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Dimitrov(10) **Pub. No.: US 2019/0162403 A1**(43) **Pub. Date: May 30, 2019**(54) **SOLID FUEL BURNER**(71) Applicant: **Dimitar Dimitrov, Wien (AT)**(72) Inventor: **Dimitar Dimitrov, Wien (AT)**(21) Appl. No.: **16/306,560**(22) PCT Filed: **May 30, 2017**(86) PCT No.: **PCT/AT2017/000043**

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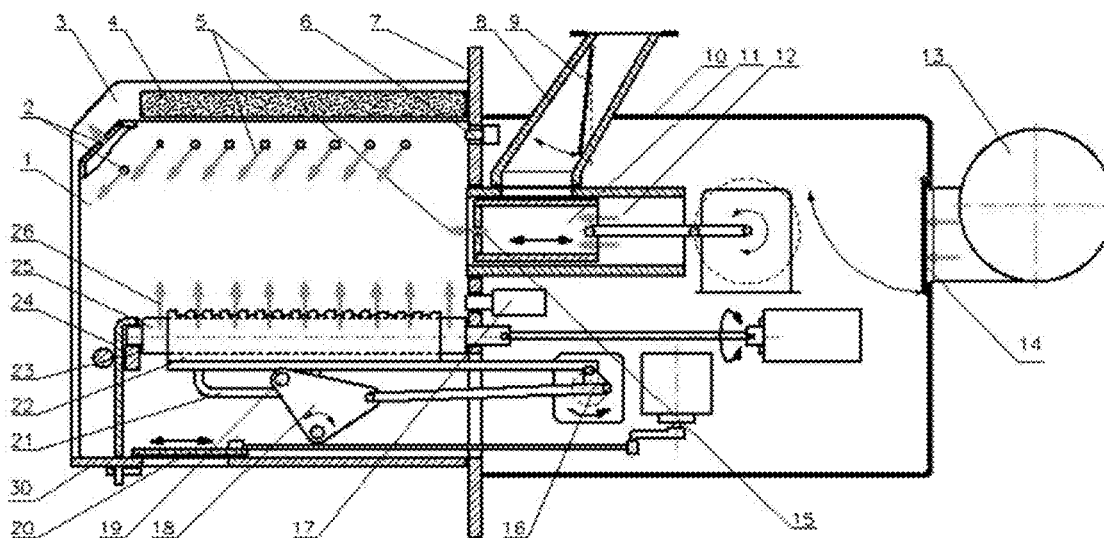
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(57)

ABSTRACT

Slag (28) is formed during the combustion of solid fuels with a lower ash fusion temperature and covers parts of the solid fuel, prevents complete combustion and blocks the air supply, thereby leading to an interruption of the combustion process. According to the invention, the embers and the fusing ashes are mixed by means of a cleaning comb (22) and are discharged from the burner. The burner consists of rotating grate bars (25) which are arranged parallel to one another within the inner walls (1). The cleaning comb (22) moves between the grate bars (25); upwards between the grate bars (25); in direction of the burner opening; downwards under the grate bars; and finally in the direction of the burner flange (7). When the slag (28) adheres to the rotating grate bars (25), it is scraped off by the cleaning comb (22). The fuel supplied to a funnel (8) slides downwards by the force of gravity, the funnel lid (9) opens, and the fuel is pushed onto the grate bars (25) by the plunger (11). The plunger (11) has at least one opening (15) for secondary air (5) which also provides cooling. A blower (13) blows the ashes fallen through the grate bars (25) through a cut-out section in the burner floor (30) opened by the floor trap (20).



