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(54) **HEATING BOILER**

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(73) Proprietor: **Parvanov, Severel Paskov**
Pokrajna, 3764 Vidin (BG)

(72) Inventor: **Parvanov, Severel Paskov**
Pokrajna, 3764 Vidin (BG)

(74) Representative: **Vinarova, Emilia Zdravkova**
Patentcorrect Ltd.
P.O.Box 639
1000 Sofia (BG)

(56) References cited:
WO-A-2006/008762
DE-U1- 8 220 521
DE-U1- 8 810 474
DE-U1- 9 000 738

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Description

FIELD OF INVENTION

[0001] The invention is applicable in the field of heat supply, in particular for home heating and heating water for domestic purposes, by burning biofuel.

PRIOR ART

[0002] A heating boiler, operating with pellets is known from documents AT402850B and WO 2006/008762. The heating boiler shown in document AT 402850 B consists of a coated with heat- insulating material tetrahedral-prism-shaped body, at the bottom of which is located a hearth, in the shape of a double-wall jacket with numerous openings over its inner surface, through which it is in connection with a primary air source. The primary-air inlet is situated on the lateral surface of the double-wall jacket. A screw, feeding the biofuel, is mounted on the lower part of the hearth, connected to a driving mechanism. Above the front part of the screw, outside the body of the boiler, is envisioned a bunker for the biofuel. Above the hearth is located a connected- to- the upper part- of the- body heat exchanger, which has vertical channels for the flue gases. At the lower part of the heat exchanger, before the inlet for the flue-gases is installed a housing for guiding the flue gases, which is in the shape of a frustum of a cone, turned with its larger base downwards. At the upper part of the gas- guiding housing, immediately before the inlet of the heat exchanger, is envisioned a hollow ring-shaped body, over the inner cylindrical surface of which are situated outlet openings. The space of the hollow ring-shaped body is connected to a fan for secondary air via a pipeline. Above the upper part and above the heat exchanger there is formed a space for the flue gases, above which is situated a metal reflecting plate. The body is provided with flue-gases outlet. The heat exchanger has an inlet and an outlet for the heat-conductor.

[0003] The problem of this heating boiler is that it can operate only with pellets and has a comparatively low efficiency, due to the fact that combustion is performed in a hearth, over the inner surrounding surface of which primary air is supplied to the biofuel through many openings. The combustion of the biofuel is incomplete because the primary air does not reach, or only reduced quantity of it reaches the biofuel, located along the axis of the hearth. Besides, the pressure of the primary air, going out of the different openings of the hearth to the biofuel, is different, resulting from the lateral feeding of primary air to the hollow space of the double-wall housing. This accounts for the uneven and incomplete combustion of the biofuel. On the other side, the possibility for deposition of a large quantity of soot over the walls of the heat exchanger additionally reduces the efficiency, due to the obstructed heat exchange through them.

[0004] Another problem of the known boiler is that, because of the incomplete and uncontrolled combustion of the biofuel, a significant amount of environmentally-harmful emissions are released into the atmosphere.

SUMMARY OF THE INVENTION

[0005] The aim of the invention is to create a heating boiler of higher efficiency and reduced amount of environmentally- harmful, dismissed into the atmosphere, emissions, operating with pellets as well as with other kind of biofuel.

[0006] The solution to this aim is a heating boiler according to claim 1. Embodiments of the invention are defined in the dependent claims.

[0007] The advantage of this heating boiler, according to the invention, is that it can work with pallets, as well as with other biofuels, e.g. wood chips, hayseed, dry animal faeces, maize and soybeans.

[0008] Another advantage of the boiler, according to the invention, is the increased efficiency, due to the fact that the construction of the horizontal hollow combustion plate allows for an uniform burning of the biofuel over its whole combustion surface, while, at the same time, the shape of the cone-shaped openings prevents them from getting blocked and ensures a lower biofuel consumption, because of its more complete and more even burning. On the other hand, the spiral-shaped cleaners of quadrangular section, tightly adhering to the inner surface of the smoke tubes, prevent from soot deposing upon the walls of the smoke tubes, thus improving the process of heat-releasing through them, and create a turbulent movement of the flue gases, elongating their way through the smoke tubes, which, on its turn, additionally improves the process of heating. Further efficiency increase is guaranteed by the fact that the axis of the screw for biofuel intercepts the horizontal at an angle of 3° to 6°, which prevents its clogging and ensures an even feeding of biofuel to the hollow horizontal combustion plate.

[0009] Yet another advantage of the boiler, according to the invention, is the decreased quantity of discharged-into- the atmosphere harmful emissions, resulting from the controlled and more complete combustion of the biofuel, ensured by the numerous built-in detectors, transmitting signals to the remote- control device, which analyses them and emits controlling signals to the corresponding nodes of the heating boiler in the cases when the flue gases do not fall into the set-in- advance parameters, and ensures the performance of additional processing of the flue gases, so that they reach the set-in-advance parameters for the quantity of the released into the atmosphere harmful emissions.

[0010] Another advantage of the boiler, according to the invention, is its quick operation, due to the possibility for simultaneous and more even combustion of the biofuel over the whole upper surface of the hollow horizontal combustion plate.

[0011] Another advantage of the boiler, according to the invention, is the more even waste disposal out of the

boiler, because the bearings of the waste screw at its both ends, makes possible the avoiding of its beating, which causes its blocking.

[0012] Another advantage of the boiler, according to the invention, is that its construction allows for easy service maintenance, as well as its easy transformation from a boiler of a certain capacity into a boiler of a higher capacity, by simply replacing the hollow horizontal combustion plate, hollow ring-shaped airline and reflecting disk with other ones of the desired capacity.

DESCRIPTION OF THE FIGURES

[0013] The invention is explained in grater detail by means of an embodiment, shown on the attached figures, where:

1. Figure 1 is a vertical section along the axis of the heating boiler;
2. Figure 2 is a vertical section along A-A of the heating boiler on fig.1;
3. Figure 3 is a cross- section of profile bottom 6;
4. Figure 4 is a view from the above of profile bottom 6;
5. Figure 5 is a view from the outer wall of the combustion panel 18 with a partially removed outer wall;
6. Figure 6 is a section along B-B of fig.5;
7. Figure 7 is a side view of the body of the heating boiler with a partial cut through tight door 17;
8. Figure 8 is a vertical section of combustion plate 26;
9. Figure 9 is a view from the above of combustion plate 26;
10. Figure 10 is an enlarged vertical section of part of the boiler shown on fig. 1;
11. Figure 11 is a side-view of an axonometry of upper chamber 1;
12. Figure 12 is a partial vertical section of reflecting plate 45 along the axis of cleaners 48;
13. Figure 13 is a side-view of combustion panel 18, together with the connected to it thrust strip 36 and fans for primary 23 and secondary 25 air.
14. Figure 14 is a vertical section along A-A of the heating boiler from fig.1, showing the way of the flue gases, forced back to the lower chamber 2 by the flue-gases fan for further processing.

EMBODIMENTS OF THE INVENTION

[0014] In the shown on the figures exemplary construction of the invention, the heating boiler (fig. 1 and 2) consists of a cylindrical body, including an upper chamber 1 and a lower double-wall chamber 2, connected in a fixed position to one another by flanges, between which there is a heat-resistant gasket. The lower chamber 2 is constructed of concentrically positioned outer 3 and inner 4 bodies. The outer body 3 has a flat horizontal bottom 5. The inner body 4 has a profile bottom 6 (figs. 3 and 4), which is at a distance from bottom 5 of the outer body 3. The profile bottom 6 consists of a horizontal sector 7 and its two sides pass over into slanted rising sectors 8 and 9, one of which, 8, passes over into a second horizontal sector 10. The length of the central horizontal sector 7 is equal to the distance between the outer walls of the hollow door 17 and the combustion panel 18. Between the bottoms 5 and 6 are arranged the distance-ensuring elements 11. In this way space is formed between the outer body 3 and the inner body 4, which is connected with the inlet for the heat conductor.

[0015] Close to the horizontal sector 10 in the wall of the lower chamber 2 is formed an opening, which is closed with the inspection door 12, in front of which, to the inside, is positioned a movable screen 13 with possibility for rotating round its upper end. The inspection door 12 is constructed of heat-resistant material, with handles, made of heat-resistant material, and has an inspection opening 14, closed with cover 15. Diametrically opposite, and at both sides of inspection door 12 in the wall of the lower chamber 2, are formed two identical openings 16, one of which is closed with hollow door 17, and the other is closed with the combustion panel 18.

[0016] The combustion panel 18 (figs. 5, 6 and 13) is a hollow door, whose inner space is divided into two separate chambers 19 and 20 by a diagonal barrier 21. One of the spaces of the hollow door 19, through an opening 22 in the outer wall of the combustion panel 18, is connected to a fan for secondary air 23. The other space 20, through a corresponding opening 24 in the outer wall of the combustion panel 18, is connected to a fan for primary air 25.

