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(54) FUEL FEED SYSTEM FOR A PELLET FIRE

BRENNSTOFFZUFUHRSYSTEM FÜR EINEN PELLET-BRENNER

SYSTÈME D'ALIMENTATION EN COMBUSTIBLE POUR BRÛLEUR À PASTILLES

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Description

Technical Field

[0001] The present invention is a fuel feed system for use in pellet fires.

Background Art

[0002] Any discussion of the prior art throughout the specification is not an admission that such prior art is widely known or forms part of the common general knowledge in the field.

[0003] Pellet fires are becoming more popular; they burn compressed pellets of combustible material, normally wood, but corn, grain and other materials are used. The pellets are a uniform size range and composition so their combustion is more predictable than natural wood or coal.

[0004] Pellet fires automatically feed the fuel into the fire box from a storage hopper. Pellet fires are classified by their method of feeding fuel into the burn pot, top feed or bottom feed.

[0005] In a bottom feed pellet fire a horizontal auger that normally lies in the base of the burn pot, for at least part of its length, feeds the pellets from the hopper through the burn pot and discharges the ash out the other end. It can be difficult to prevent the fire burning back into the hopper full of fuel if a power failure occurs. The auger is exposed to the full heat of the fire and the abrasive and/or corrosive ash and combustion products. However, aesthetically, many prefer the look of a bottom fed pellet fire as they tend to have a wider exposed flame front.

[0006] In a top feed pellet fire an inclined auger lifts the pellets from the base of the hopper and discharges them above the burn pot. The pellets then gravity feed into the burn pot, often falling onto an inclined plate first. This feed is from a single tube or chute which forms a single pile of pellets in the burn pot, which some find creates a less aesthetically appealing flame than the bottom feed. The gravity feed section minimises the chance of any burn back into the hopper.

[0007] WO 2009/134904 discloses a fuel feed system for a pellet fire which includes conveying means within a casing, a single inlet means and a plurality of outlet means.

[0008] It is preferably an object of the present invention to provide a fuel feed system for a pellet fire that ameliorates one or more of the limitations of existing systems, or provides the consumer with a useful choice.

Disclosure of Invention

[0009] The present invention provides a fuel feed system for a pellet fire which includes conveying means within a casing, said casing including a plurality of inlet means distributed lengthwise along the casing and a plurality of outlet means distributed lengthwise along the casing, such that each inlet means is horizontally offset from the adjacent outlet means and wherein said conveying means is configured to move compressed fuel pellets from an inlet means to an adjacent outlet means; such that in use said fuel feed system is configured to form a plurality of overlapping piles of compressed fuel pellets in a burn pot of the pellet fire.

[0010] Preferably the longitudinal axis of the casing and the burn pot are approximately parallel.

[0011] Preferably said inlet means and/or outlet means are apertures in the casing. In a highly preferred form the conveying means is one or more concentrically aligned augers. In a most preferred form the conveying means is a single auger.

[0012] Preferably the casing is not a single piece of material. In one preferred form the casing is formed by parts of the pellet fire or fuel feed system alone or in combination with additional separate components.

[0013] In a preferred form the fuel feed system includes a plurality of delivery ducts and/or channels such that each outlet means forms one end of an associated delivery duct or channel, such that at an opposite end of each said delivery duct or channel there is a delivery outlet that is configured to deliver the compressed fuel pellets, directly or indirectly, into the burn pot. Preferably the fuel feed system includes a distribution section which lies between the delivery outlets and the burn pot. In a highly preferred form the distribution section is an angled plate that vertically and/or horizontally separates the delivery outlets and the burn pot.

[0014] Preferably where the fuel feed system does not include delivery ducts and/or channels it includes a primary distribution section which lies between the outlet means and the burn pot. In a highly preferred form the primary distribution section is an angled plate that vertically and/or horizontally separates the outlet means and the burn pot.

[0015] The invention also includes a pellet fire incorporating the fuel feed system.

[0016] Preferably the pellet fire includes a hopper configured to store compressed fuel pellets such that an outlet of the hopper is coterminous with the fuel feed system. In a highly preferred form the casing lies essentially horizontally across the outlet of the hopper.

[0017] In a further preferred form the fuel feed system includes a plurality of casings, either separated or coterminous, each with at least one conveying means.

Brief Description of Drawings

[0018] By way of example only, a preferred embodiment of the present invention is described in detail below with reference to the accompanying drawings, in which:

Figure 1 is a cutaway pictorial view of a pellet fire showing the fuel feed system;

Figure 2 is a pictorial view of a hopper with a fuel feed

system and fire box removed from the pellet fire;

Figure 3 is a plan view of the hopper with feed system and fire box removed from the pellet fire, with no fuel in the hopper or burn pot;

Figure 4 is a cross sectional plan view through the hopper and fuel feed system in the direction of arrows A-A., with no fuel in the burn pot;

Figure 5 is a is a plan view of the hopper with feed system and fire box removed from the pellet fire, with fuel pellets in the hopper and interlinking piles of pellets in the burn pot

Best Mode for Carrying Out the Invention

[0019] Referring to Figure 1, a cutaway view of a pellet fire (1) including a first sub-assembly (2) is shown. Said first sub assembly (2) includes a hopper (3), fuel feed system (4) and burn pot (5), such that the hopper (3) is a storage container for compressed fuel pellets of a known type. The hopper (3) is connected to the fuel feed system (4), which in turn is connected to the burn pot (5).