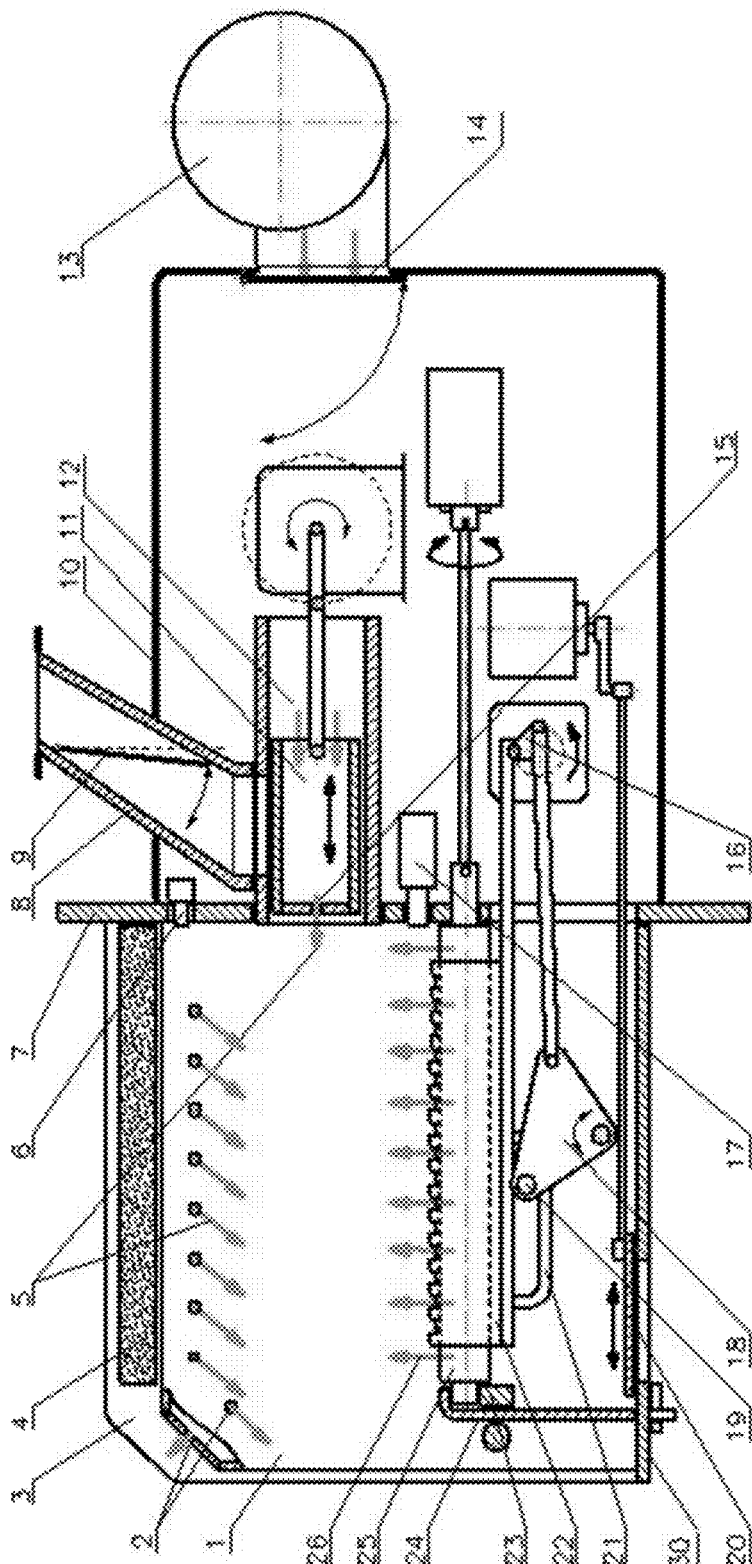


Fig. 1

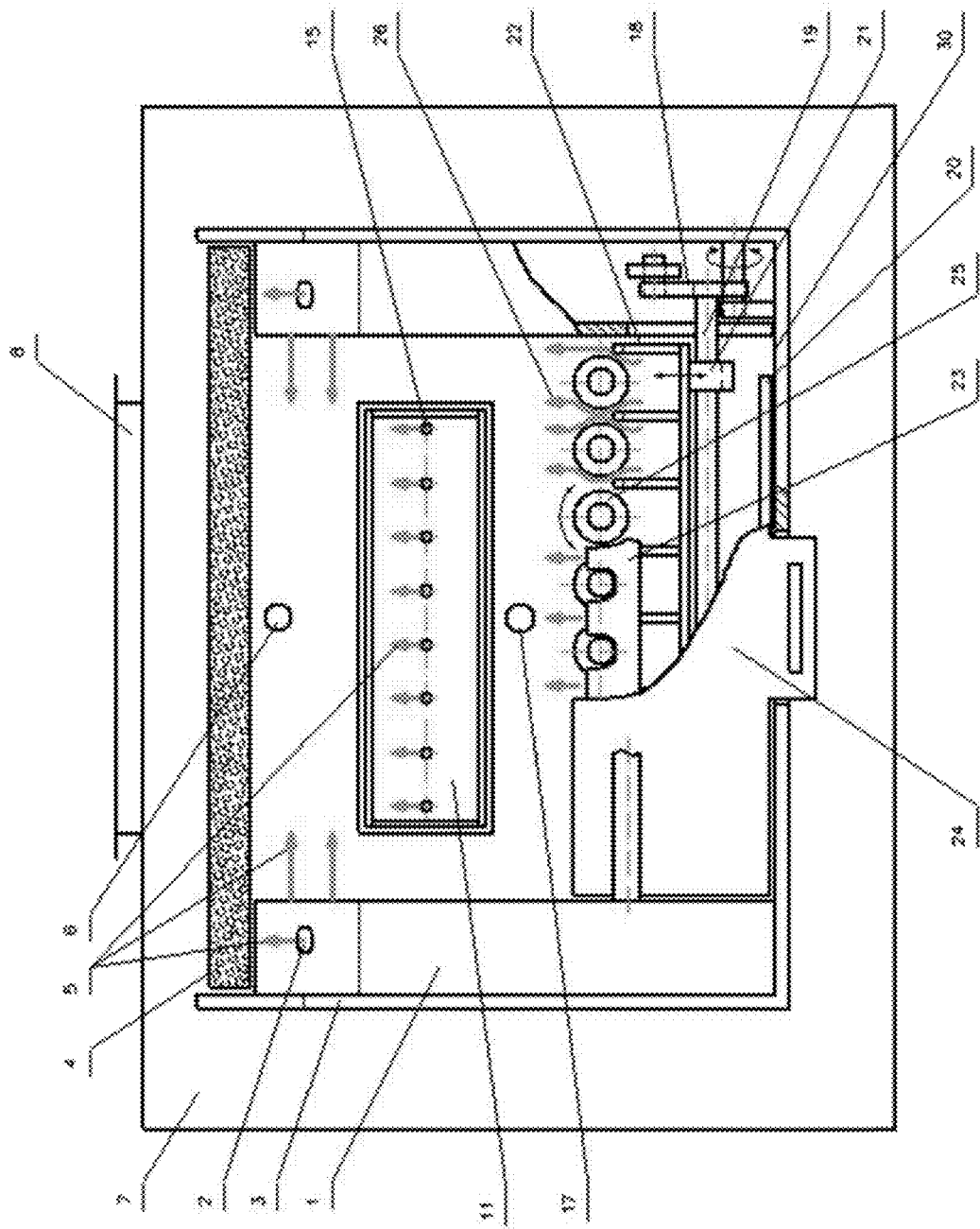


Fig. 2

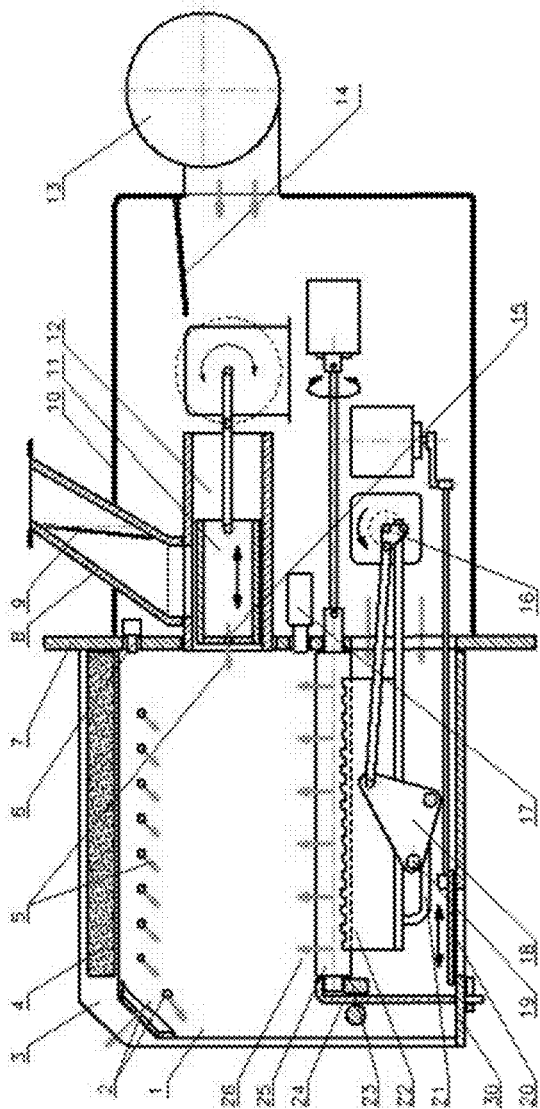


Fig. 3

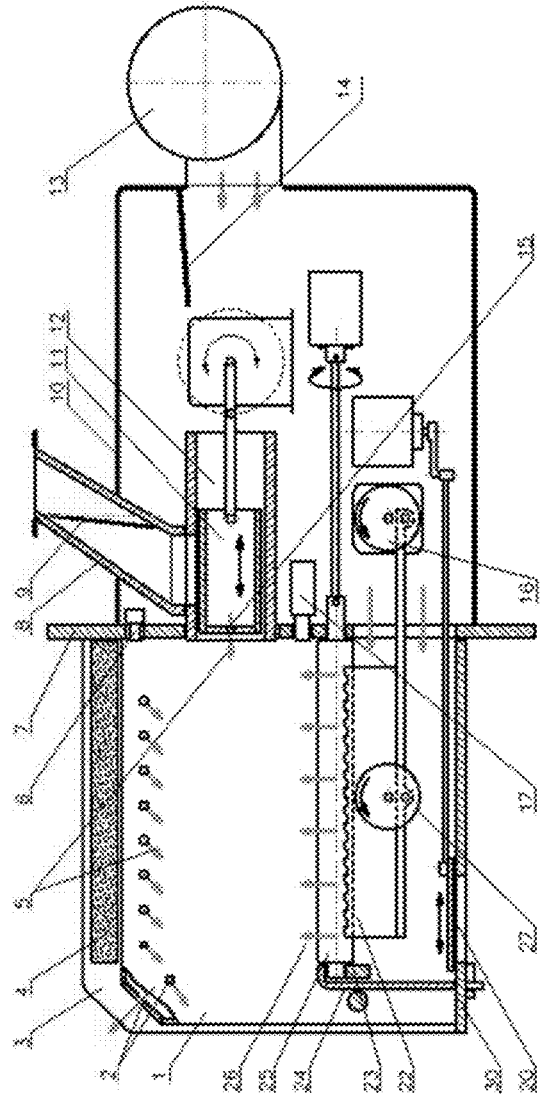


Fig. 4

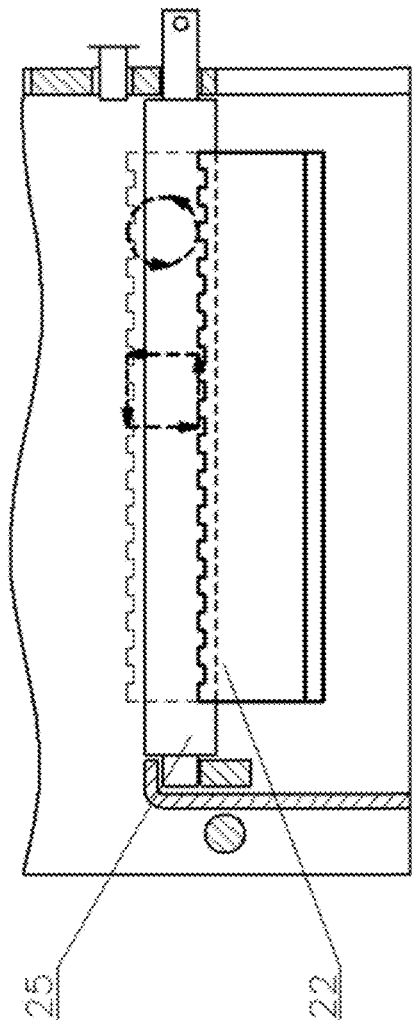