[0017] Near the bottom of the inner body 4, centrally, is positioned a furnace, which is a hollow horizontal combustion plate 26 (figs. 8 and 9), with a central cylindrical opening 27, running through the whole height of combustion plate 26. Round the central opening 27, all over the upper surface 28 of the combustion plate 26 are formed a number of openings 29 in the shape of a frustum of a cone, turned with its smaller base downwards. The openings 29 are evenly distributed in circles, concentrically to the central opening 27, which ensures the complete combustion of the fed biofuel, with no risk of getting blocked. To the lower part of combustion plate 26 and concentrically to the central opening 27 is formed another opening 27'. The lower end of the central cylindrical opening 27 of the combustion plate 26 is connected to an inner tube 30 (fig.10). The inner tube 30 consists of an elbow and a straight section, along the axis and along the whole length of which is mounted a screw 31, whose axis joins the horizontal at 3° to 8°, preferably 7°. A concentrical outer tube 32 encloses the inner tube 30. There is an empty space between the two tubes 30 and 32, connected to space 20 of the combustion panel 18, which, on its turn, is connected to the fan for primary air 25. The space between the two tubes 30 and 32 is connected to the space of the combustion plate 26 through its second opening 27'. The inner tube 30 runs through the combus-

tion panel 18. Above the upper end of inner tube 30 is connected a vertical furrow 33, which, through a fire-safety dose pump 34 is connected to the outlet of bunker 35 for biofuel. The back end of screw 31 is on bearings in a thrust strip 36, which closes the space of the inner tube 30. The thrust strip 36 is connected in a fixed position to the front part of dose pump 34. The screw 31 is driven by a gear transmission with engine 37.

[0018] Through the combustion panel 18, at its upper end, runs a heat-resistant tube 38 of stainless steel, which is connected with its outer end to an ignition device 39, located sideward to and out of the combustion panel 18. The other end of tube 38 is situated in the space of inner tube 30, immediately under the central opening 27 of the combustion plate 26.

[0019] Coaxically, and at a distance above the upper surface 28 of the combustion plate 26, is positioned a hollow ring-shaped airline 40, over whose entire inner surface there are formed openings 41, set in parallel and horizontal rows. The diameter of the openings 41 is bigger with every ascending row than that of the preceding row. Above the hollow ring-shaped airline 40 is situated a reflecting disk 42. The width of the ring-shaped airline 40 has been so chosen, as to ensure the complete combustion and guiding of the flame to the center of the reflecting disk 42, creating a turbulent movement of the hot air along the walls of inner body 4 of lower chamber 2. The inner space of the ring-shaped airline 40 is connected to space 19 of the combustion panel 18, which, on its turn, is connected to the fan for secondary air 23.

[0020] Near the horizontal sector 7 of the profile bottom 6 of the inner body 4 and under the outer tube 32, is located a waste-cleaning device 43, constructed as a screw. In the hollow-door wall 17, and coaxically to the screw 31 is installed, in a fixed position, a guide tube 31', along the axis of which runs the going out of the lower body 2 front end of the screw 31, ending above the waste bin 63. The end of guide-tube 31' is a dead-end, and before it, to the waste-bin's 63 side, is formed an opening for waste discharge. The screw 31 is on bearings at its both ends, correspondingly, at the dead-end of the guide-tube 31' and in the combustion panel 18.

[0021] In the upper chamber 1, which is closed by cover 44, is installed a heat exchanger with vertically positioned tubes. Below the cover 44, and at some distance from the heat exchanger, is positioned a reflecting plate 45, constructed as a three-layer plate, consisting of a base under which are placed a heat-resistant layer and a reflector of stainless sheet. The reflecting plate 45 has formed openings 46 and is connected in a fixed position to the upper body 1. The heat exchanger includes a number of vertical and parallel to one another smoke tubes 47, located under every opening 46 of the reflecting plate. In every smoke tube 47 is positioned a cleaner 48, every one of which is a coiled spiral of a stainless- steel profile of quadrangular section. The two edges of the quadrangular section are in close contact with the inner surface of smoke tube 47. The upper end of each cleaner 48 (fig.12) is connected with axis 49, which is on bearings in the outlet 46 of the reflecting plate 45. The upper end of axis 49 is connected in a fixed position with gear 50, positioned in the space above the reflecting plate 45. All gear wheels 50 are connected to a driver through a gear transmission.

[0022] Smoke tubes 47 are connected in a fixed position to the upper chamber 1 through an upper mirror 51, and a lower mirror 52. The upper mirror 51 is positioned at some distance from the reflecting plate 45, at which, space 53 is formed for the flue gases. Between the upper mirror 51 and the lower mirror 52 is formed some space 54 for the heat conductor. This space 54 for the heat conductor is connected through a pipeline 55 to the space between the outer 3 and the inner 4 bodies of the lower chamber 2.

[0023] In the back part of the upper chamber 1 is connected in a fixed position a gas-turbine panel 56 (fig. 11), which has an upper opening 57, to which a flue-gas fan is connected, and a lower opening 58, connected to a smoke off-take. At one side of the gas-turbine panel 56 is situated an outlet for the heat conductor, and at its other side there is an inlet/outlet to/for other heat conductors. The gas-turbine panel 56 is equipped with a A-probe 59, positioned outside of the upper body 1 of the boiler, in the space before the upper opening 57. At both sides of the gas-turbine panel 56 there are formed control openings 60, two at each side, designated for transmitting signals from a pick-up device for the temperature of the heat conductor in the space 54, a transducer for the pressure of the heat conductor in the space 54, a pick-up device for the temperature of the outer wall of the upper chamber 1, and a pick-up device for preliminary chemical gases in the space of the nearest smoke tube 47. Every one of the enumerated pick-ups, which is not shown on the attached figures, is connected to the remote-control device 61. The remote-control device 61 is in connection with the A- probe 59, and with a detector 62 for smoke availability, located immediately by the lower opening 58 of the gas-turbine panel 56.

[0024] The remote-control device 61 could be realized by the available at the market Universal regulator type 5711 OGC of TEM company, Switzerland.

[0025] The construction of the boiler, according to the invention, allows for easy service maintenance, as well as its easy transformation from a boiler of a certain capacity into a boiler of higher capacity, by simply replacing the hollow horizontal combustion plate 26, hollow ring-shaped airline 40 and reflecting disk 42, with other ones of the desired capacity. At higher capacity, the area of the upper surface 28 of the hollow horizontal combustion plate 26 and the reflecting disk 42 is bigger. Correspondingly, the inner diameter of the hollow ring-shaped airline 40 is increased proportionally to the hollow horizontal combustion plate 26. Increase is, also, the number of the openings 29 in the combustion plate 26 and the openings 41 in the hollow ring-shaped airline 40.

[0026] The invention is constructed as a heating boiler

of 100 KW.

ACTION OF THE INVENTION

[0027] Doses of bio-fuel are fed from the biofuel bunker 35, through dose-pump 34, down the vertical furrow 33, at certain intervals, and they enter the back end of screw 31. Dose- pump 34 works according the set- by- the remote-control device 61 programme and discharges the dosed biofuel, which, under the pressure of its own weight, down along the vertical furrow 33, goes onto screw 31. The screw 31 conveys the biofuel to the central opening 27 of the hollow combustion plate 26, where it enters into contact with the fed by the ignition device 39, through heat-resistant tube 38, hot air. In seconds the biofuel ignites spontaneously. The smoke detector 62 switches on the smooth feeding of the primary air from fan 25. The air passes consecutively through chamber 20 of the combustion panel 18, the space between the tubes 30 and 32, the opening 27', and goes into the cavity of the hollow horizontal plate 26, from where it goes out through the cone-openings 29 on its upper surface 28. The screw 31 starts to smoothly take out the biofuel and to push upwards the already ignited biofuel upon the upper surface 28 of the combustion plate 26. That even and smooth discharge of the biofuel allows for discharging the burning material in the shape of a circle upon the upper surface 28 of the combustion plate 26. On the other hand, the fact that the screw's 31 axis joins the horizontal at an angle of 3° to 6° accounts for the avoiding the clogging of the screw 31 and ensures the even and smooth feeding of the biofuel to the surface 28 of the hollow horizontal combustion plate 26. The increase of the quantity of fed primary air through openings 29, whose shape prevents them from getting blocked, additionally ensures more complete and more even combustion of the fuel. After a certain temperature has been reached, the feeding of secondary air is switched on, which is pressed by fan 23. As a result of the continuous pushing out of the burning biofuel into a circle, concentrically to the central opening 27 of the hollow horizontal combustion plate 26, it is possible to have a quick and simultaneous ignition of all the biofuel, which is in the upper surface of the hollow horizontal combustion plate 26, thus ensuring a fast and high performance of the heating boiler.

[0028] The supplied through chamber 19 of the combustion panel 18 secondary air goes into the interior of the hollow ring-shaped airline 40, and then out through its openings 41, and gets into contact with the ascending flow of burning flue gases, in which the non-burnt particles of biofuel are increased, which ensures their additional complete combustion and further increases the temperature of the flue gases, and from it - the heat quantity released to the heat conductor. Besides, the ring-shaped airline 40, ensures directing the flame to the centre of the reflecting disk 42. The going upwards flow of burning flue gases is, under the pressure, directed to the reflecting disc 42, which diverts it and creates turbulent movement, directed to the lower part of the internal body 4 of the lower chamber 2, at which their heat is released to the heat conductor, located in the space between the outer 3 and inner 4 bodies of the lower chamber 2. After that the flue gases take an upward direction under the existing pressure and as a result of the created by the smoke-offtake natural draught through opening 58, pass through the smoke tubes 47, and before reaching the smoke offtake, release their heat to the already heated in the space between the outer 3 and inner 4 bodies heat conductor, entering the space 54 between the smoke tubes 47 through pipeline 55. The movement of the spiral-like cleaners 48 additionally improves the heat- releasing through the walls of the smoke tubes 47 due to the fact that, on the hand, keeps their inner surface clean of soot through continuously scraping them by the sharp edges of the moving profile 48, and on the other hand, creates a turbulent movement of the moving upwards in the smoke tubes 47 flow of flue gases, which lengthens its way.

