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(54) **IMPROVED PELLET BURNER**

VERBESSERTER PELLETBRENNER

BRÛLEUR À GRANULÉS AMÉLIORÉ

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Description

[0001] The invention relates to a pellet burner having a burning space in which a grate is arranged and into the burning space a duct leading cold air is introduced, and further an ignition tube is introduced, and the pellet burner comprises a container arranged under the grate for holding the grate.

[0002] A high number of pellet burners are available in commerce, of which those of providing most kinds of services and have automated operation it is characteristic that they are capable for burning high quality pellets only because automatic operation and efficient burning is prevented if during burning of lower quality pellets with higher ash content the ash generated during burning gets accumulated on the bottom of the pellet-holding grate in the burning space, and the presence of such ash brakes down the inflow of air required for the burning. In the burning space of such pellet burners the duct introducing the required cold air and the ignition tube providing hot air for the ignition are extending in a predetermined fixed position relative to the boundary walls that define the burning space.

[0003] The removal of ash generated by the burning of high quality pellets takes place during occasional openings of the burning space by removing the grate, and this operation should be carried out in fairly infrequent intervals, therefore the somewhat complicated way of such an operation does not disturb the users of the burners.

[0004] Several known pellet burners are designed as described here, of which one might mention the pellet burners with the commercial names Brema and Oslo of the Spanish company Ecoforest Biomassa Eco-Forestal de Villacanas S. A. (Sampayo Areeiro, 51, 36.215 -Vigo -Espana) which is present also in Hungary, and these types are associated with very detailed instructions of use also in Hungarian.

[0005] In FR 3033625A1 a burner is described in which the pellets are ignited by hot air supplied through a duct at the bottom of the burning space. The burning space has a fixed design, and because of the reason the removal of ash requires additional work and time. FR 3033625 A1 provides the basis for the two-part form of claim 1.

[0006] In EP 2816283A1 a burner is described in which the size of the burner space can be changed by the use of two limiting walls in order to make decrease the active burning space. The air supply occurs also at the bottom of the burning space. The burning space cannot be turned around a central axis to release the collected ashes.

[0007] It is also known that the price of pellets with less perfect quality i.e. that have higher ash content is lower than the price of higher quality pellets, therefore it is a justified requirement on the part of consumers to have pellet burners with cheaper operation but which are equally automated and can be easily handled, in which there will be an easy and efficient way to overcome the accumulation of ash.

[0008] The task of the invention is to provide a pellet burner which can satisfy the above requirements in which the ash accumulating time to time can be removed in an easy and automated way.

[0009] This task has been solved by providing a pellet burner designed as defined in claim 1.

[0010] Further properties of the present invention are defined in the dependent claims.

[0011] The so designed pellet burner can efficiently solve the task set and by turning the grate, the excess ash can be removed in an easy and fast way, and this operation can also be automated.

[0012] The invention will now be described in connection with an exemplary embodiment thereof, in which reference will be made to the accompanying drawings. In the drawing:

Fig. 1 shows schematically an enlarged detail of the pellet burner according to the invention;
Fig. 2 shows the perspective view of another detail of the pellet burner with a bowl-shaped grate; and
Fig. 3 shows a perspective view similar to Fig. 2 in a position when ash is just being spilled.

[0013] Reference is made to Fig. 1 which shows the sectional view of burning space 11 of a pellet burner 10 and the surrounding constructional parts. The burning space 11 of the pellet burner 10 is surrounded by double walls 12, between which a water space 13 is formed filled with water to be warmed by the burning fire. In the burning space 11 a preferably bowl-shaped grate 14 is arranged which is held from below by a container 15 open at the top in such a way that the grate 14 has an outer rim that is supported by the upper edge of the container 15. The grate 14 and the container 15 constitute a common mechanical unit. The shape of this mechanical unit can be rectangular but in the exemplary embodiment the choosing of a circular cross section is preferred i.e. the container 15 has a cylindrical shape and the grate 14 arrange and held above it also has a circular cross section with a profile that is similar to an upwardly widening bowl. From the centre of the grate 14 a threaded bolt 16 extends till the bottom of the container 15, and a threaded nut (not shown in the drawing) connects the grate 14 and the container 15 in a releasable way. The inner space of the container 15 is substantially large to receive the fine ashes that are generated during the burning process and falling down through the lower openings of the grate 14 through a long period of time, therefore its disassembly and cleaning is required only in longer periods when the pellet burner 10 is maintained, e.g. once a year.