[0020] The burn pot (5) is of a known type that includes a channel (6) with a perforated base (7) which, when the pellet fire (1) is in use, acts as a grate. Other surfaces of the channel (6) or burn pot (5) may also be perforated but this is optional and not shown in the drawings.

Referring to Figures 2 to 5 the first sub-assembly (2) is shown removed from the pellet fire (1) for clarity. Figures 2 to 4 show the first sub-assembly (2) without compressed fuel pellets.

[0021] Referring to figures 2 to 4, where figure 4 is a cross sectional view in the direction of arrows A-A shown in figure 2, the fuel feed system (4) including a second sub-assembly (10) is shown. The second sub-assembly (10) includes a conveying means (11), a plurality of inlet means (12) and a plurality of outlet means (13). Each inlet means (12) is separated from the adjacent inlet means (12) by first shield means (14), and each outlet means (13) is separated from the adjacent outlet means (13) by second shield means (15).

[0022] The conveying means (11) is an auger of known type which lies essentially horizontally (though in some embodiments may be angled) across the base of the hopper (3). The first and second shield means (14,15) form a casing (16) in which the conveying means (11) is located, the inlet and outlet means (12,13) are apertures in this casing (16). Each inlet means (12) is horizontally offset from the nearest outlet means (13) along the length of the casing (16).

[0023] The first sub-assembly (2) further includes a plurality of delivery means (20) and delivery outlets (21), and a distribution section (22). Each delivery means (20) is a duct which has an outlet means (13) as one end and a delivery outlet (21) as the opposite end. Each delivery means (20) is angled such that the delivery outlet (21) is vertically separated from the associated outlet means (13). The term 'duct' is intended to include hollow prisms with any cross sectional shape, even if the cross sectional shape changes from one end to the other.

[0024] Each delivery outlet (21) lies above the distribution section (22) which is connected to the burn pot (5). The distribution section (22) is an angled plate extending the length of the channel (6).

[0025] Referring to figure 5, the first sub-assembly (2) containing compressed fuel pellets is shown. The fuel feed system (4), in use, creates a plurality of overlapping pellet piles (30), such that in use these overlapping piles form a wide flame front in the burn pot (5).

[0026] By way of example only the flow of compressed fuel pellets through the first sub-assembly with the pellet fire (1) in use will be described.

[0027] The compressed fuel pellets in the hopper (3) fall, or are pulled through, an inlet means (12). The conveying means (11) then moves these compressed fuel pellets to a horizontally offset adjacent outlet means (13). The compressed fuel pellets then move through the delivery means (20) associated with that outlet means (13) and out of the associated delivery outlet (21). The compressed fuel pellets then fall onto the distribution section (22) and are gravity fed into the channel (6). Each delivery outlet (21) directs compressed fuel pellets onto a separated, but overlapping pellet pile (30) for combustion.

[0028] As each inlet means (12) is horizontally offset from each adjacent outlet means (13), the mass/volume of compressed fuel pellets through the fuel feed system (4) can be controlled. In other words the compressed fuel pellets cannot fall directly from an inlet means (12) into an outlet means (13), they must be physically moved from one to the other by the conveying means (11). This horizontal separation of adjacent inlet and outlet means (12,13) prevents the compressed fuel pellets from directly feeding from the hopper (3) to the burn pot (5). If the conveying means (11) is stopped then the compressed fuel pellet flow is essentially stopped at the same time.

[0029] In a further embodiment the fuel feed system (4) is not directly connected to the burn pot (5). In this embodiment the fuel pellets fall from the fuel feed system (4) into the burn pot (5).

[0030] In a further embodiment (not shown) the distribution section (22) is not present, so that in use the compressed fuel pellets fall directly from each delivery outlet (21) into the burn pot (5).

[0031] In a further embodiment the second sub-assembly (10) is not at the base of the hopper (3).

[0032] In a further embodiment the conveying means (11) is a plurality of augers each able to be separately driven.

[0033] In a further embodiment there are two or more augers which may or may not be concentrically aligned. For example (not shown) they may be parallel with horizontal or vertical separation.

[0034] In one embodiment (not shown) there are one or more additional casings, each separate from or coterminous with the casing (16). Each of these additional casings is similar to the casing (16) in that they include

additional inlet and/or outlet means that are horizontally separated, and house one or more additional conveying means. For example there may be two parallel augers within a single casing, two additional conveying means in two separated casings each configured to, either separately or in combination, create a plurality of overlapping pellet piles (30).

[0035] In a further embodiment (not shown) the conveying means (11) is not located in the casing (16) and the casing (16) is hollow.