Fig. 5

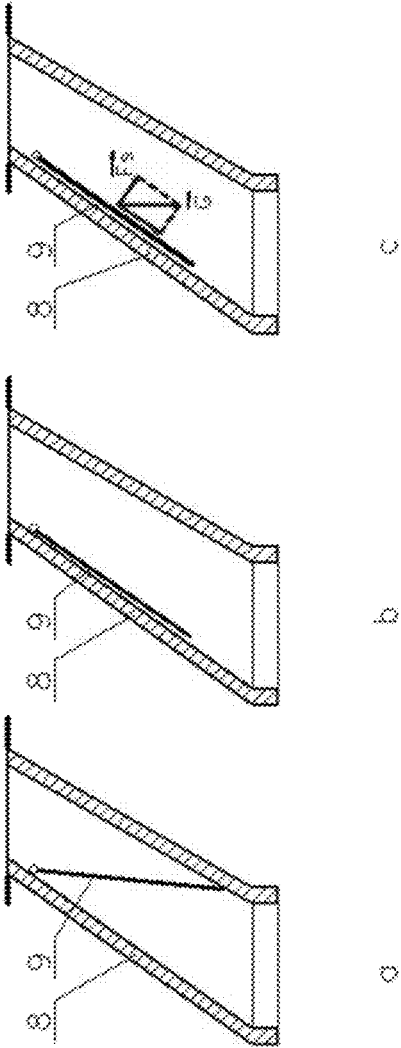


Fig. 6

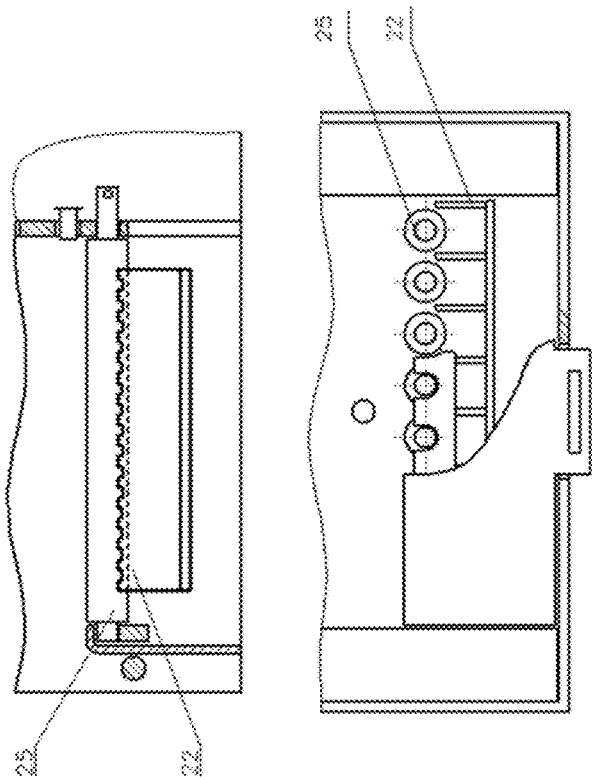


Fig. 7

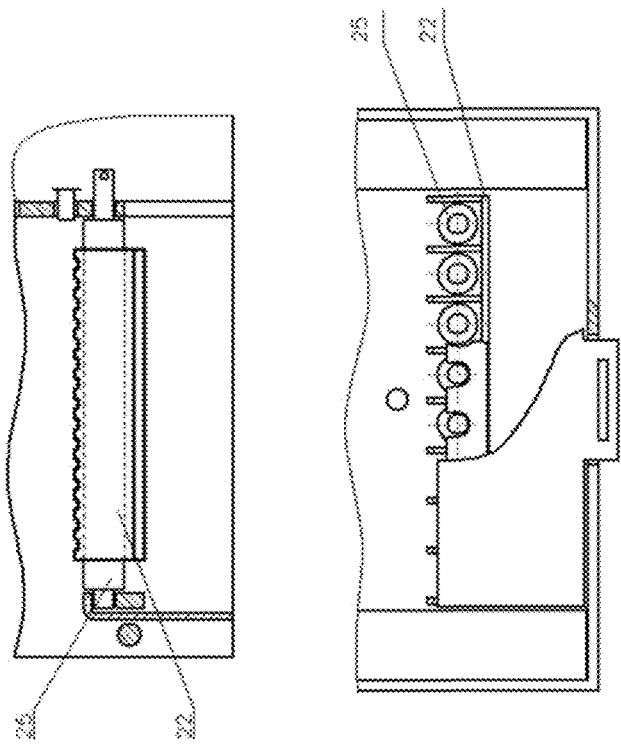


Fig. 8

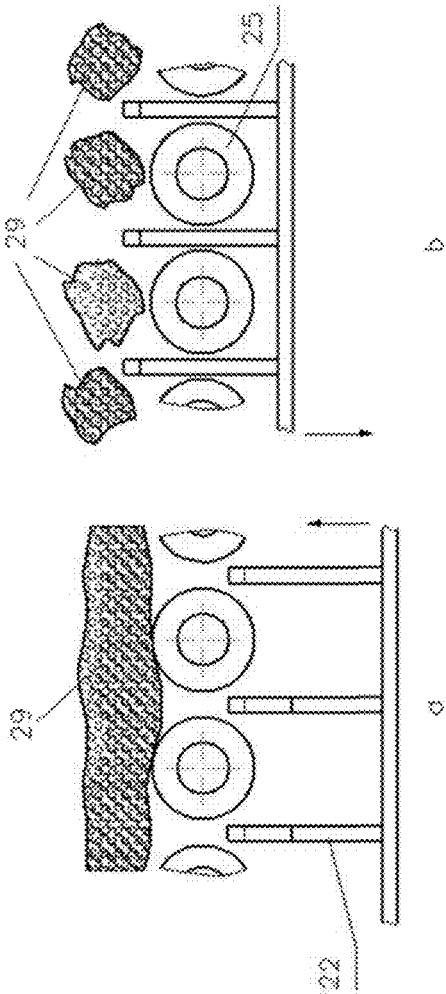


Fig. 9