[0014] In the wall 12 in a lateral opening thereof a guiding sleeve 17 is fixed that has an axis which extends substantially in the medium height of the unit formed by the grate 14 and the container 15, and a tubular duct 18 is pivotally arranged in the sleeve 17 that has an inner end that extends in the burning space 11 and it is fixed

to the side wall of the container 15. Through the inner space of the duct 18 cold air is allowed to stream in the inner space of the container 15, and the negative pressure prevailing in the burning space 11 will suck the cold air through the openings of the grate 14 and this air will flow among the pellets held by the grate 14 and ensures the oxygen supply required for the burning. In Fig. 1 the flow of the cold air has been illustrated by arrows 19.

[0015] In the interior of the duct 18 asymmetrically relative to its axis of rotation 20 an ignition tube 21 is arranged which is fixed at its top to the wall of the duct 18. The inner end of the ignition tube 21 extends in the inner space of the container 15 and it is coupled to the side wall of the grate 14 through which an opening 22 is provided for the passage of hot air flowing in the interior of the ignition tube 21, and the height of the opening 22 is slightly above the bottom of the grate 14. In the interior of the ignition tube 21 a heating element 23 is arranged which has a hollow design and has the task of heating the airflow in the ignition tube 21 to a temperature sufficient to ignite the pellets when the hot air illustrated by hashed arrows 24 in Fig. 1 leaves the heating element 23 and arrives in the inner space of the grate 14. Naturally, the heating element 23 is switched on only for the duration of the ignition, since after the burning has started this function is not required any further.

[0016] The outside of the duct 18 is surrounded preferably by a gear 25 which is connected from above by a motor-operated drive unit 26 which can best be observed in the perspective views of Figs. 2 and 3.

[0017] For the description of the mechanical assembly it should be mentioned that in the line of the axis of rotation 20 a stub-axle 27 is extending out from the other end of the container 15 and the outer end thereof is pivotally held by a support assembly 28 fixed to the inner side of the wall 12 that defines the burning space 11. It is preferred if the height of the support assembly is adjustable because thereby the container 15 can always be adjusted to take the horizontal position. An abutment member 29 is arranged asymmetrically at the bottom of the container 15 which is fixed at a rear position to the wall 12 (not shown in Fig. 1) and limits the turning of the container 15 in a direction.

[0018] For the sake of completeness it should be mentioned that through the wall 12 a smoke pipe 30 leads out from the burning space 11 through which the exhaust products are lead out, and the sucking effect required for the operation is also established through the smoke pipe 30.

[0019] Reference is made now to Fig. 2 that shows the units shown in Fig. 1 in perspective view from the front and with open burning space 11 in which it can be observed that over the right end of the pellet burner 10 and under it an ash collector space 30 is arranged which lies in lateral direction slightly in front of the grate 14 and in a much lower height, it is open from above and can be accessed from the exterior. In Fig. 2 the dark illustration of the bottom of the grate 14 symbolizes that in it rather much ash 32 has been collected. For ensuring the quality of burning there is a need for removing the ash 32. This can be carried out naturally after the burning has stopped. For the removal of the ash 32 the drive unit 26 is started and with it the grate 14 and the container 15 connected therewith will be turned to an extent of about 90° to 100° by moving the duct 18 around the axis of rotation 20 through the gear 25. Fig. 3 shows this turned position in which ash 32 falls out from the turned grate 14 and drops in the ash collector space 31. Following the removal of the ash 32 the assembly will be returned by the drive unit 26 to the basic state shown in Fig. 2, then pellets required for the next burning cycle are fed from above on the grate 14, and they will be ignited in the described way by switching on the heating element 23 in the ignition tube 21. The burning process will now take place under optimum circumstances because there will be no ash layer on the bottom of the grate 14 which would block or impede the inflow of air required to the burning. It is important to mention that to the burning not only high quality pellets can be used which leave only small amount of ash but lower quality pellets with higher ash content can also be used, however in such cases the aforementioned ash removal should be made more frequently.

[0020] The design of the described embodiment of the pellet burner is rather simple because by the special arrangement of the previously used pipe that led the cold air into the burning space in a stable way and of the ignition tube, i.e. by assembling them so that they can also be turned around, an easy and fast ash removal has been made possible which has hardly made the design of the pellet burner more difficult to manufacture but has ensured an easy ash removal without the danger of accidents.