Claims

1. A fuel feed system (4) for a pellet fire (1) which includes conveying means (11) within a casing (16), said casing (16) including a plurality of inlet means (12) distributed lengthwise along the casing (16) and a plurality of outlet means (13) distributed lengthwise along the casing (16), such that each inlet means (12) is horizontally offset from an adjacent outlet means (13) and wherein said conveying means (11) is configured to move compressed fuel pellets from one of the plurality of inlet means (12) to an adjacent one of the plurality of outlet means (13); such that in use said fuel feed system (4) is configured to form a plurality of overlapping piles (30) of compressed fuel pellets in a burn pot (5) of the pellet fire (1).

2. The fuel feed system as claimed in claim 1 **characterised in that** the longitudinal axes of the casing (16) and the burn pot (5) are approximately parallel.

3. The fuel feed system as claimed in claim 1 or claim 2 **characterised in that** the casing (16) and the burn pot (5) are vertically separated.

4. The fuel feed system as claimed in any of the preceding claims **characterised in that** the said inlet means (12) and/or outlet means (13) are apertures in the casing (16).

5. The fuel feed system as claimed in any one of the preceding claims **characterised in that** the conveying means (11) is one or more concentrically aligned augers.

6. The fuel feed system as claimed in any one of the preceding claims **characterised in that** the conveying means (11) is a single auger.

7. The fuel feed system as claimed in any one of the preceding claims **characterised in that** the fuel feed system (4) includes a plurality of delivery ducts and/or channels, wherein each outlet means (13) forms one end of an associated delivery duct or channel, such that at an opposite end of each said delivery duct or channel there is a delivery outlet (21) that is configured to deliver the compressed fuel pellets, directly or indirectly, into the burn pot (5).

8. The fuel feed system as claimed in claim 7 **characterised in that** the fuel feed system (4) includes a distribution section (22) which lies between the delivery outlets (21) and the burn pot (5).

9. The fuel feed system as claimed in claim 8 **characterised in that** the distribution section (22) is an angled plate that vertically and horizontally separates the delivery outlets (21) and the burn pot (5).

10. The fuel feed system as claimed in any one of claims 1 to 6 **characterised in that** the fuel feed system (4) includes a primary distribution section which lies between the outlet means (13) and the burn pot (5).

11. The fuel feed system as claimed in claim 10 **characterised in that** the primary distribution section is an angled plate that vertically and horizontally separates the outlet means (13) and the burn pot (5).

12. The fuel feed system as claimed in any one of the preceding claims **characterised in that** the casing (16) is not a single piece of material.

13. The fuel feed system as claimed in claim 12 **characterised in that** the casing (16) is formed by parts of the pellet fire (1) or fuel feed system (4) alone or in combination with additional separate components.

14. The fuel feed system as claimed in any one of the preceding claims which includes at least one additional casing, either separated from or coterminous with the casing (16), wherein the or each additional casing includes one or more additional conveying means.

15. A pellet fire (1) including the fuel feed system (4) as claimed in any one of the preceding claims.

16. The pellet fire as claimed in claim 15 **characterised in that** it includes a hopper (3) configured to store compressed fuel pellets such that an outlet of the hopper (3) is coterminous with the fuel feed system (4).

17. The pellet fire as claimed in claim 16 **characterised in that** the casing (16) lies essentially horizontally across the outlet of the hopper (3).

Patentansprüche

1. Brennstoffzufuhrsystem (4) für einen Pellet-Ofen (1), das eine Fördereinrichtung (11) innerhalb eines Gehäuses (16) enthält, wobei das Gehäuse (16) meh-

rere Einlassmittel (12), die in Längsrichtung entlang des Gehäuses verteilt sind, und mehrere Auslassmittel (13), die in Längsrichtung entlang des Gehäuses (16) verteilt sind, enthält, so dass jedes Einlassmittel (12) von einem benachbarten Auslassmittel (13) horizontal abgesetzt ist, und wobei die Fördereinrichtung (11) dafür konfiguriert ist, komprimierte Brennstoff-Pellets von einem der mehreren Einlassmittel (12) zu einem benachbarten der mehreren Auslassmittel (13) zu bewegen, so dass im Gebrauch das Brennstoffzufuhrsystem (4) dafür konfiguriert ist, in einem Brenngefäß (5) des Pellet-Ofens (1) mehrere überlappende Haufen (30) komprimierter Brennstoff-Pellets zu bilden.

2. Brennstoffzufuhrsystem nach Anspruch 1, **dadurch gekennzeichnet, dass** die Längsachsen des Gehäuses (16) und des Brenngefäßes (5) näherungsweise parallel sind.

3. Brennstoffzufuhrsystem nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** das Gehäuse (16) und das Brenngefäß (5) vertikal getrennt sind.

4. Brennstoffzufuhrsystem nach irgendeinem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einlassmittel (12) und/oder die Auslassmittel (13) Öffnungen in dem Gehäuse (16) sind.

5. Brennstoffzufuhrsystem nach irgendeinem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fördereinrichtung (11) eine oder mehrere konzentrisch ausgerichtete Fördererschnecken aufweist.