[0029] The heated heat conductor is led out of the boiler to a user-unit, for example, a local heating installation, through an outlet in the upper chamber 1.

[0030] Before the flue gases enter the smoke offtake 58, they get in contact with the A- probe 59. The A- probe 59 supplies data for chemical analysis of the flue gases to the remote-control device 61, which, depending on the established chemical composition and the pre-set parameters, regulates the air quantity, fed by the fans 23 and 25.

[0031] When the A- probe 59 establishes that the leaving space 53 flue gases is within the norms of the pre-set parameters, the remote controlling device 61 switches on the not-shown on the figures fan for flue gases for sucking and discharging them into the atmosphere.

[0032] If the A- probe 59 establishes that the leaving space 53 flue gases are out of the pre-set parameters, the controlling device 61 sends a signal to the fan for flue gases, switching it into a back-movement regime, which causes reverse feeding of the flue gases through space 53 and the smoke tubes 47 in the lower body 2, where, due to the increased quantity of oxygen in the fed secondary air, is carried out their complete combustion and achievement of the pre-set norms (fig.14).

[0033] The heating boiler, according to the invention, has a reduced quantity released- into- the atmosphere harmful emissions, resulting from the ensured programmed and more complete combustion of the biofuel, due to the in-built A- probe 59, sending a signal to the remote- controlling device 61, which analyses it and emits controlling signals to the fans for the flue gases in the cases when they are not within the pre-set parameters.

[0034] The waste from the combusted biofuel is continuously pushed out to the periphery of combustion plate 26 by the entering through the central opening 27 combusting biofuel, and from there, sliding down the slanted sections 8 and 9 of the profile bottom 6 of the inner body

4, falls onto the central horizontal sector 7, from where, by means of cleaning device 43, for example a screw, is conveyed to the waste bin 63.

[0035] During the process of operation the heating boiler, whose outlet for the heat conductor is connected to an user, it is possible to lead out, from the outlet for other heat resources, part of the warmed heat conductor to an additional user. If the heating boiler, connected to the user, is not in use at the moment, it is possible, through the same inlet, to supply to the user (a local heating network) in space 54, a heat conductor from another source, e.g. a sun panel, with no need of disassembling and installing new links to the user.

Claims

1. A heating boiler, which consists of a body coated with insulating-material and covered with a lid,
at the lower part of the body is a hearth,
below the lower part of the hearth a biofuel- feeding screw being provided, which is connected to a driving mechanism,
and the hearth having a number of openings through which it is connected to a source of primary air,
and outside the body of the boiler above the front part of the biofuel- feeding screw is a bunker for biofuel,
a heat exchanger, connected to the upper part of the body, being mounted above the hearth, through which runs a heat conductor, the heat exchanger having vertical channels for the flue gases, at which, above the hearth and before the inlet of the heat exchanger and coaxially to the hearth a hollow ring-shaped body being situated,
and over the inner cylindrical surface of which are situated outlet openings, the space of the hollow ring-shaped body being connected to a source of secondary air,
and above the upper part of the heat exchanger a metal reflecting plate being mounted, and the space formed between the heat exchanger and the metal reflecting plate being connected to the flue-gases outlet,
the body being cylindrical and constructed by connecting in a fixed position an upper (1) and a lower (2) chamber,
the lower chamber (2) being double-walled and being constructed of a concentrically positioned outer (3) and inner (4) body,
the outer body (3) having a flat horizontal bottom (5), while the inner body (4) has a profile bottom (6), which is at a distance from the bottom (5) of the outer body (3),
and between said inner and outer bodies a space is formed which is connected to the inlet of the heat conductor,
nearby the profile bottom (6), in the wall of the lower chamber (2), an opening is formed, which is closed with an inspection door (12) having located in front of it a movable screen (13),
diametrically opposite, and on both sides of the inspection door (12), in the lower chamber (2) wall, two identical openings (16) are formed, one of which is closed with a hollow door (17), while the other is closed with a combustion panel (18),
the combustion panel being a hollow door, whose inner space is divided into two separate chambers (19 and 20) by a diagonal barrier (21),
one of the spaces (19) of the hollow door of the combustion panel (18) being connected to the source of secondary-air (23) through an opening (22) on the outer wall of the combustion panel (18),
and the other space (20) being connected to the source of primary-air (25) through a corresponding opening (24) on the outer wall of the combustion panel (18),
and the hearth being a horizontal hollow combustion plate (26) with a central cylindrical opening (27), running through the whole height of the burning plate (26),
at the lower side of the hollow combustion plate (26), concentrically to the cylindrical opening (27) a second opening (27') is formed,
and the number of furnace openings being formed on the upper surface (28) of the hollow horizontal combustion plate (26),
the lower end of the central cylindrical opening (27) of the hollow horizontal combustion plate (26) being connected to an inner pipe (30), which consists of an elbow and a straight section, along the axis and the whole length of which is mounted the biofuel-feeding screw (31),
and the axis of the biofuel-feeding screw (31) intersecting the horizontal plane at an angle of 3° to 8°,
the inner pipe (30) being concentrically enclosed by an outer pipe (32), and the space formed between the inner pipe and the outer pipe being connected to the fan for primary air (25),
and the space between the two pipes (30) and (32) being in connection with the inner space of the hollow horizontal combustion plate (26) through its second opening (27'),
the inner pipe running through the combustion panel (18), and behind its back end is connected a vertical furrow (33), which, through a fire-safety dose-pump (34), is connected to the biofuel- bunker's outlet (35),
and through the combustion panel (18) running a pipe (38), which is connected at its outer end to an ignition device (39), located outside the body of the boiler, while its other end is situated in the space of the inner pipe (30),
immediately under the central opening (27) of the hollow horizontal combustion plate (26), a reflecting disk (42) is mounted above the hollow ring-shaped airline (40),

and the openings (41) of the disk (40) are arranged in parallel horizontal rows,
and the diameter of every following ascending row are bigger than the diameter of the preceding one,
and the heat exchanger being mounted in the upper chamber (1), at which the inner space of the ring-shaped airline (40) is connected to a fan for secondary air (23) through the space (19) of the combustion panel (18),
and below a cover (44), and at some distance from the heat exchanger, a reflecting plate (45) with formed openings (46) is positioned, connected in a fixed position to the upper chamber (1),
and the heat exchanger consisting of a number of smoke tubes (47) being arranged vertical and parallel to one another,
located under each opening (46), and in each smoke tube (47) being positioned a rotating-round-its-axis cleaner (48),
and the smoke tubes (47) being connected in a fixed position to an upper mirror (51),
which is positioned at some distance from the reflecting plate (45), between which is formed some space (53) for taking off the flue gases,
and the smoke tubes (47) being also connected in a fixed position to the lower mirror (52),
and the space (54) for the heat conductor formed between the two mirrors (51) and (52) being connected through a tube (55) to the space between the outer (3) and the inner (4) bodies of the lower chamber (2),
and a gas-turbine panel (56) being positioned in the back part of the upper chamber (1), which gas-turbine panel having an upper opening (57), to which is connected a flue-gas fan and a lower opening (58), connected to the space (53) for the flue gases, which is connected to a smoke offtake,
and the gas- turbine panel (56) being equipped with a λ-probe (59), positioned in the space before the upper opening (57) and outside to the upper body (1) of the boiler,
and at both sides of the gas-turbine panel (56) there being formed control openings (60), two at each side, designated for transmitting signals from a pick-up device for the temperature of the heat conductor in space (54),
a transducer for the pressure of the heat conductor in space (54), a pick-up device for the temperature of the outer wall of the upper chamber (1), a pickup device for preliminary chemical gases in the space of the nearest smoke tube (47), and each one of the enumerated pick-ups being connected to a remote-control device (61), which is in connection with the A-probe (59) and a detector (62) for smoke availability, located immediately by the lower opening (58).

2. A heating boiler, according to claim 1, **characterised by** the fact that the profile bottom (6) is constructed of a central horizontal sector (7), whose two walls pass over into slanting, rising sectors (8 and 9), one of which (8) passes over into a second horizontal sector (10), and the length of the central horizontal sector (7) being equal to the distance between the outer walls of the hollow door (17) and the combustion panel (18).

3. A heating boiler, according to claim 1, **characterised by** the fact that each of the cleaners (48) is a spiral-coiled profile of stainless steel, and the upper part of the cleaner (48) in the space above the reflecting plate (45) being connected in a fixed position to a gear wheel (50), and all gear wheels (50) being connected to an engine through a transmission.