Claims

1. Pellet burner having a burning space (11) comprising a grate (14), a duct for introducing cold air into the burning space (11), an ignition tube (21), and a container (15) arranged under the grate (14) for holding the grate (14), wherein the ignition tube (21) is arranged in the interior of the duct (18) that supplies the cold air, and the duct (18) is coupled to the wall of a common mechanical unit formed by the grate (14) and the container (15), **characterized by** the air supply taking place in a medium height region of this mechanical unit, and by a drive unit (26) coupled to the duct (18) for ensuring its bi-directional turning by at least a right angle relative to a boundary wall defining the burning space (11), such that the duct (18) is pivoted by being turned around relative to the boundary wall (11) and by an ash collector (31) space outside the burning space (11) for receiving the ash that drops out from the grate (14) in its rotated position.

2. The pellet burner as claimed in claim 1, wherein the axis of rotation (20) of the duct (18) is in the height of the bottom of the grate (14) or in a height close thereto.

3. The pellet burner as claimed in claims 1 or 2, wherein the ignition tube (21) is attached to the wall of the duct (18) at a position above the axis of rotation (20) when the pellet burner is in the basic position of its operation.

4. The pellet burner as claimed in any of claims 1 to 3, wherein the grate (14) and the container (15) supporting the grate (14) have a circularly symmetric design around an axis which is normal to the axis of rotation (20), and the grate (14) is designed as an upwardly broadening bowl which is open at the top.

5. The pellet burner as claimed in any of claims 1 to 4, wherein from the side of the container (15) which is opposite to the duct (18) that leads the cold air, a stub-axle (27) is extending out which is pivotally arranged and held by a support assembly (28) fixed to the opposite wall of the burning space (11).

6. The pellet burner as claimed in any of claims 1 to 5, wherein an abutment member (29) is arranged at the bottom of the container (15) far from the axis of rotation (20) adapted to abut the angular displacement of the container (15) in one of the turning directions.

Patentansprüche

1. Pelletbrenner mit einem Brennraum (11) umfassend einen Rost (14), einen Kanal zum Einleiten von Kaltluft in den Brennraum (11), ein Zündrohr (21) und einen unter dem Rost angeordneten Behälter (15) zum Halten des Rostes (14), wobei das Zündrohr (21) im Inneren des die Kaltluft führenden Kanals (18) angeordnet ist und der Kanal (18) an die Wand einer gemeinsamen mechanischen Einheit, gebildet durch den Rost (14) und den Behälter (15), angekoppelt ist,
gekennzeichnet dadurch, dass die Luftzufuhr in einem Bereich mittlerer Höhe dieser mechanischen Einheit stattfindet, und durch eine Antriebseinheit (26), die mit dem Kanal (18) gekoppelt ist, um seine bidirektionale Drehung um mindestens einen rechten Winkel relativ zu der den Brennraum (11) definierenden Begrenzungswand sicherzustellen, so dass der Kanal (18) durch Umdrehen relativ zur Begrenzungswand (11) verschwenkt wird, und durch einen Aschesammelraum (31) außerhalb des Brennraums (11) zum Aufnehmen der Asche, die aus dem Rost (14) in seiner gedrehten Position herausfällt.

2. Pelletbrenner nach Anspruch 1, **dadurch gekennzeichnet, dass** die Drehachse (20) des Kanals (18) in Höhe des Bodens des Rostes (14) oder in dessen Nähe liegt.

3. Pelletbrenner nach Anspruch 1 oder 2, wobei das Zündrohr (21) an einer Position oberhalb der Drehachse (20) an der Wand des Kanals (18) befestigt ist, wenn sich der Pelletbrenner in seiner Grundstellung seines Betriebs befindet.

4. Pelletbrenner nach einem der Ansprüche 1 bis 3, wobei der Rost (14) und der den Rost (14) tragende Behälter (15) um eine zur Drehachse senkrechte Achse (20) kreissymmetrisch ausgebildet sind, und der Rost (14) als sich nach oben erweiternde Schüssel, die nach oben offen ist, ausgebildet ist.