6. Brennstoffzufuhrsystem nach irgendeinem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fördereinrichtung (11) eine einzelne Fördererschnecke aufweist.

7. Brennstoffzufuhrsystem nach irgendeinem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Brennstoffzufuhrsystem (4) mehrere Belieferungsschächte und/oder Kanäle enthält, wobei jedes Auslassmittel (13) ein Ende eines zugeordneten Belieferungsschachtes oder Kanals bildet, so dass sich an einem entgegengesetzten Ende jedes Belieferungsschachtes oder Kanals ein Belieferungsauslass (21) befindet, der dafür konfiguriert ist, die komprimierten Brennstoff-Pellets direkt oder indirekt in das Brenngefäß (5) zu liefern.

8. Brennstoffzufuhrsystem nach Anspruch 7, **dadurch gekennzeichnet, dass** das Brennstoffzufuhrsystem (4) einen Verteilungsabschnitt (22) enthält, der zwischen den Belieferungsauslässen (21) und dem Brenngefäß (5) liegt.

9. Brennstoffzufuhrsystem nach Anspruch 8, **dadurch gekennzeichnet, dass** der Verteilungsabschnitt (22) eine angewinkelt Platte ist, die die Belieferungsauslässe (21) und das Brenngefäß (5) vertikal und horizontal trennt.

10. Brennstoffzufuhrsystem nach irgendeinem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** das Brennstoffzufuhrsystem (4) einen primären Verteilungsabschnitt enthält, der zwischen den Auslassmitteln (13) und dem Brenngefäß (5) liegt.

11. Brennstoffzufuhrsystem nach Anspruch 10, **dadurch gekennzeichnet, dass** der primäre Verteilungsabschnitt eine angewinkelt Platte ist, die die Auslassmittel (13) und das Brenngefäß (5) vertikal und horizontal trennt.

12. Brennstoffzufuhrsystem nach irgendeinem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Gehäuse (16) kein einzelnes Materialstück ist.

13. Brennstoffzufuhrsystem nach Anspruch 12, **dadurch gekennzeichnet, dass** das Gehäuse (16) von Teilen des Pellet-Ofens (1) oder des Brennstoffzufuhrsystems (4) allein oder in Kombination mit zusätzlichen separaten Bauteilen gebildet wird.

14. Brennstoffzufuhrsystem nach irgendeinem der vorangehenden Ansprüche, das wenigstens ein zusätzliches Gehäuse aufweist, entweder getrennt von dem oder angrenzend an das Gehäuse (16), wobei das oder jedes zusätzliche Gehäuse eine oder mehrere zusätzliche Fördereinrichtungen enthält.

15. Pellet-Ofen (1), der das Brennstoffzufuhrsystem (4) nach irgendeinem der vorangehenden Ansprüche enthält.

16. Pellet-Ofen nach Anspruch 15, **dadurch gekennzeichnet, dass** er einen Behälter (3) enthält, der dafür konfiguriert ist, komprimierte Brennstoff-Pellets zu speichern, so dass ein Auslass des Behälters (3) an das Brennstoffzufuhrsystem (4) angrenzt.

17. Pellet-Ofen nach Anspruch 16, **dadurch gekennzeichnet, dass** das Gehäuse (16) im Wesentlichen horizontal quer zu dem Auslass des Behälters (3) liegt.

Revendications

1. Système d'alimentation en carburant (4) pour un poêle à pellet (1), qui comprend des moyens de convoyage (11) à l'intérieur d'un boîtier (16), ledit boîtier (16) comprenant une pluralité de moyens d'entrée

(12) répartis dans le sens de la longueur le long du boîtier (16), et une pluralité de moyens de sortie (13) distribués dans le sens de la longueur le long du boîtier (16), de telle sorte que chacun des moyens d'entrée (12) soit décalé horizontalement par rapport à un moyen de sortie adjacent (13), et dans lequel lesdits moyens de convoyage (11) sont configurés de façon à déplacer des pastilles de carburant comprimées de l'un de la pluralité de moyens d'entrée (12) à un moyen adjacent de la pluralité de moyens de sortie (13), de telle sorte que, lors de l'utilisation, ledit système d'alimentation en carburant (4) soit configuré de façon à former une pluralité d'empilements chevauchés (30) de pastilles de carburant comprimées dans un pot de combustion (5) du poêle à pellet (1).

2. Système d'alimentation en carburant selon la revendication 1, **caractérisé en ce que** les axes longitudinaux du boîtier (16) et du pot de combustion (5) sont approximativement parallèles.

3. Système d'alimentation en carburant selon la revendication 1 ou la revendication 2, **caractérisé en ce que** le boîtier (16) et le pot de combustion (5) sont verticalement séparés.

4. Système d'alimentation en carburant selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'entrée (12) et/ou lesdits moyens de sortie (13) sont des ouvertures dans le boîtier (16).

5. Système d'alimentation en carburant selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens de convoyage (11) sont une ou plusieurs vis sans fin alignées de façon concentrique.