4. A heating boiler, according to claim 1, **characterised by** the fact that near the horizontal sector (7) of the bottom (6) of the inner body (4) and under the outer tube (32), is located a waste-cleaning device (43), constructed as a second screw,
and through hollow-door wall (17), coaxially to the second screw, being installed a guide tube (31'), the guide tube (31') extending out of the lower body (2) and ending above the waste bin (63),
and one of the guide-tube's (31') ends being a dead-end, and before it, to the waste-bin's (63) side, there being an opening for waste discharge,
and the second screw rests on bearings at its both ends, correspondingly, at the dead-end of the guide-tube (31 ') and the combustion panel (18).

5. A heating boiler, according to claim 1, **characterised by** the fact that near the horizontal sector (7) on the bottom (6) of the inner body (4) and under the outer tube (32) is positioned an ash-cleaning device (43), constructed as a vacuum-sucking device, connected to the waste-bin (63).

6. A heating boiler, according to claim 1, **characterised by** the fact that a smoke detector (62) is connected to the device for initial ignition (39) through a remote-control device (61).

7. A heating boiler, according to claim 1, **characterised by** the fact that the reflecting plate (45) is constructed as a three-layer plate, made of a base under which is positioned a temperature-resistant layer and a reflector made of stainless sheet.

8. A heating boiler, according to claim 3, **characterised by** the fact that the cleaner's (48) profile is of quadrangular section, two of whose edges being in close contact with the inner surface of the smoke tube (47).

9. A heating boiler, according to claim 1, **characterised by** the fact that the number of openings (29) on the hollow horizontal combustion plate (26) are evenly

distributed in concentric to the central opening (27) circles, and are in the shape of a frustum of a cone with its smaller base downwards.

Patentansprüche

1. Heizkessel, der aus einem Körper besteht, das mit Isolationsmaterialbeschichtet ist, mit einem Deckel bedeckt ist, an dem unteren Teil davon einen Herd vorgesehen ist, im unteren Teil des Herdes eine Schraube für Einreichung von Biokraftstoffen, die mit einem Aktuator verbunden ist und der Herd mehrere Öffnungen hat, durch die es mit einer Quelle von Primärluft verbunden ist, und außerhalb des Kesselkörpers über dem vorderen Teil der Schraube ein Bunker für Biokraftstoff vorgesehen ist, über dem Herd einen Wärmetauscher zu dem oberen Teil des Körpers verbunden ist, durch welchen läuft ein Heizleiter, der Wärmetauscher hat vertikale Kanäle für Gase, an dem über dem Herd und vor dem Einlaß des Wärmetauschers ein koaxial zum Herd hohlen ringförmigen Körper befindet, und über die innere zylindrische Oberfläche dem Körper sind gelegenen Auslassöffnungen und der Raum des hohlen ringförmigen Körpers ist zu einer Quelle für Sekundärluft verbunden ist, und über dem oberen Teil des Wärmetauschers eine Metall Reflexionsplatte gelegen ist, und die zwischen ihnen gebildeten Raum ist mit dem Gasauslass verbunden ist, **gekennzeichnet durch** die Tatsache, dass der Körper zylindrisch ist und konstruiert durch eine feste Verbindung eine obere (1) und eine untere Kammer (2) und die untere Kammer (2) ist doppelwandig und aus einem konzentrisch angeordneten äußeren (3) und inneren (4) Körper, dem Außenkörper (3) hat einen flachen horizontalen Boden (5), und der innere Körper (4) hat einen Profilboden (6), die in einem Abstand vom Boden (5) des Außenkörpers ist (3) und zwischen ihnen ein Raum gebildet wird, der mit dem Einlaß von dem Wärmeleiter verbunden ist, in der Nähe der Profilboden ist (6) in der Wand der unteren Kammer (2) wird eine Öffnung gebildet, die mit einer Inspektionsklappe geschlossen ist (12) mit einem vor ihm befindet bewegbaren Schirm (13), diametral gegenüberliegend und auf beiden Seiten der die Inspektionsklappe (12) in der Wand des unteren Kammer (2) zwei identischen Öffnungen (16) ausgebildet sind, eine von denen mit einer hohlen Tür (17) geschlossen ist, der andere mit einer Verbrennungsplatte (18) geschlossen ist, die eine hohle Tür, dessen Innenraum in zwei getrennte Kammern (19) und (20) aufgeteilt ist **durch** eine diagonale Sperre (21), einen der Räume (19) des hohlen Tür der Verbrennungsplatte (18) **durch** eine Öffnung (22) an der Außenwand der Verbrennungsplatte (18) ist mit der Quelle von Sekundärluft (23), und dem anderen Raum (20) **durch** eine Öffnung (24) in der äußeren Wand der Verbrennungsplatte (18) mit der Quelle von Primärluft (25) verbunden ist und der Herd ist ein hohler horizontal Brennteller (26) mit einer zentralen zylindrischen Öffnung (27), verlaufend über die gesamte Höhe der Brennteller (26), an dem unteren Teil des Brennteller (26), konzentrisch der zylindrischen Öffnung (27) eine zweite Öffnung (27 '), und mehrere der Ofenöffnungen sind geformt auf das obere Teil (28) des hohlen horizontalen Verbrennungsplatte (26), wobei der untere Abschnitt des zentralen zylindrischen Öffnung (27) des hohlen horizontalen Brennteller (26) zu einem inneren Rohr (30) verbunden ist, der aus einem aus Knie und einen geraden Abschnitt entlang der Achse und der gesamten Länge davon ist die Schnecke (31) für Einreichung von Biokraftstoffen installiert, deren Achse schliessen mit der Horizontale ein Winkel vom 3 ° bis 8 °, das Innenrohr (30) ist konzentrisch umschlossen von einem Außenrohr (32) und der zwischen ihnen gebildete Zwischenraum ist mit dem Gebläse für Primärluft (25) und dem Raum zwischen den beiden Rohren (30) und (32) ist in Verbindung mit dem Innenraum des hohlen horizontalen Brennteller (26) **durch** die zweite Öffnung (27 '), wobei vergeht das Innenrohr (30) **durch** die Verbrennungsplatte (18) und über das hinteren Ende ist eine vertikale Furche (33) verbunden ist, welcher, der mit feuergesicherter Dosierpumpe (34), an das Biokraftstoff Bunkers Ausgang (35) verbunden ist, und **durch** den Brennplatte (18) vergeht ein Rohr (38), die an ihrem äußeren Ende mit einer Zündvorrichtung (39), die außerhalb des Körpers des Kessels verbunden ist, während sein anderes Ende ist in dem Raum des Innenrohrs (30) unmittelbar unter der zentralen Öffnung (27) der hohlen horizontalen Kraftstoffplatte (26), und eine Reflexionsplatte (42) über dem hohlen ringförmigen Luftrohr (40) und die Öffnungen (41) der Scheibe (40) montiert sind in parallelen horizontalen Reihen angeordnet sind, und der Durchmesser der jede folgende aufsteigende Reihe größer ist, dass der Durchmesser des vorhergehenden, und der Wärmetauscher wird in der oberen Kammer (1), an dem der Innenraum des ringförmigen Luftrohr (40) mit einem Ventilator für Sekundärluft verbunden ist (23) **durch** den Raum (19) der Verbrennungsplatte (18) und unterhalb des Deckels (44) und in einiger Entfernung von dem Wärmetauscher, einer reflektierenden Platte (45) mit ausgebildeten Öffnungen (46) angeordnet ist, in Verbindung eine feste Position in die obere Kammer (1) und der Wärmetauscher besteht aus einer Reihe von vertikalen und parallel zueinander Rauchrohre (47) unter jeder Öffnung (46) angeordnet ist, und in jedem Rauchrohr (47) ein um seine Achse drehenden Reiniger (48) positioniert ist, und die Rauchrohre (47) sind verbunden in einer festen Position an einem oberen Spiegel (51), die in einem gewissen Abstand von der reflektierenden Platte (45) positioniert ist, zwischen denen zum Ab-

ziehen der Rauchgase gebildet ist etwas Raum (53) und die Rauchrohre (47) sind ebenfalls in einer festen Position auf dem unteren Spiegel (52) verbunden ist und der zwischen den beiden Spiegeln (51) und (52) gebildeten Raum (54) für den Wärmeleiter ist **durch** ein Rohr (55) zu dem Raum, der zwischen der äußeren (3) und der inneren (4) Kasten der unteren Kammer (2) und einer Gasturbinenwand (56) im hinteren Teil der oberen Kammer (1) positioniert ist, die eine obere Öffnung (57) hat, an die ein Rauchgasgebläse und eine untere Öffnung (58) verbunden mit dem Raum (53) für die Rauchgase, die zu einem Rauchabzug angeschlossen ist, und der Gasturbinen-Platte (56) mit einem λ- Sonde (59) in dem Raum vor der oberen Öffnung (57) positioniert ist und außen an dem oberen Gehäuse (1) des Kessels, und an beiden Seiten der Gasturbinenwand (56) gebildet sind Steueröffnungen (60), zwei an jeder Seite, bestimmt für die Übertragung von Signalen von einem Temperatursensor des Heizleiters im Raum (54), einen Drucksensor der Heizleiter im Raum (54), Temperatursensor an der Außenwand der oberen Kammer (1), Sensor für vorläufigen chemischen Gase in den Raum der nächstgelegenen Rauchrohren (47) und jedem der aufgezählten Sensoren mit einer Gerät für Fernbedienung (61), die im Zusammenhang mit der λ- Sonde (59) und einen Rauchsensor (62) der neben der unteren Öffnung (58) befindet.

2. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass der Profilboden (6) aus einem zentralen, horizontalen Sektor aufgebaut ist (7), dessen beiden Wände gehen in geneigten, ansteigenden Bereichen (8) und (9), einer von denen (8) übergeht in einen zweiten horizontalen Bereich (10) und die Länge der zentralen horizontalen Bereich (7) gleich dem Abstand zwischen den Außenwänden der Hohltür (17) und dem Verbrennungstafel (18).

3. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass jeder der Reiniger (48) eine Spiral gewickelte Profil aus Edelstahl, und der obere Teil des Reinigers (48) in den Raum oberhalb der Reflexionsplatte (45) in einer festen Position mit einem Zahnrad (50) verbunden ist und alle Zahnräder (50) sind **durch** ein Getriebe mit einem Motor verbunden.

4. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass in der Nähe der horizontalen Ausschnitt (7) des Bodens (6) der Innenkörper (4) und unter dem Außenrohr (32) wird Reinigungsmittel (43) befindet und es ist als Schraube ausgebildet, und **durch** Hohltürwand (17), coaxically zur Schraube (31), ein Führungsrohr (31 ') installiert ist, entlang dessen Achse verläuft gehend aus dem unteren Körper (2), vorderen Ende der Schraube (31), die den Abfallbunker (63) erreicht, und der Führungsrohr (31 ') Ende ist geschlossen, und vor ihm um den Abfallbunkers ist (63) Seite befindet sich eine Öffnung zum Ableiten von Abwasser und die Schraube (31) an Lagern an ihren beiden Enden in entsprechender Weise an dem toten Ende der Führungsröhre (31 ') und der Verbrennungsplatte (18).

5. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass in der Nähe der horizontalen Ausschnitt (7) auf dem Boden (6) des inneren Körpers (4) und unter dem Außenrohr (32) eine Aschereinigungsmittel positioniert ist (43) als ein Vakuumansaugen Vorrichtung zum Abfallbehälter (63) verbunden ausgebildet ist.

6. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, daß der Rauchsensor (62) mit der Einrichtung zur Initialzündung (39) verbunden ist, **durch** eine Fernsteuervorrichtung (61).

7. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass die reflektierende Platte (45) als Dreischichtplatte ausgebildet ist, mit einer Base unter den eine hitzebeständige Schicht und einen Reflektor aus Edelstahl positioniert ist.

8. Heizkessel nach Anspruch 3, **gekennzeichnet durch** die Tatsache, dass (48) das Profil des Reinigungsmittels ist von viereckigen Querschnitt, während zwei der Ränder in engem Kontakt mit der Innenfläche des Rauchgasrohres (47) sind.

9. Heizkessel nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass die Anzahl der Öffnungen (29) auf dem hohlen horizontalen Kraftstoffplatte (26) gleichmäßig in die konzentrisch zur zentralen Öffnung verteilt (27) Kreisen und in der Form eines Kegelstumpfes mit seiner kleineren Basis nach unten.

Revendications

1. Une chaudière de chauffage, qui se compose d'un enduit de corps en matière isolante, recouvert d'un couvercle, à la partie inférieure de laquelle est prévu un foyer sous la partie inférieure de la cheminée d'une vis d'alimentation biofuel- est prévu, qui est relié avec un entraînement mécanisme, et le foyer a un certain nombre d'ouvertures à travers lesquelles il est connecté à une source d'air primaire, et l'extérieur du corps de la chaudière au-dessus de la partie avant de la vis un bunker de biocarburant est prévu un échangeur de chaleur, reliée à la partie supérieure du corps, est monté au-dessus du foyer, traversé par un conducteur de chaleur, l'échangeur de chaleur présente des canaux verticaux pour les

gaz de combustion, au cours de laquelle, au-dessus du foyer et avant l'entrée de l'échangeur de chaleur et de manière coaxiale à l'âtre une corps en forme d'anneau creux est situé, et au-dessus de la surface cylindrique intérieure de laquelle sont orifices de sortie est situé, l'espace du corps en forme d'anneau creux est relié à une source d'air secondaire, et au-dessus de la partie supérieure de l'échangeur de chaleur d'un métal plaque réfléchissante est montée, et l'espace formé entre eux est reliée à la sortie des effluents gazeux, **caractérisé par le fait que** le corps est cylindrique et construit par connectée dans une position fixe une haut (1) et inférieur (2) chambres, la chambre inférieure (2) est à double paroi et est constituée d'un externe (3) et d'un interieur (4) corps, le corps externe positionné de manière concentrique extérieur (3) présente un fond plat horizontal (5), tandis que le corps intérieur (4) comporte un fond de profil (6), qui est à une distance du fond (5) du corps extérieur (3), et entre eux un espace est formé, qui est reliée à l'entrée du conducteur de chaleur, à proximité du fond de profil (6), dans la paroi de la chambre inférieure (2), une ouverture est formée, qui est fermé par une porte d'inspection (12) avec un écran mobile située en avant de celui-ci (13), diamétralement opposées, et des deux côtés de la trappe de visite (12), dans la chambre inférieure (2) paroi, sont formées deux ouvertures identiques (16), dont l'une est fermée par une porte creuse (17), tandis que l'autre est fermée par un panneau de combustion (18) et le panneau de combustion est une porte creux, dont l'espace intérieur est divisé en deux chambres séparées (19) et (20) par une barrière diagonale (21), l'un des espaces (19) de la porte creux de la plaque de combustion (18), à travers une ouverture (22) sur la paroi extérieure du panneau de combustion (18), est reliée à la source d'air secondaire (23), et l'autre espace (20), à travers une ouverture correspondante (24) sur la paroi extérieure de la plaque de combustion (18), est reliée à la source d'air primaire (25), et le foyer est une plaque horizontale creux de combustion (26) avec une ouverture cylindrique centrale (27), qui traverse toute la hauteur de la plaque de combustion (26), sur le côté inférieur de la plaque de combustion creux (26), concentrique par rapport à l'ouverture cylindrique (27) une deuxième ouverture (27 ') est destiné, et le nombre d'ouvertures du four sont formées sur la surface supérieure (28) de la plaque de combustion horizontal creux (26), l'extrémité inférieure de l'ouverture cylindrique centrale (27) de la plaque horizontal creux de combustion (26) est relié à un tube intérieur (30), qui se compose d'un coude et une section rectiligne, le long de l'axe et sur toute la longueur de laquelle est montée la vis d'alimentation biofuel- (31), et l'axe de l'intersection de l'horizontale à 3 ° à 8 °, le tube intérieur (30) est enfermé concentriquement par un tube extérieur (32), et l'espace formé entre eux est relié à la soufflante pour l'air primaire (25), et l'espace entre les deux tubes (30) et (32) est en liaison avec l'espace intérieur, aussi, de la plaque creuse horizontale de combustion (26) à travers sa deuxième ouverture (27 '), le tube intérieur traverse le panneau de combustion (18), et dernière son extrémité arrière est raccordée un sillon vertical (33), qui, bien que d'un feu La pompe de la sécurité (34), est relié à la sortie du bunker biofuel- (35), et à travers le panneau de combustion (18) exécute un tuyau (38), qui est relié à son extrémité extérieure à un dispositif d'allumage (39), situé à l'extérieur du corps de la chaudière, tandis que son autre extrémité est située dans l'espace de la conduite interne (30), immédiatement sous l'ouverture centrale (27) de la creux plaque de combustion horizontal (26), un disque réfléchissant (42) est monté au-dessus de la ligne aérienne creux en forme d'anneau (40) et les ouvertures (41) du disque (40) sont disposés en rangées horizontales parallèles, et le diamètre de chaque ligne ascendante qui suit est plus grand que le diamètre de la précédente, et l'échangeur de chaleur est monté dans la chambre supérieure (1), à laquelle l'espace intérieur de la compagnie aérienne en forme d'anneau (40) est relié à un ventilateur pour l'air secondaire (23) à travers l'espace (19) de la plaque de combustion (18), et en dessous du couvercle (44), et à une certaine distance à partir de l'échangeur de chaleur, une plaque réfléchissante (45) avec des ouvertures formées (46) est placé, relié à une position fixe à la chambre supérieure (1) et l'échangeur de chaleur est constitué d'un certain nombre de colonnes et parallèlement les uns aux autres fumées tubes (47) figurant en dessous de chaque ouverture (46), et chaque tube de fumée (47) est positionné une tour ax rotation propre (48), et les tubes de fumée (47) sont reliés dans une position fixe à un miroir supérieur (51), qui est positionné à une certaine distance de la plaque réfléchissante (45), entre lesquelles est formé un espace (53) pour prélever les gaz de combustion, et les tubes de fumée (47) sont également connectés dans une position fixe sur le miroir inférieur (52), et la forme entre les deux miroirs (51) et (52) l'espace (54) pour le conducteur de chaleur est relié par un tube (55) à l'espace entre la partie extérieure (3) et l'intérieur (4) corps de la chambre inférieure (2), et un panneau de turbine à gaz (56) est positionné dans la partie arrière de la chambre supérieure (1), lequel panneau de turbine à gaz comporte une ouverture supérieure (57), qui est relié à un ventilateur de gaz de fumée et une ouverture inférieure (58), relié à l'espace (53) pour les gaz de combustion, qui est relié à un prélèvement de fumées, et le panneau de turbine à gaz (56) est équipé d'une sonde λ- (59), positionnée dans l'espace devant l'ouverture supérieure (57) et à l'extérieur de la partie supérieure du corps (1) des ouvertures de la chaudière, et au niveau des deux côtés du panneau de la turbine à gaz

(56) y sont formés commande (60), deux de chaque côté, désignés pour transmettre des signaux provenant d'un dispositif de ramassage pour la température du conducteur de chaleur dans l'espace (54), un transducteur de la pression du caloporteur dans l'espace (54), un dispositif de ramassage pour la température de la paroi extérieure de la chambre supérieure (1), un dispositif de ramassage pour préliminaires gaz chimiques de la l'espace du tube de fumée la plus proche (47), et chacun des capteurs énumérés est relié à un dispositif de télécommande (61), qui est en liaison avec la sonde λ- (59) et un détecteur (62) pour disponibilité de fumée, situé immédiatement par l'ouverture inférieure (58).

2. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** le fond de profil (6) est constitué d'un secteur horizontal central (7), dont les deux parois passer en oblique, passant secteurs (8) et (9), dont l'un (8) passe dans un deuxième secteur horizontal (10), et la longueur du secteur central horizontal (7) est égale à la distance entre les parois extérieures de la porte creux (17) et le panneau de combustion (18).

3. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** chacun des produits de nettoyage (48) est un profil en spirale enroulé en acier inoxydable, et la partie supérieure de l'aspirateur (48) dans l'espace au-dessus de la plaque réfléchissante (45) est relié dans une position fixe à une roue d'engrenage (50), et toutes les roues d'engrenage (50) sont reliés à un moteur par l'intermédiaire d'une transmission.

4. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** près du secteur horizontal (7) du fond (6) du corps intérieur (4) et dans le tube extérieur (32), se trouve un usées Dispositif (43), réalisé sous la forme d'une vis de nettoyage, et à travers la paroi creuse porte (17), coaxically de la vis (31), est installé un tube de guidage (31 '), le long de l'axe court de l'extrémité avant de la vis (31) qui sort de la partie inférieure du corps (2), qui atteint la poubelle (63) et (31 ') extrémité de tube-guide est une impasse, et avant elle, à de déchets-bin (63) côté, il ya une ouverture pour l'évacuation des déchets, et la vis (31) est sur paliers au niveau de ses deux extrémités, de manière correspondante, à l'impasse du tube-guide (31 ') et le panneau de combustion (18).

5. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** près du secteur horizontal (7) sur le fond (6) du corps intérieur (4) et dans le tube extérieur (32) est positionné à une cendre de nettoyage Dispositif (43), réalisé sous la forme d'un dispositif de succion sous vide, reliée à la poubelle de déchets (63).

6. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** le détecteur de fumée (62) est relié au dispositif pour l'allumage initial (39) par l'intermédiaire d'un dispositif de télécommande (61).

7. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** la plaque réfléchissante (45) est réalisé sous forme de plaque à trois couches, composée d'une base qui est disposée sous une couche résistant à la température et un réflecteur en inox feuille.

8. Chaudière de chauffage selon la revendication 3, **caractérisé par le fait que** (48) le profil de l'aspirateur a une section quadrangulaire, dont les bords de deux sont en contact étroit avec la surface intérieure du tube de fumée (47).

9. Chaudière de chauffage selon la revendication 1, **caractérisé par le fait que** le nombre d'ouvertures (29) sur la plaque de combustion horizontal creux (26) sont répartis uniformément dans concentrique à l'ouverture centrale (27) des cercles, et sont sous la la forme d'un tronc de cône avec sa petite base vers le bas

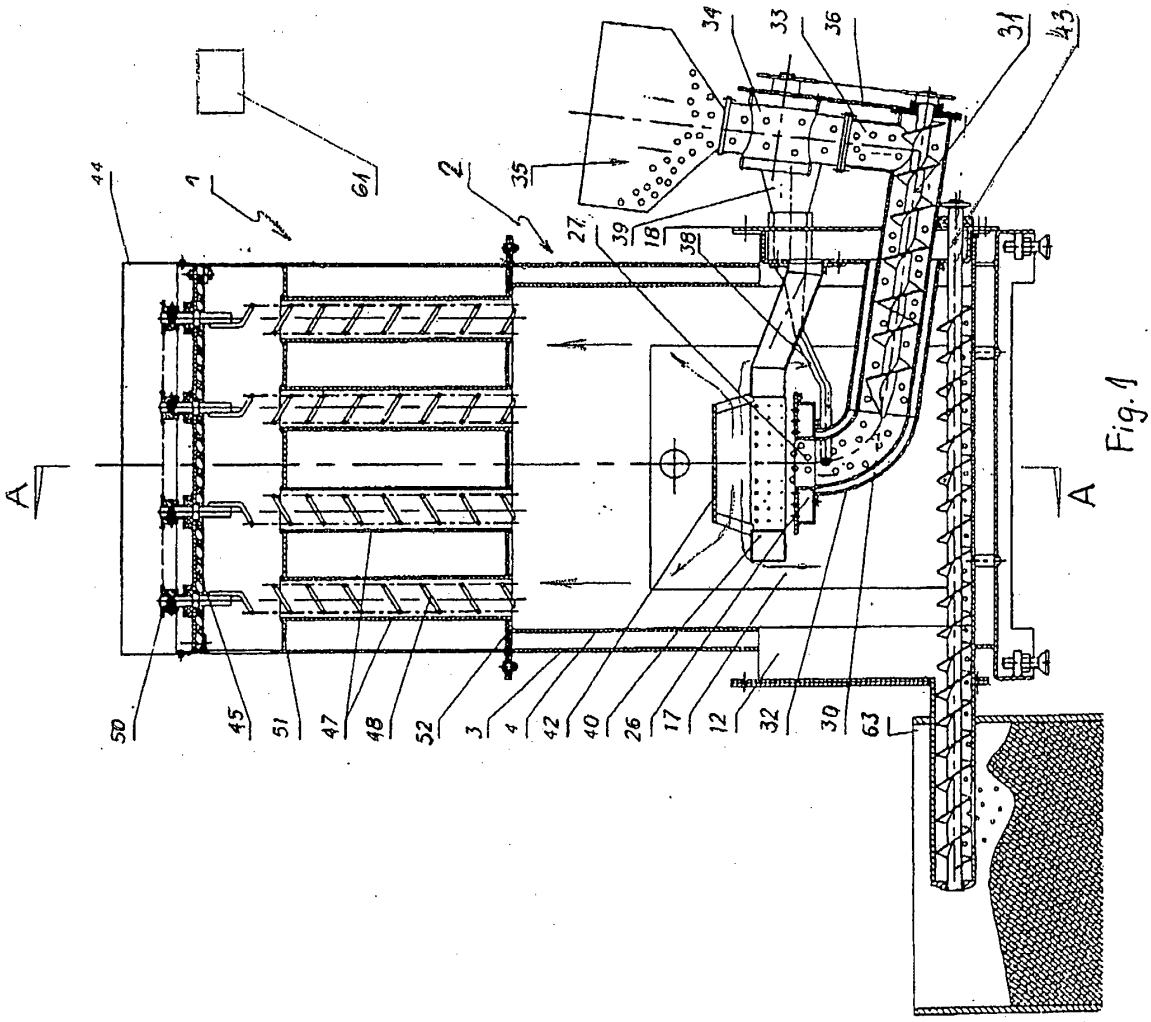
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Fig. 1