5. Pelletbrenner nach einem der Ansprüche 1 bis 4, wobei von der dem Kaltluft führenden Kanal (18) gegenüberliegenden Seite des Behälters (15), wobei von der Seite des Behälters (15), die dem die Kaltluft führenden Kanal (18) gegenüberliegt, ein Achsstummel (27) herausragt, der schwenkbar angeordnet ist und von einer an der gegenüberliegenden Wand des Brennraums (11) befestigten Stützanordnung (28) gehalten wird.

6. Pelletbrenner nach einem der Ansprüche 1 bis 5, wobei am Boden des Behälters (15) weit von der Drehachse (20) ein Anschlagelement (29) angeordnet ist, das geeignet ist, gegen die Winkelverschiebung des Behälters (15) in einer der Drehrichtungen anzustoßen.

Revendications

1. Brûleur à granulés ayant un espace de brûlage (11), comprenant un foyer (14), un conduit pour l'introduction d'air froid dans l'espace de brûlage (11), un tube d'allumage (21) et un récipient (15) agencé sous le foyer (14) pour soutenir le foyer (14), dans lequel le tube d'allumage (21) est agencé à l'intérieur du conduit (18) qui apporte l'air froid, et le conduit (18) est couplé à la paroi d'une unité mécanique commune formée par le foyer (14) et le récipient (15), **caractérisé par le fait que** l'apport en air a lieu dans une région de hauteur moyenne de cette unité mécanique, et par une unité d'entraînement (26) couplée au conduit (18) pour garantir sa rotation bidirectionnelle d'au moins un angle droit par rapport à une paroi limite définissant l'espace de brûlage (11), de sorte que le conduit (18) est pivoté en étant retourné par rapport à la paroi limite (11) et par un espace collecteur de cendres (31) à l'extérieur de l'espace de brûlage (11) pour la réception des cendres qui chutent hors du foyer (14) dans sa position tournée.

2. Brûleur à granulés selon la revendication 1, dans lequel l'axe de rotation (20) du conduit (18) est à la hauteur du fond du foyer (14) ou à une hauteur proche de celui-ci.

3. Brûleur à granulés selon les revendications 1 ou 2, dans lequel le tube d'allumage (21) est fixé à la paroi du conduit (18) à une position au-dessus de l'axe de rotation (20) lorsque le brûleur à granulés est dans la position de base de son fonctionnement.

4. Brûleur à granulés selon l'une quelconque des revendications 1 à 3, dans lequel le foyer (14) et le récipient (15) portant le foyer (14) possèdent une conception à symétrie circulaire autour d'un axe qui est normal à l'axe de rotation (20), et le foyer (14) est conçu sous la forme d'un bol s'élargissant vers le haut qui est ouvert au sommet.

5. Brûleur à granulés selon l'une quelconque des revendications 1 à 4, dans lequel, à partir du côté du récipient (15) qui est opposé au conduit (18) qui amène l'air froid, une fusée (27) s'étend vers l'extérieur, qui est agencée de manière pivotante et soutenue par un ensemble de support (28) fixé à la paroi opposée de l'espace de brûlage (11).

6. Brûleur à granulés selon l'une quelconque des revendications 1 à 5, dans lequel un organe de butée (29) est agencé au fond du récipient (15) loin de l'axe de rotation (20) conçu pour buter contre le déplacement angulaire du récipient (15) dans l'une des directions de rotation.