6. Système d'alimentation en carburant selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens de convoyage (11) sont une vis sans fin unique.

7. Système d'alimentation en carburant selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le système d'alimentation en carburant (4) comprend une pluralité de conduits et/ou canaux de délivrance, dans lequel chacun des moyens de sortie (13) constitue une extrémité d'un conduit ou canal de délivrance associé, de telle sorte qu'à une extrémité opposée de chacun desdits conduits ou canaux de délivrance se trouve une sortie de délivrance (21) qui est configuré de façon à délivrer les pastilles de carburant comprimées, directement ou indirectement, dans le pot de combustion (5).

8. Système d'alimentation en carburant selon la revendication 7, **caractérisé en ce que** le système d'alimentation en carburant (4) comprend une section de distribution (22) qui se trouve entre les sorties de délivrance (21) et le pot de combustion (5).

9. Système d'alimentation en carburant selon la revendication 8, **caractérisé en ce que** la section de distribution (22) est une plaque en angle qui sépare verticalement et horizontalement les sorties de délivrance (21) et le pot de combustion (5).

10. Système d'alimentation en carburant selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** le système d'alimentation en carburant (4) comprend une section de distribution primaire qui se trouve entre les moyens de sortie (13) et le pot de combustion (5).

11. Système d'alimentation en carburant selon la revendication 10, **caractérisé en ce que** la section de distribution primaire est une plaque en angle qui sépare verticalement et horizontalement les moyens de sortie (13) et le pot de combustion (5).

12. Système d'alimentation en carburant selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le boîtier (16) n'est pas une pièce de matériau unique.

13. Système d'alimentation en carburant selon la revendication 12, **caractérisé en ce que** le boîtier (16) est constitué par des parties du feu de pastilles (1) ou du système d'alimentation en carburant (4) seules ou en combinaison avec des composants séparés additionnels.

14. Système d'alimentation en carburant selon l'une quelconque des revendications précédentes, qui comprend au moins un boîtier additionnel, soit séparé du boîtier (16) soit coïncident à celui-ci, dans lequel le ou chaque boîtier additionnel comprend un ou plusieurs moyens de convoyage additionnels.

15. Poêle à pellet (1) comprenant le système d'alimentation en carburant (4) selon l'une quelconque des revendications précédentes.

16. Poêle à pellet selon la revendication 15, caractérisé en qu'il comprend une trémie (3) configurée de façon à stocker des pastilles de carburant comprimées de telle sorte qu'une sortie de la trémie (3) soit coïncident au système d'alimentation en carburant (4).

17. Poêle à pellet selon la revendication 16, caractérisé en que le boîtier (16) est disposé de façon essentiellement horizontale à travers la sortie de la trémie (3).