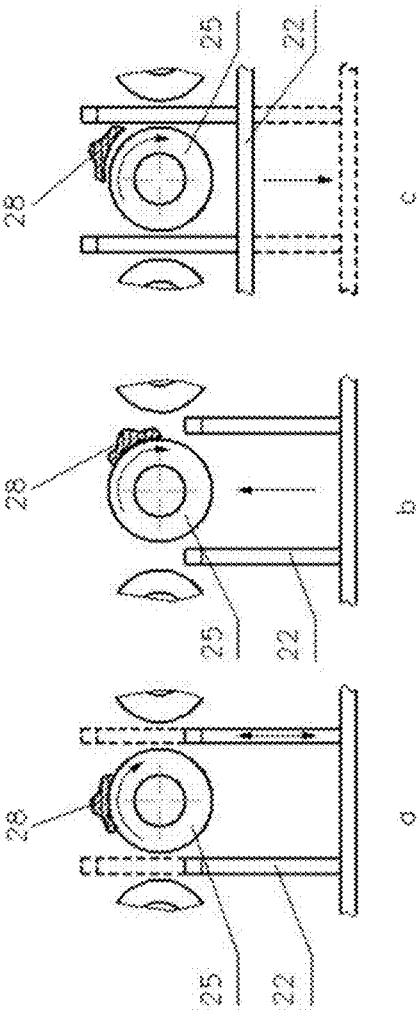


Fig. 10

SOLID FUEL BURNER

[0001] The present invention relates to a novel burner for the combustion of solid fuels, in particular, but not exclusively wood chips and pellets that may have 14961-2 melting temperature of the ash also lower than required by the class A2 according to the EN is provided. These are, for example, pellets of agricultural wastes, peat, and others which have a melting temperature of the ash below 1 100° C.