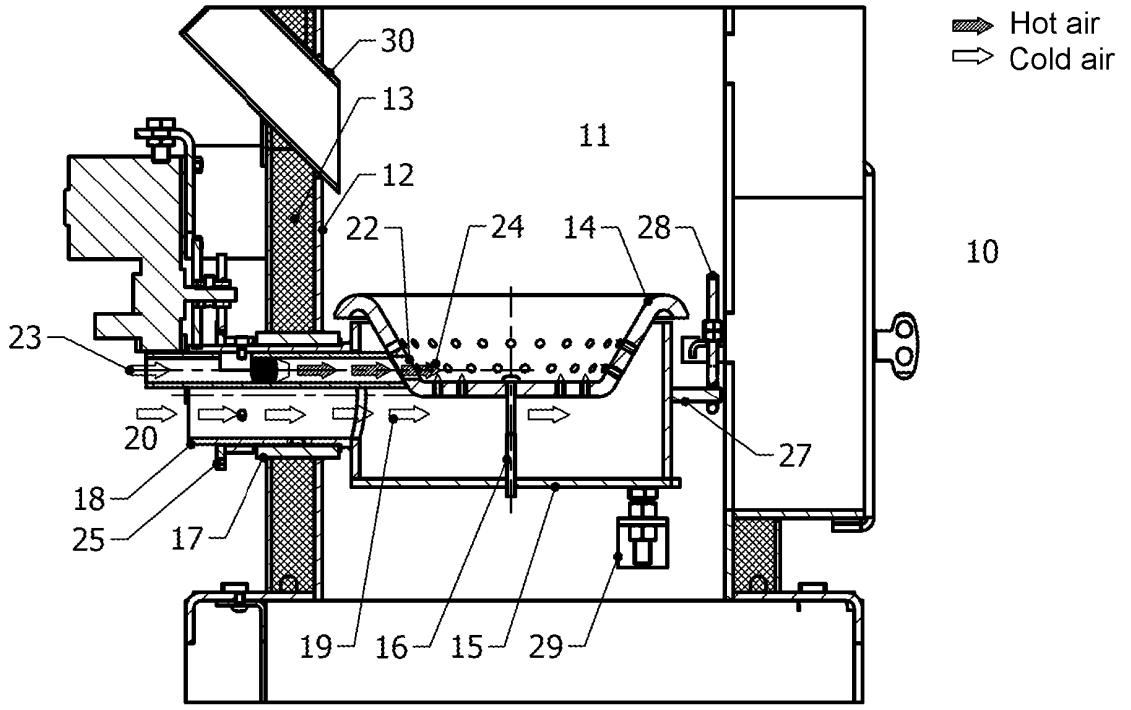

Fig. 1

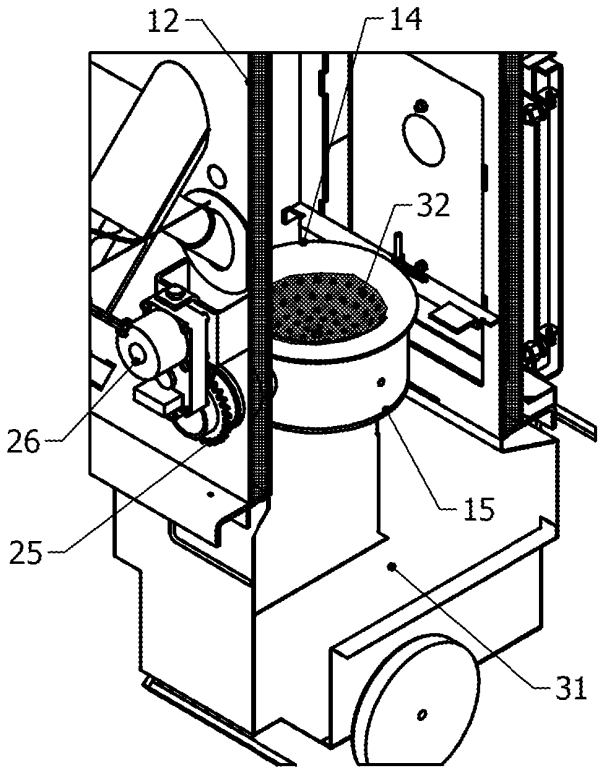

Fig. 2

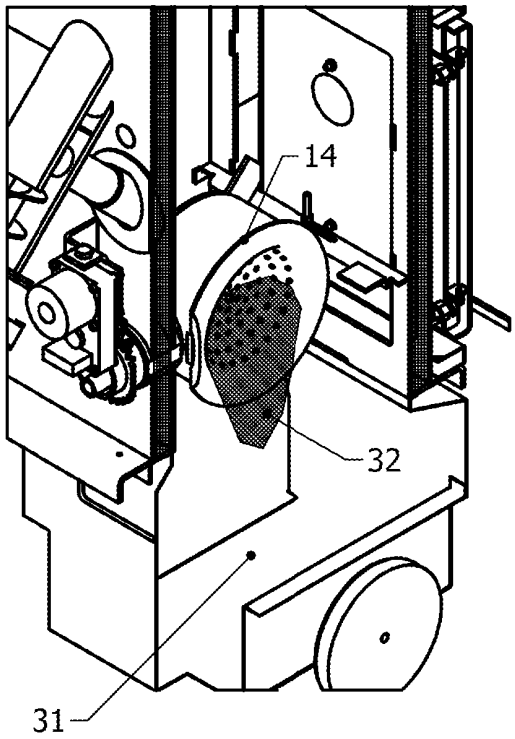

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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