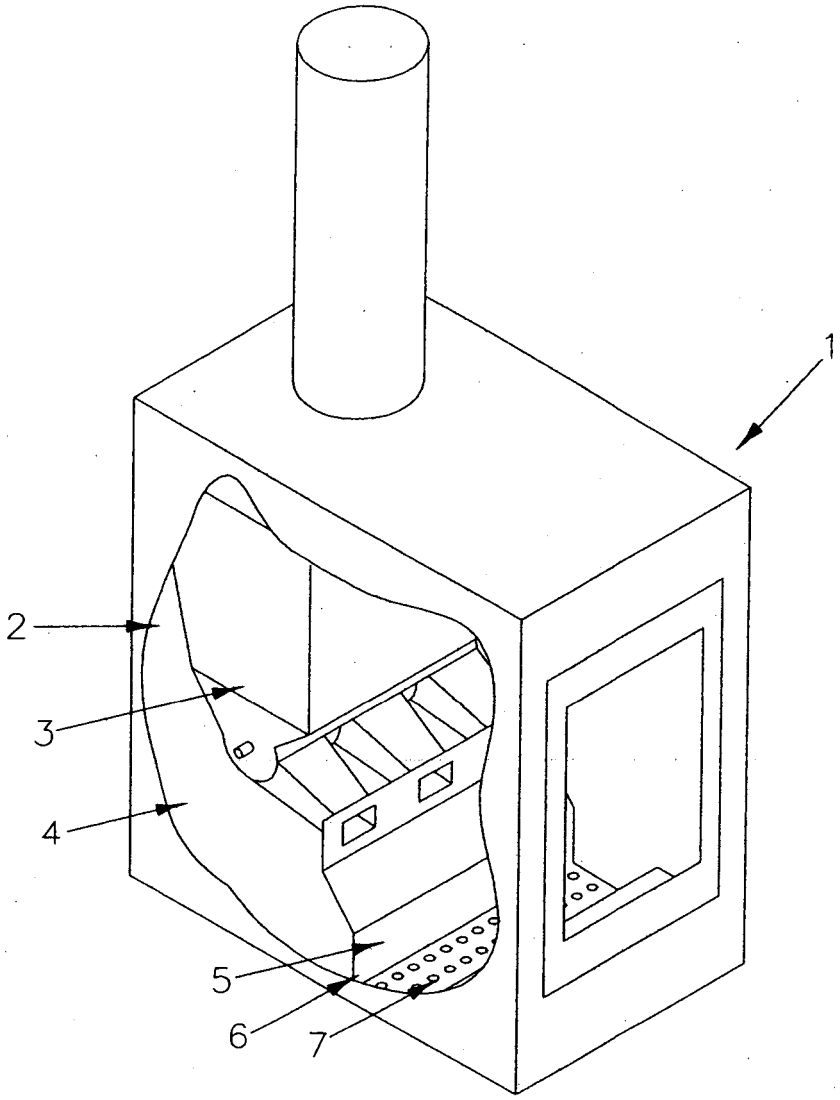

Fig.1

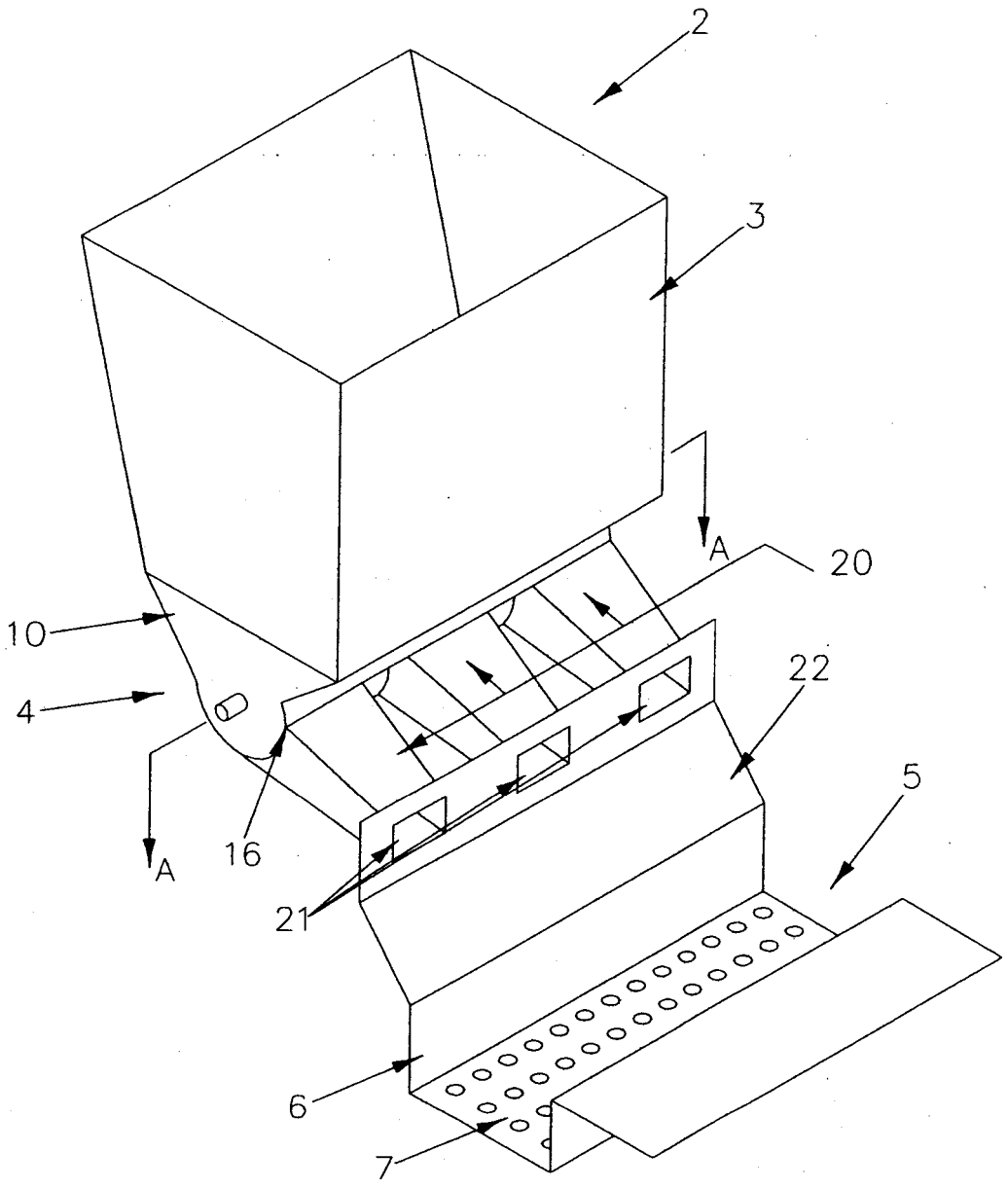

Fig.2