[0002] From the prior art, a pellet burner is known, which is provided for the combustion of solid fuels, particularly pellets. (WO 02/079693 A1). The burner has arranged mutually parallel at mutual distances hollow grate bars. is primary air through the hollow grate bars in the under these ash space and contained passed between the hollow grate bars and over the arranged in front of the hollow grate bars perforated front plate in the combustion chamber.

[0003] The combustion of fuels with a low melting temperature of the ash in this and other similar burners leads to a fusion of the ash and formation of slag that the supply of primary air through the grate bars and/or bored-through plates (e.g. IWABO VILLA—S1; ECOVARM—E) clogged. The cleaning with such burners can be made only with compressed air from a compressor. This leads to two problems: Cyclical operation of the burner, and bullet-like noise at each burner cleaning are known cases where the bored-through plates of the high temperature overheat and deform.

[0004] One attempt to solve this problem with fuels with low melting temperature of the ash can be found at the burners with sliding grate (eg IWABO VILLA—S2; ECOVARM—E+), and in burners with a tilting grate (eg HEART Pelletstar).

[0005] Disadvantage of these burners is the cyclic operation of the burner—after burning a certain amount of pellets, the burner is full of ash and/or slag. Then the torch will go to burn, stop the firing process, and is cleaned. The worse the pellets, the shorter the burning phase. Some pellets—eg peat pellets—the time for lighting, burnout, and cleaning is greater than the time during which the burner to burn fuel. This leads to power reduction (for example, if the burner in one hour 20 minutes in the combustion phase, and the remaining 40 min in the lighting phase, the burnout phase and the cleaning phase works). are known burner for solid fuels, especially for wood chips and pellets, which are provided with stepped reciprocating grates (e.g. heart Firematik. Strebel Taurus). By the movement of each second grate fuel and/or embers is pushed. The grate overhead to clean the low rack in the movement. In slag-forming fuels often sticking happened slag, ash and unburned fuel in a mass that covers the burner, thus preventing the air supply. Cases where slag sticking on the lower grid and the upper grate are known slides over the slag. Thus flows a large amount of air between both grids and they burn through.

[0006] Further, in the fusion of the ash of the fuel from the fused ash wrapped. The slag prevents the air supply to the fuel on the grate, and thus this fuel is not burned. So we have a higher percentage of unburned fuel in the ash tray.

[0007] Another attempt to solve the problem of slagging the burner Kesseis Verner A251. This has a movable grate, which extends through the averages of the grate plate linearly forwardly and upwardly moved, and returns thereafter. This rust is to solve the slag from the burner plate. In fact, the slag is removed only from the Durschnitten the grate plate, but remains on the other parts of the grate plate.

Often the slag adhered on the movable grate and moves with it back and forth, until the air supply is obstructed.

[0008] Moreover, cases are known where are thrown away from the grate plate due to long train of the moving grate, the complete ash, slag, fuel and embers, and thus interrupting the combustion.

[0009] Somewhat better results in the combustion of slag-forming fuels, patent KR 100541280 with the Rostreiniungsvorrichtung with a moving between grate bars, a circular motion applying cleaning comb. This construction has the following disadvantages:

[0010] a. The cleaning comb cannot clean the surface of the grate bars which are unmitelbar between the blades of the cleaning comb.

[0011] b. All moving parts are located in the combustion chamber at an extremely high temperature (above 1000° C.), and therefore have a short lifespan

[0012] c. All moving parts are in a room with the fuel and the ash.

[0013] Thus, the ash falls not only on the Rosstäbe, but also on the moving parts, such as chain wheels, chain, shaft, and drive, and causes an intensive wear.

[0014] From patent KR 100901365 an openable by fuel and compressed air funnel flap is known which serves to return fire protection. The use of compressed air into the hopper is not desirable for light fuels (chips. Pellets), because, firstly, a reverse blow-by of the fuel may cause upward and secondly brings an uncontrolled additional amount of air in the combustion chamber.

[0015] From the patent JP 2000266333 a furnace is known, wherein the blowing ash takes place through an opening in the furnace bottom, which is opened by a falling down flap. Such a construction does not allow the mounting of a burner in a boiler with a lower-lying burner door since under the burner no free space remains.

[0016] The U.S. Pat. No. 1,441,293 a burner with two pistons is known. The lower piston is connected to a member of the thrust grate, the primary air comes to the sliding grate by an opening in the lower piston. The upper piston is used to Brennstoffnachfüllen and has no air hole. Thus, it is high temperatures loaded.

[0017] These problems are solved by the features recited in patent claim 1.