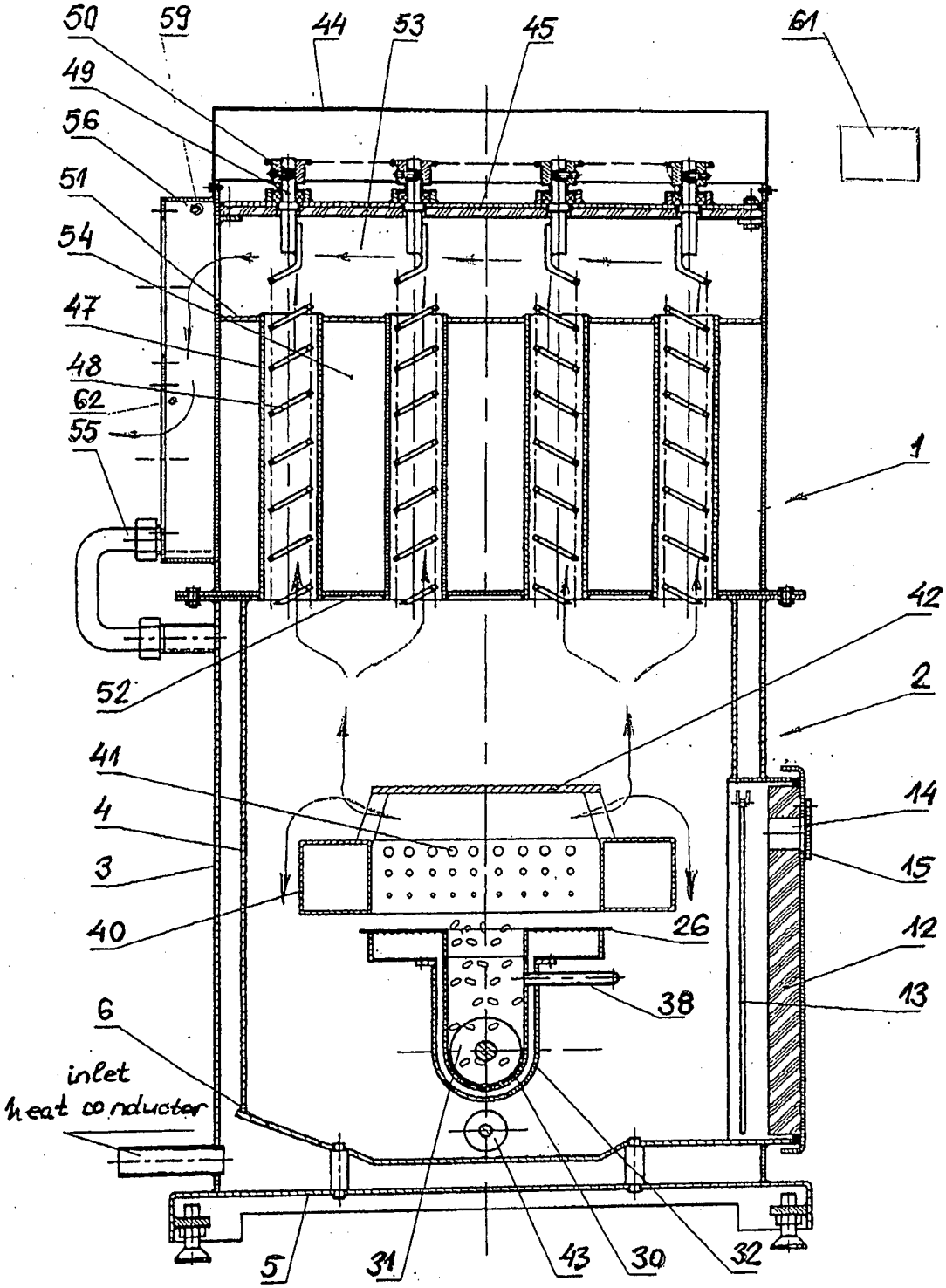
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Fig. 2