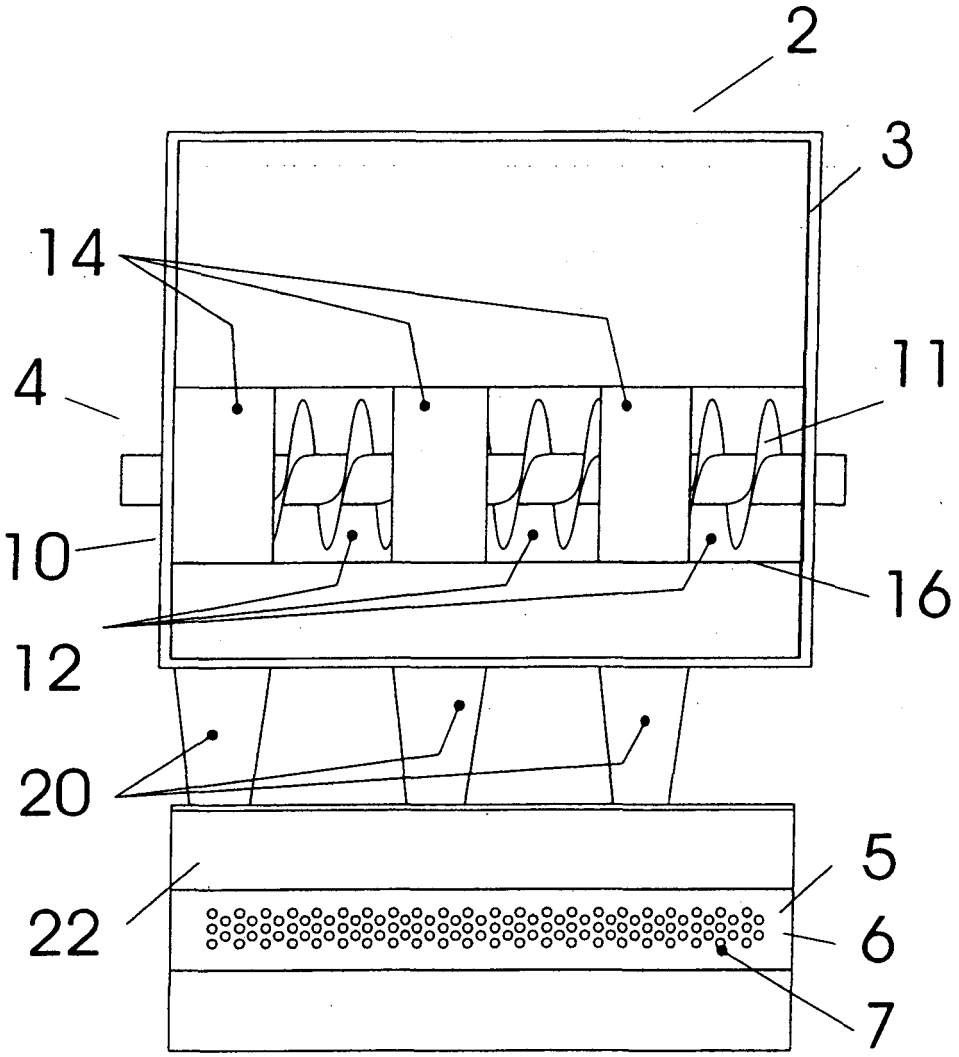

Figure 3

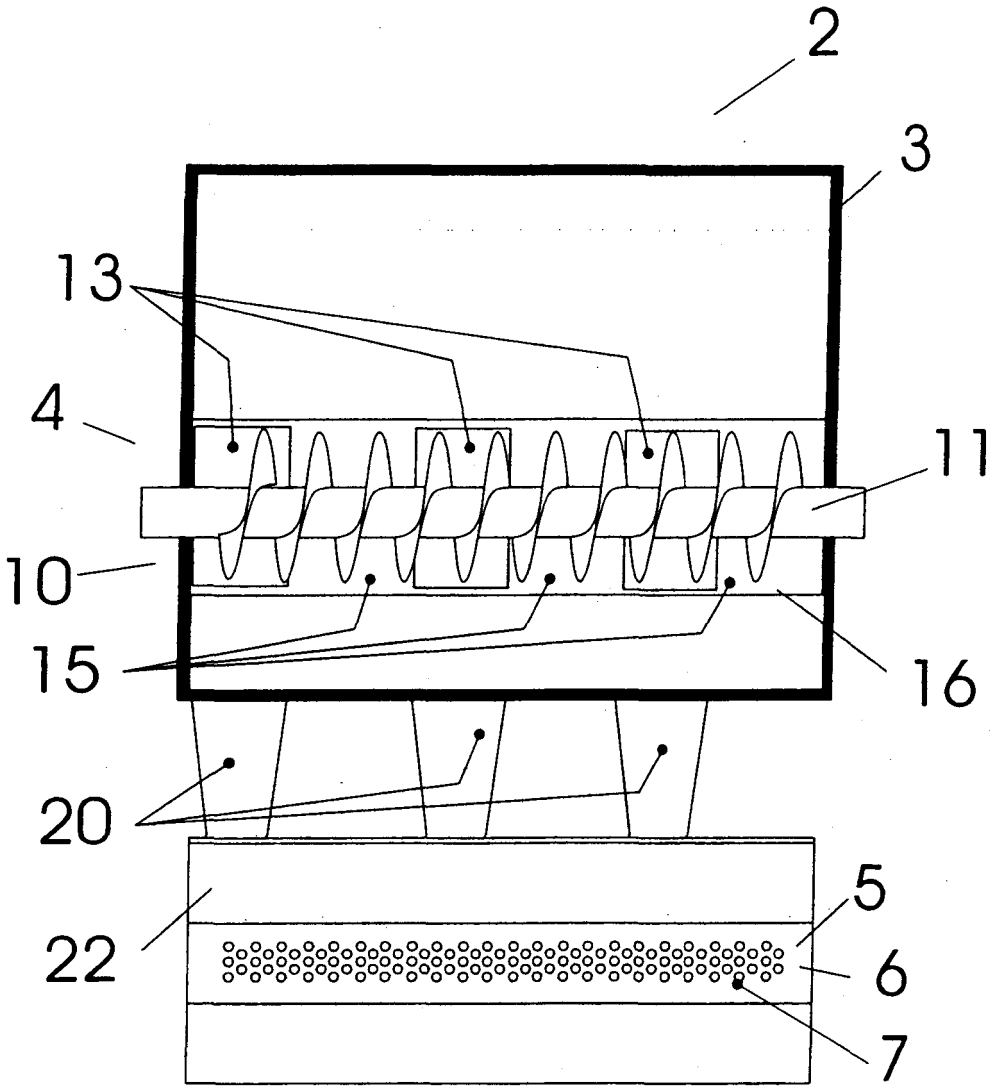

Figure 4