[0018] The advantages achieved with the invention consist in particular in that the glow and the fused ash lying on the grate are agitated by the cleaning comb. Thus, two effects are achieved: more complete combustion of the fuel and crushing of the slag before it has hardened. During the movement of the cleaning comb above the grate in the direction of the burner port, the ash and the Schiacke are discharged from the burner. According to the invention it is achieved that in the case that the slag sticking on top of the grate bars, it will be abraded during the rotation of the grate bars of the flush ridge of the grate bar. The plaster comb always leads through the grates move through in one direction only to burner opening, and the grates, the movement of which takes place burner opening back.

[0019] The Accommodate of fuel on the grate bars by means of a piston. The piston includes in his stoppage the opening of the hopper, and thus forms the back fire protection.

[0020] The piston has at least one secondary air supply at the end face. Thanks to the air flowing through the air piston piston and the piston channel to be cooled, and thus prevents adhesion of fuel particles.

[0021] Fuel slips due to gravity through the hopper, since the slide wall has an inclination angle which is greater than the angle of the natural demolition. The funnel of the fuel in the bottom has a larger opening than above. Thus, the hopper cannot clog.

[0022] The funnel has a back fire damper whose Aufhängeschse is arranged so that the return fire damper comes to rest on the slide wall. Thus, the return fire damper closes the hopper and opens only when fuel from above suppressed.

[0023] All moving Teile of the burner are located in that has passed combustion air zones and thus be cooled.

[0024] An embodiment of the invention will be explained in more detail with reference to Figures:

[0025] FIG. 1 shows a burner according to the invention shown in side section with an eccentric shaft and a pendulum flap

[0026] FIG. 2 shows a burner from the burner opening, in partial section

[0027] FIG. 3 shows a burner in the side section, with an eccentric shaft and a swing flap with cleaning comb and piston in standstill positions

[0028] FIG. 4 shows burners in the side section with two eccentric shafts

[0029] FIG. 5 shows a part of the burner in the side section with depicted possible movements of the cleaning comb

[0030] FIG. 6 shows the funnel with the funnel flap

[0031] FIG. 7 shows the cleaning comb and grate bars with position of the cleaning comb down (rest)

[0032] FIG. 8 shows cleaning comb and grate bars with position of plaster ridge above

[0033] FIG. 9 shows battering and stirring the slag and embers

[0034] FIG. 10 shows abrading the slag from the rotary grate bar through the plaster comb

[0035] The invention relates to a burner for the combustion of solid fuels, particularly pellets and wood chips, which is also lower than standard may have ash fusion temperature. The burner has at least two parallel to each other at mutual distances mounted grate bars 25, in which primary air 26 flows in. The grate bars 25 are juxtaposed between inner walls of the burner 1 and positioned in the openings in the Burner 7 and supported on the grate carrier 24th The inner walls 1 have at least one opening 2 for secondary air. 5 The inner walls 1 together with the outer walls of a channel 3 for secondary air. 5

[0036] The grate bars 25 can be rotated or the grate bars 25 can be rotated by a drive by the interaction of the adhesive to the grate bars and the slag moved plaster comb 22nd

[0037] All moving parts are cooled either under the grate bars 25, or in the channel between the inner wall 1 and outer wall 3, and thus from flowing under the grate primary air 26, or from flowing through the channel secondary air. 5

[0038] The cleaning comb 22 is at a standstill below the grate bars 25 and is cooled by flowing through the primary air 26th The cleaning comb 22 makes the following movement: upwardly through the grate bars 25, smashes on the grate bars 22 lying slag and embers 29, and by stirring the lying on the grate bars 22 slag and embers 29. Thereafter, the cleaning comb 22 moves toward the burner port, and thereby

transmits the slag 28 from the burner, and then down under the grate bars, and last in the direction of Burner flange 7. This movement of the cleaning comb 22 may also be circular.

[0039] The burner is closed by a burner cover 4 from above, lying on the inner walls. 1

[0040] For mounting the burner to the boiler, or other device, the flange is seventh on the flange 7 can most burner parts, such as

[0041] Flame detector 6; An ignition unit 17, are fixed.

[0042] The fuel, which is supplied to the hopper 8 falls by gravity to the opening in the piston channel 12 and is brought by the piston 1 1 on the grate bars 25th. The room with the Brennerteilen on the other side of the Brennerfi-anisches 7 is covered with a burner cap 10th The burner cap 10 is close to the Burner 7 and mounted hopper. 8 The fan 13 is tightly mounted on the burner cap.

