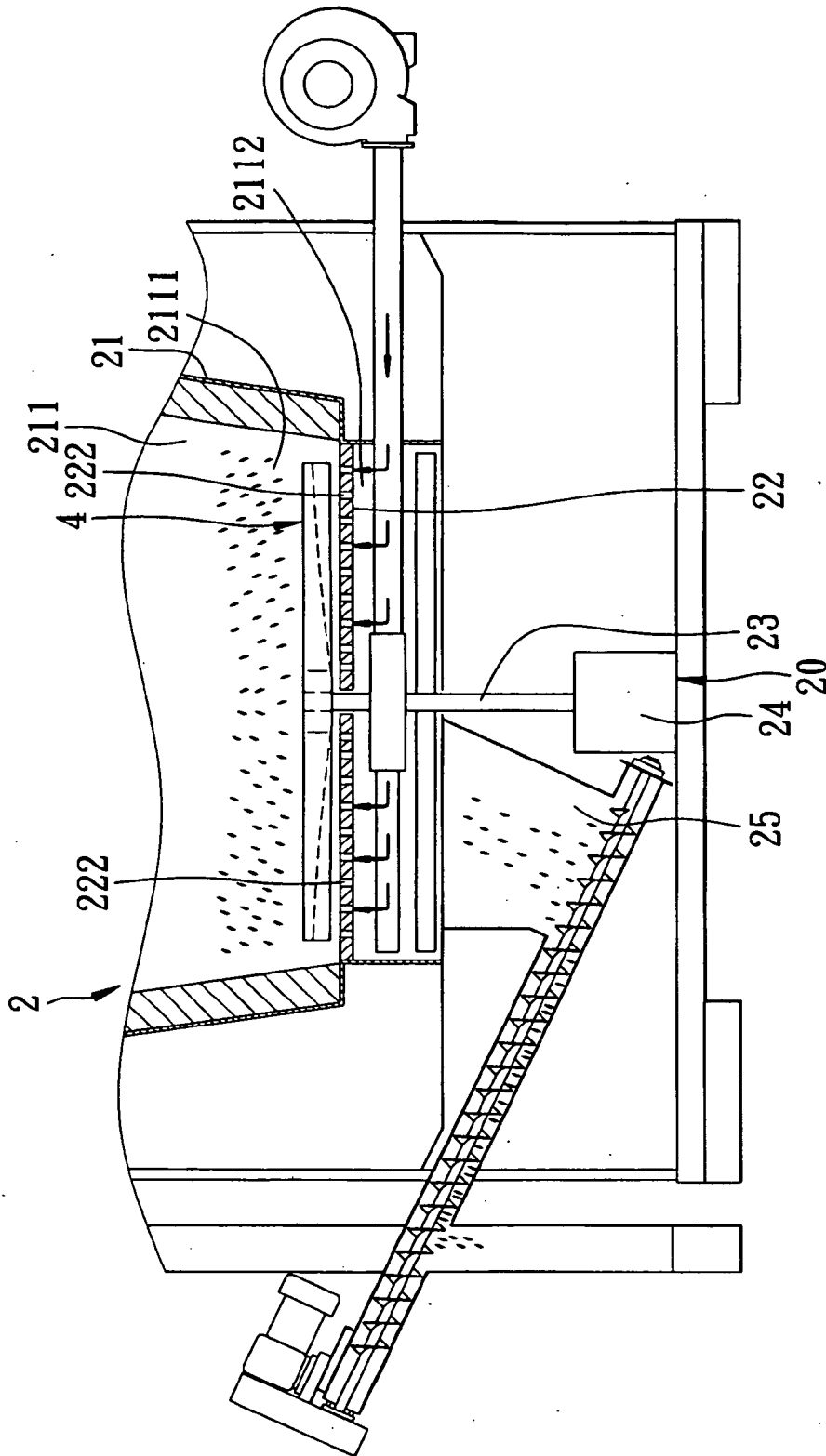


FIG. 1

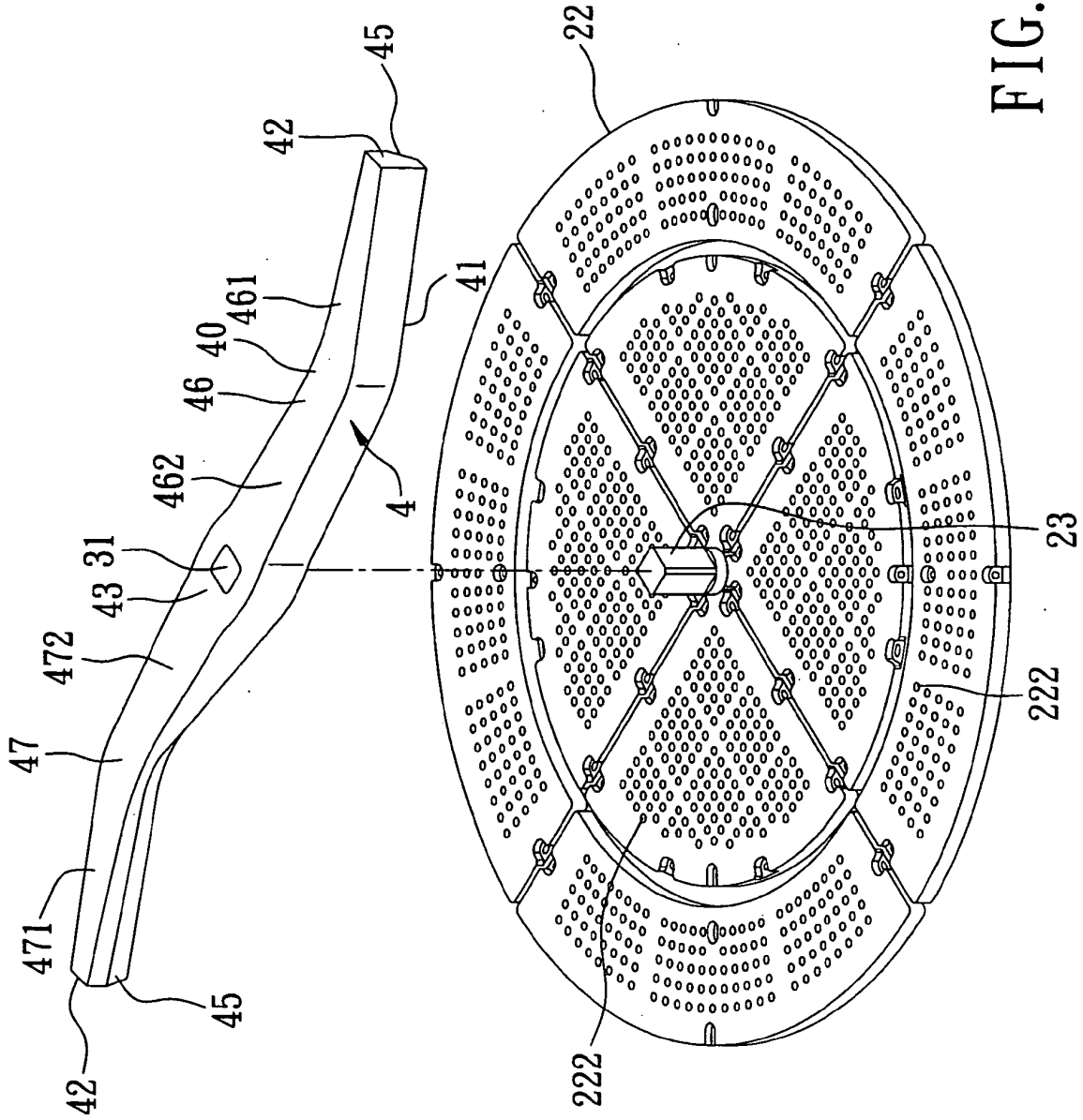


FIG. 2