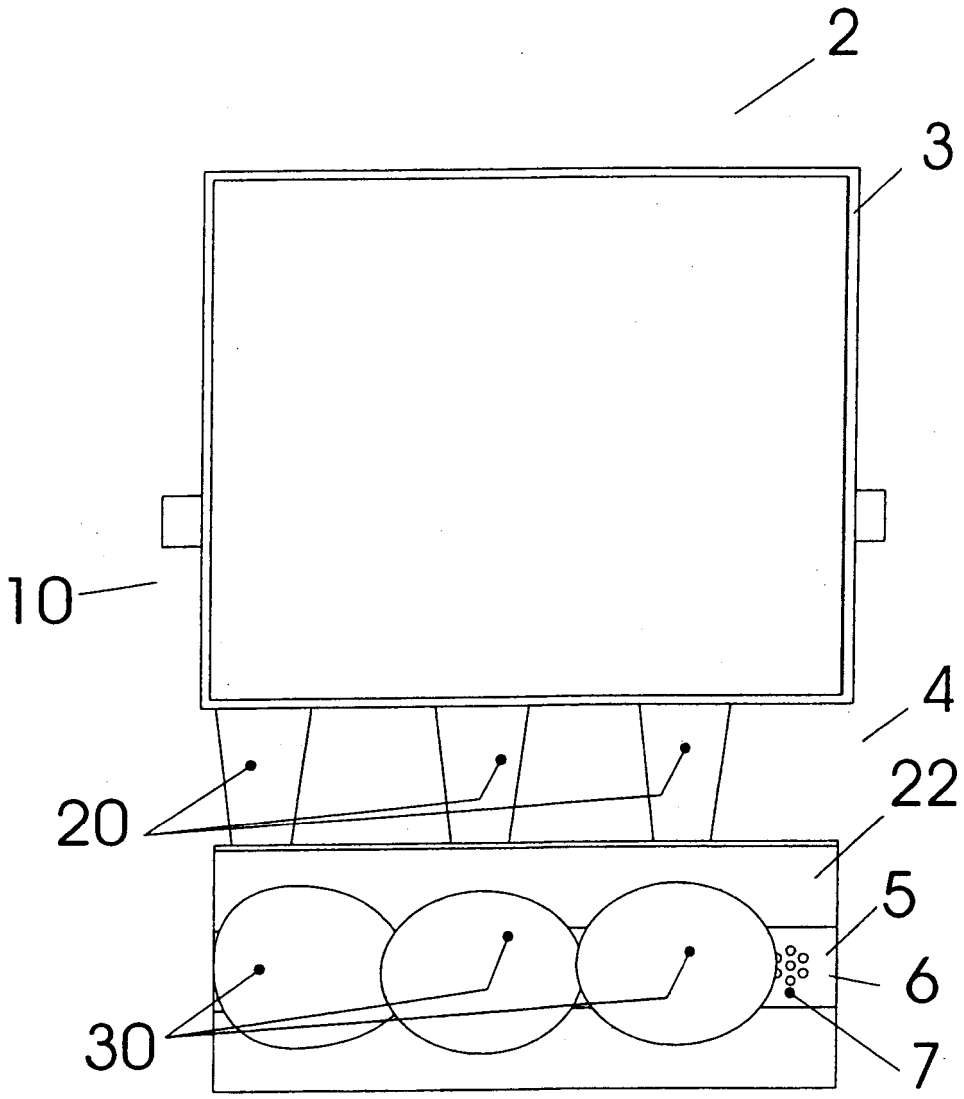

Figure 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2009134904 A **[0007]**