[0043] Burn-back protection is achieved by the closing of the fuel port in the plunger passage 12 by the piston 1 1 at a standstill, as well as of the hopper door 9 and Fan flap reaches 14th. During the cleaning phase of the bottom gate 20 opens, and the ash that has fallen between the grate bars 25 on the burner base 30 is blown by the fan 13 through the opening in the bottom 30th

[0044] FIG. 1 and FIG. 2 show the burner in the side section and in view of the burner opening. The cleaning comb 22 is one of an eccentric shaft and Pendulum flap 18 moves. The eccentrics of the cleaning comb 22 and the Shuttle plate 18 are offset about the axis of the eccentric shaft sixteenth Thus is achieved that when the right portion (in the picture) of the cleaning comb 22 above, Pendeilasche 18 is rotated to the right, and the Pendeiachse 19 the left part lifts (in the picture) of the cleaning comb upward. FIG. 3 shows the burner in the side section, with an eccentric shaft 16 and a swing flap 18 with cleaning comb 22 and piston 10 in idle positions. For the cleaning comb 22, the standstill position is under the grate bars 25 where the primary air cools the cleaning comb 22nd For the piston 10, the stop position of the end point in the direction of the burner opening (as shown in the picture). FIG. 4 shows the burner in the side section with two eccentric shafts 16 and 27, which define the movement of the cleaning comb 22nd FIG. 5 shows parts of the burner (cleaning comb 22 and grid rods 25), and the possible movements of the cleaning comb 22. FIGS. 7 and 8 show parts of the burner (cleaning comb 22 and grid rods 25) in the side section and the positions of the cleaning comb 22 under (FIG. 7) and (FIG. 8) the grate bars 25. FIG. 6 shows a side section of the hopper 8 with the hopper door 9 in the closed state (FIG. 6a); in the open state (FIG. 6B) and the vector of the gravitational force in the open state (FIG. 6c). FIG. 9 shows the battering and stirring the slag and embers 29, lying on the grate bars 25, by the cleaning comb 22 during its upward movement. FIG. 9a shows the cleaning comb 22 at a standstill under the grate bars 25 before the beginning of its upward movement. FIG. 9b shows the cleaning comb 22 through the grate bars 25 after it has stirred the slag and embers 29th. FIG. 10 shows the abrasion of adhering to the grate bar 25 slag 28 22 of the Prutzkamm FIG. 10a shows the slag 28 adhered to the upper side of the grate bar 25, FIG. 10b shows the grate bar 25 already rotated, the FIG. 10c shows the grated heard of the grate bar 25 slag 28 and the cleaning comb 22 in position above the grate bar 25.

1. burner parallel to each other for the combustion of solid fuels, in particular Pellets and wood chips, comprising at least two between the inner walls (1) of the torch in spaced arranged grate rods (25) formed in openings of a Brennerflanschs (7) and on a grate carrier (24) are mounted, characterized in that between the grate bars (25) makes a cleaning comb (22) following movement: upward through the grate bars (25), then, in the direction of the burner opening, then down under the grate bars, and last in the direction of the burner flange (7), wherein in a hopper (8) fuel slides by gravity downwardly open a hopper door (9) and by a piston (11) having at least one opening (15) for secondary air (5) for the cooling of the piston (11) and the Koibenkanals (12) provides, on the grate bars (25) is pushed, wherein on a burner base (30) under the grate bars fallen (25) ash, by a fan (13) is blown open by a bottom of slider (20) cutout in the burner base (30).

2. Burner according to claim 1, characterized in that the grate bars (25) are mounted freely rotating, and adhering of the interaction of the to the grate bars (25) and the moving slag cleaning comb (22) are rotated.

3. Burner according to claim 1, characterized in that the grate bars (25) are mounted rotatable and are rotated by means of drive.

4. Burner according to one of claims 1 to 3, characterized in that the movement of the cleaning comb (22) is circular.

5. Burner according to one of claims 1 to 4, characterized in that the cleaning comb (22) by an eccentric shaft (16) with

two staggered about an axis of eccentric cams and a swing flap (18), swing axle is moved (19).

6. Burner according to one of claims 1 to 4, characterized in that the cleaning comb (22) of two eccentric shafts (16) and (27) is moved.

7. A burner according to any one of claims (1) to (6), characterized in that the funnel (8) has the shape of an inclined pyramid, the bottom has a larger opening than the top and arranged a receiving axis of the hopper flap (9) so that the hopper flap (9) comes to lie on a slide wall by its own weight, the sliding wall being at such angle that allows slipping of the fuel.

8. Burner according to one of claims 1 to 7, characterized in that all moving parts under the grate bars (25) and/or between the inner walls (1) and outer walls (3) are in air-flow zones.

Positions: 1 inner wall, 2 opening for secondary air, 3 outer wall, 4 burner cover, 5 secondary air, 6 flame detector (ZB photosensor), 7 Burner, 8 funnel, 9 hopper door, 10 burner hood, 11 Kolbe, 12 Kolbenkanal, 13 fan, 14 fan flap, 15 Luftöffnung in the Kolbe, 16 eccentric, 17 ignition unit, 18 pendulum flap, 19 swing axle, 20 Squeegee, 21 axis guide, 22 cleaning comb, 23 grate bar carrier, 24 Schließplatte, 25 grate bar rotating primary air

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