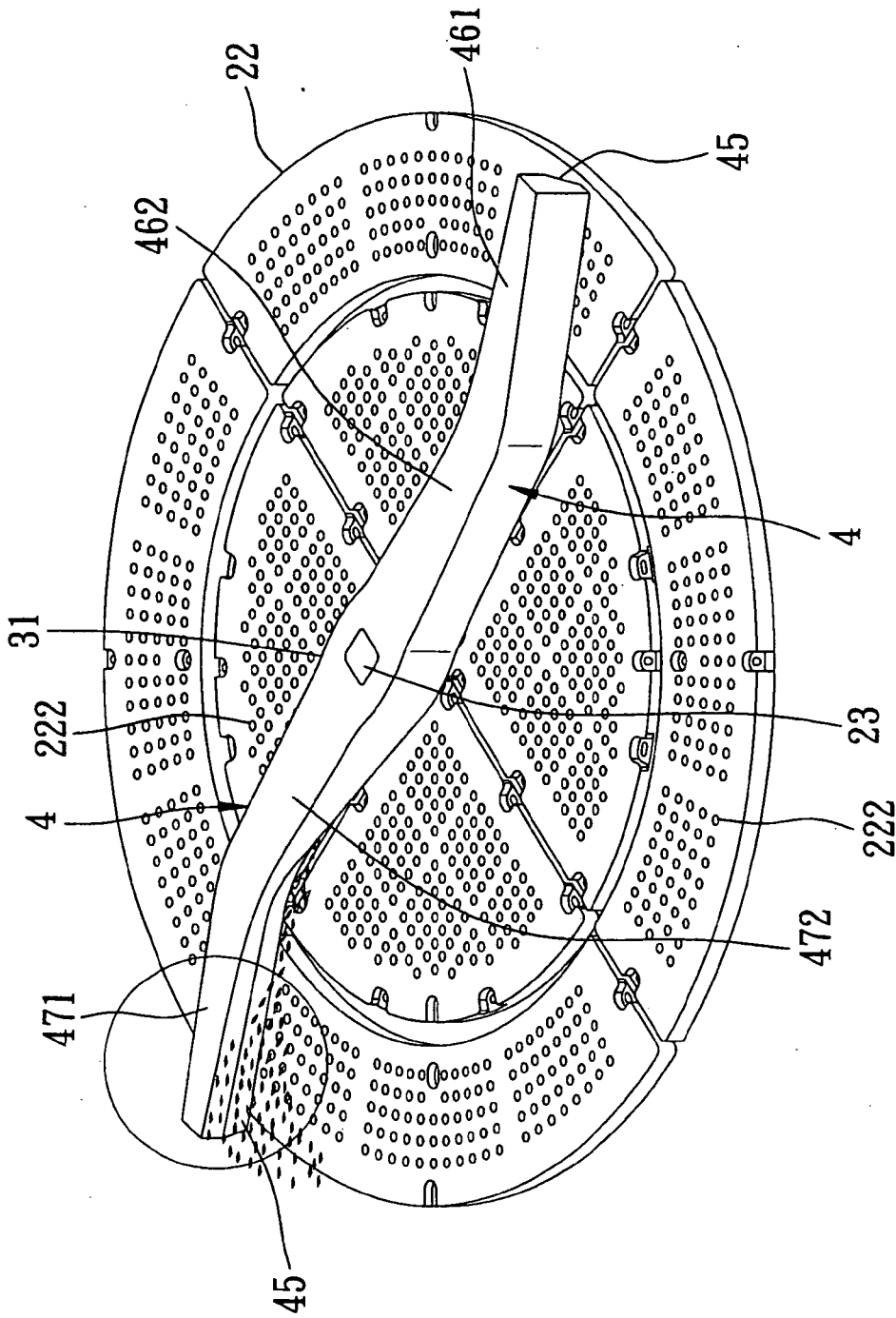


FIG. 3

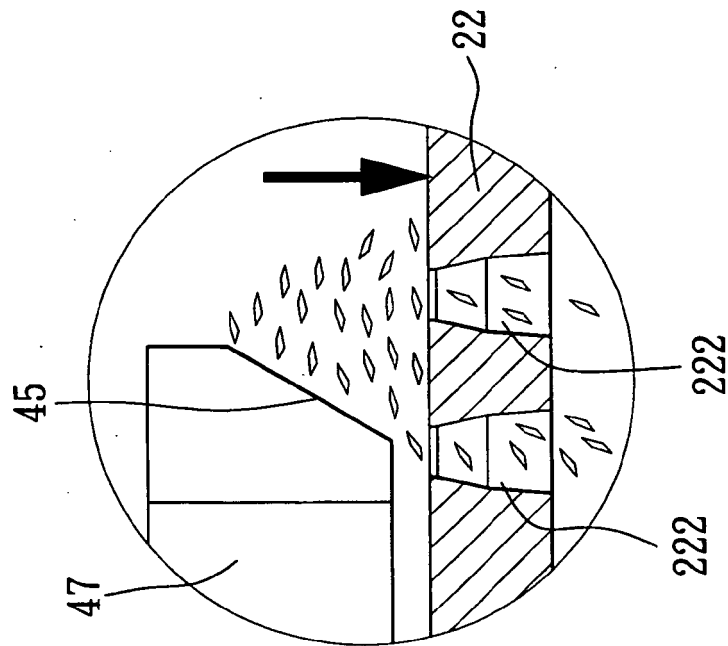


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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