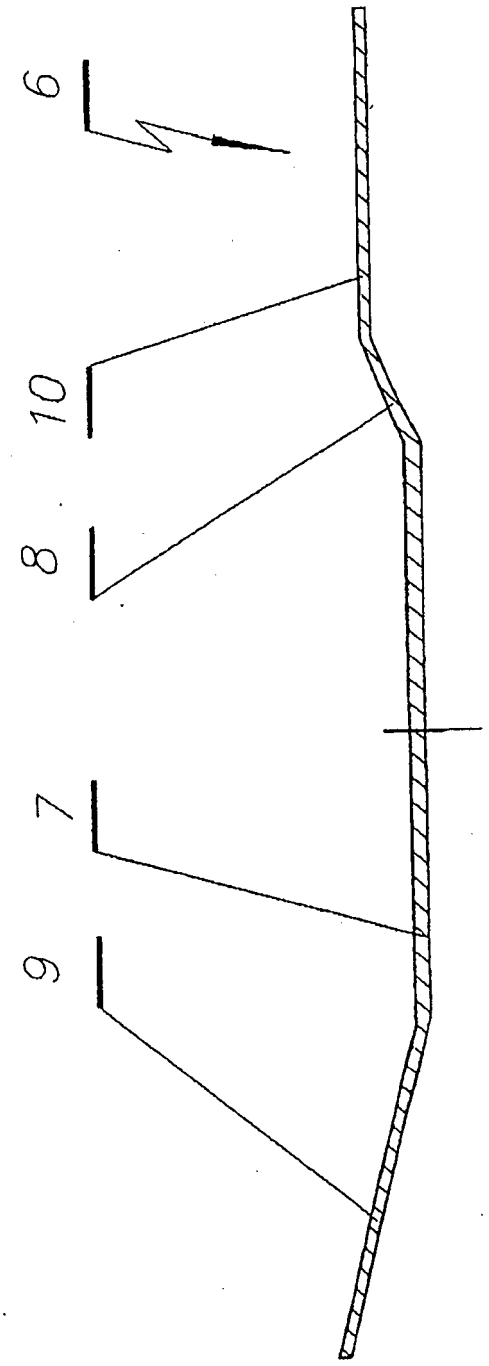


Fig.3

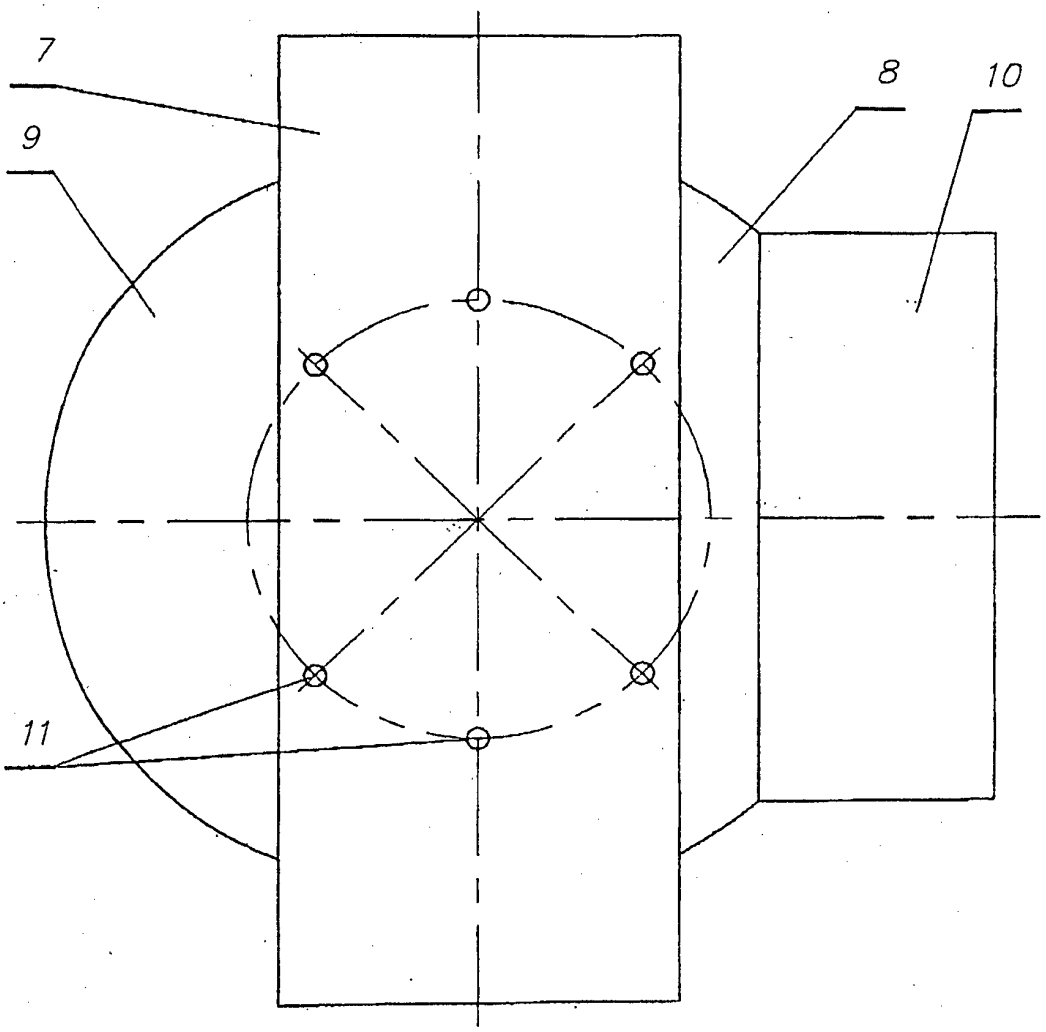


Fig. 4

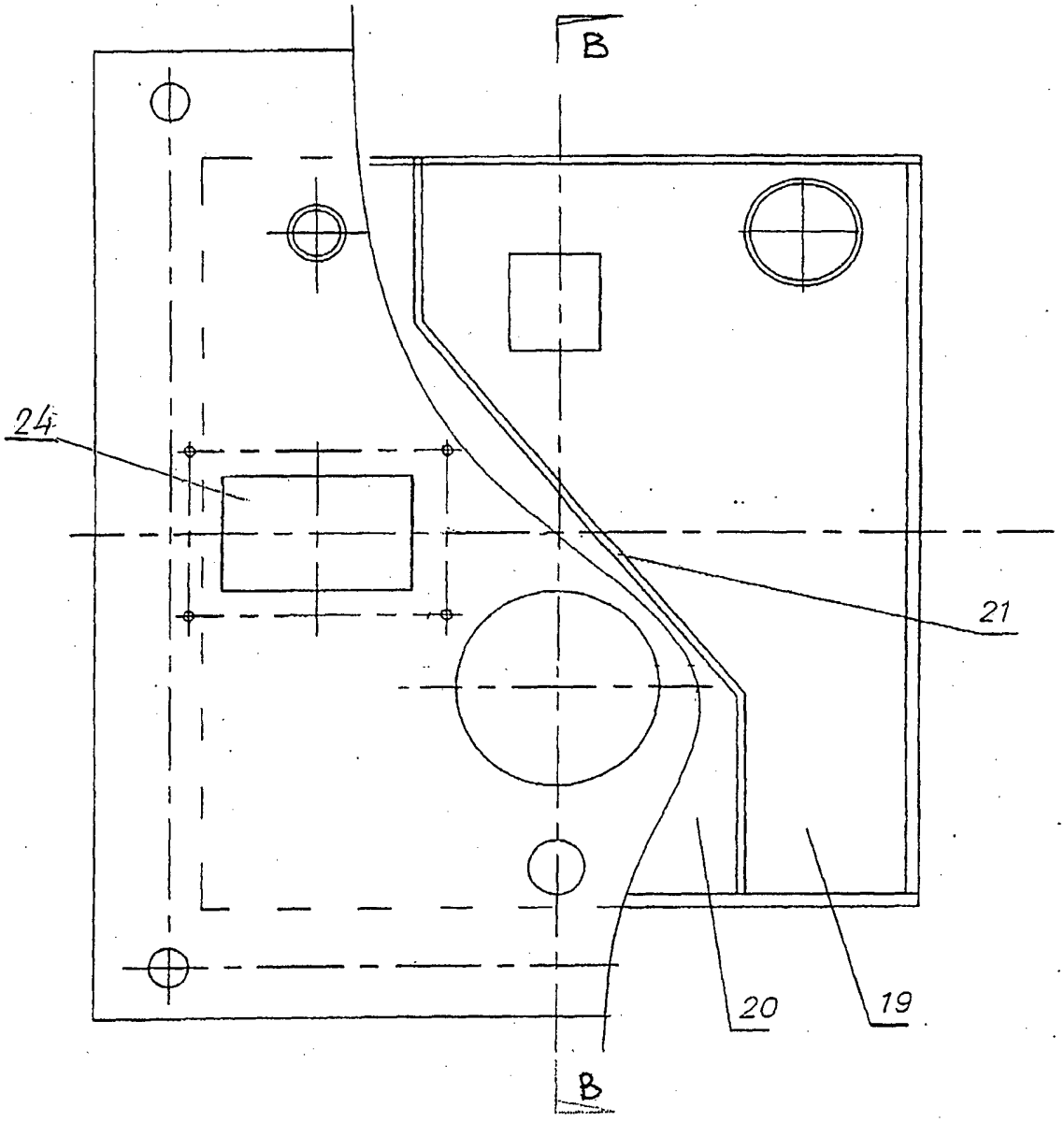


Fig. 5

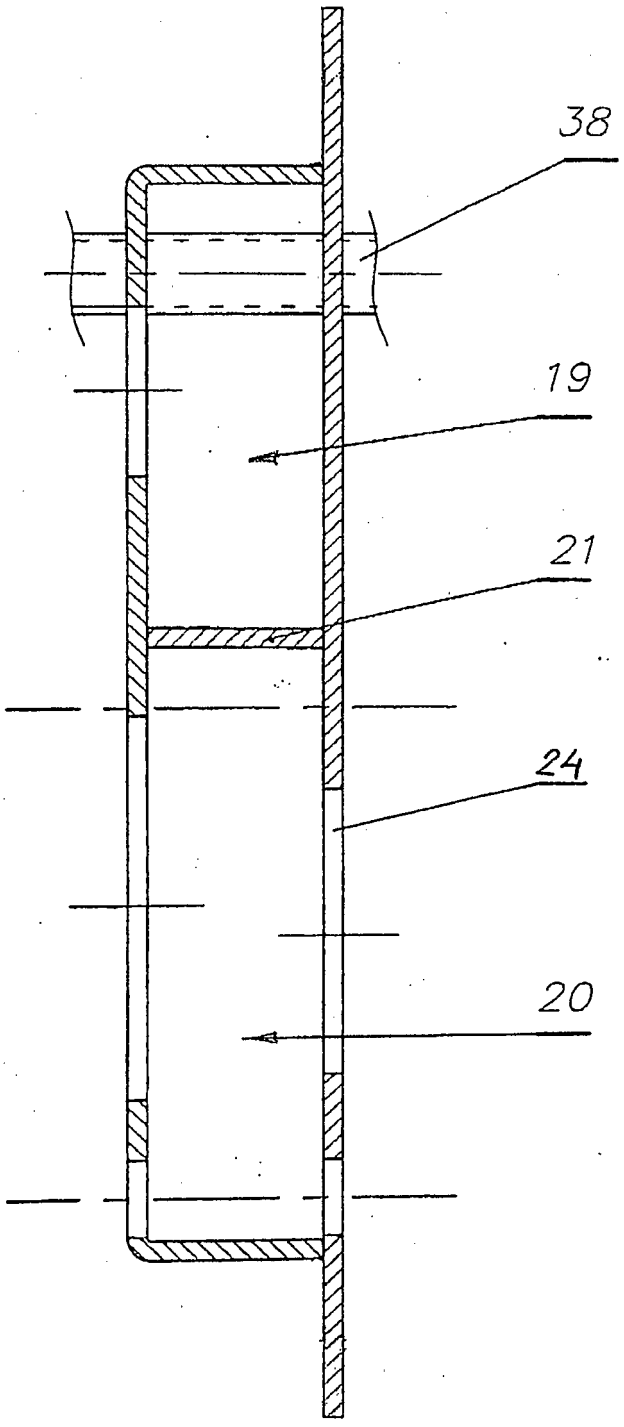
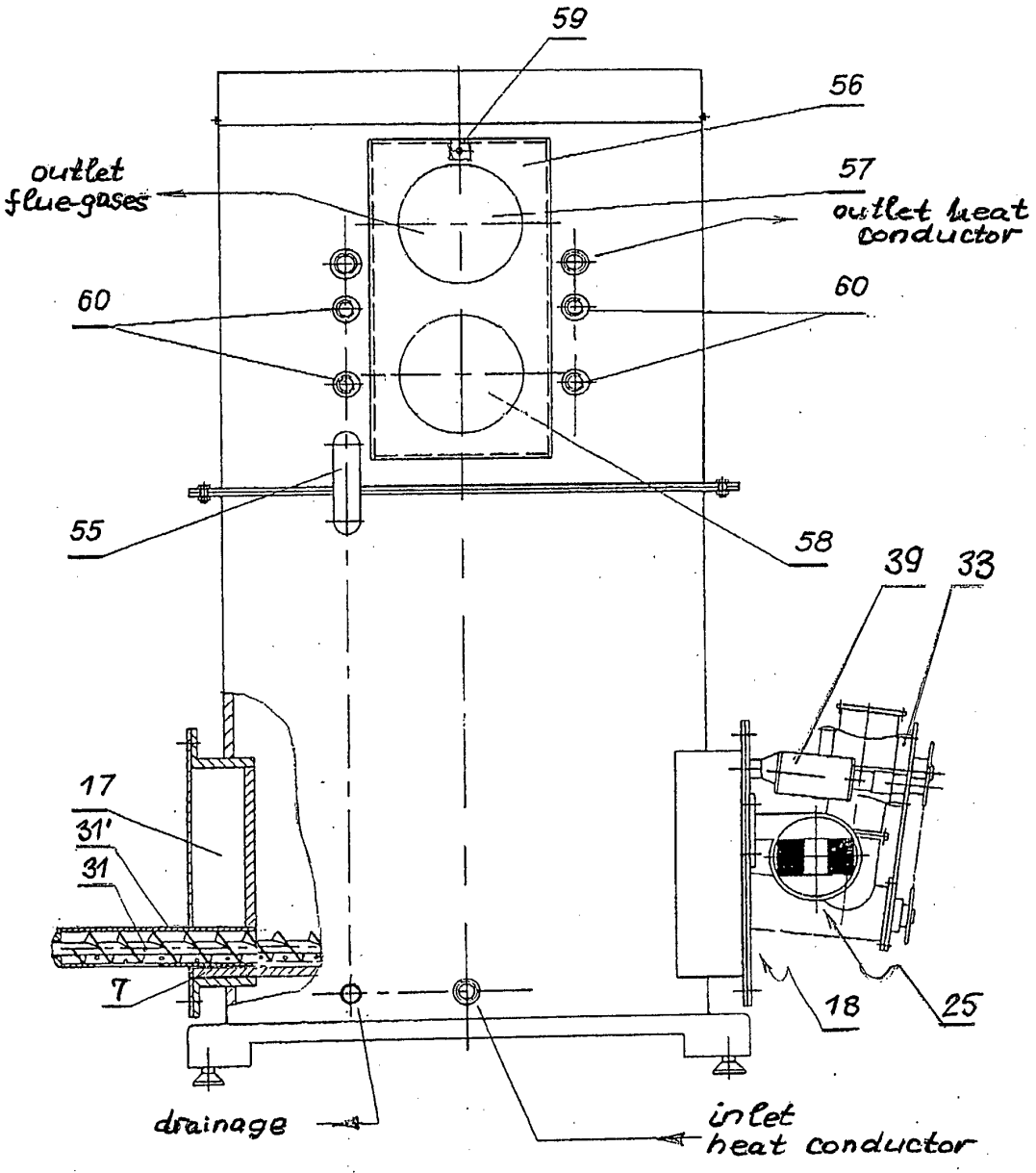


Fig. 6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outlet flue-gases
57
outlet heat conductor
60
60
55
58
39
33
17
31'
31
7
18
25
drainage
inlet heat conductor

Fig.7

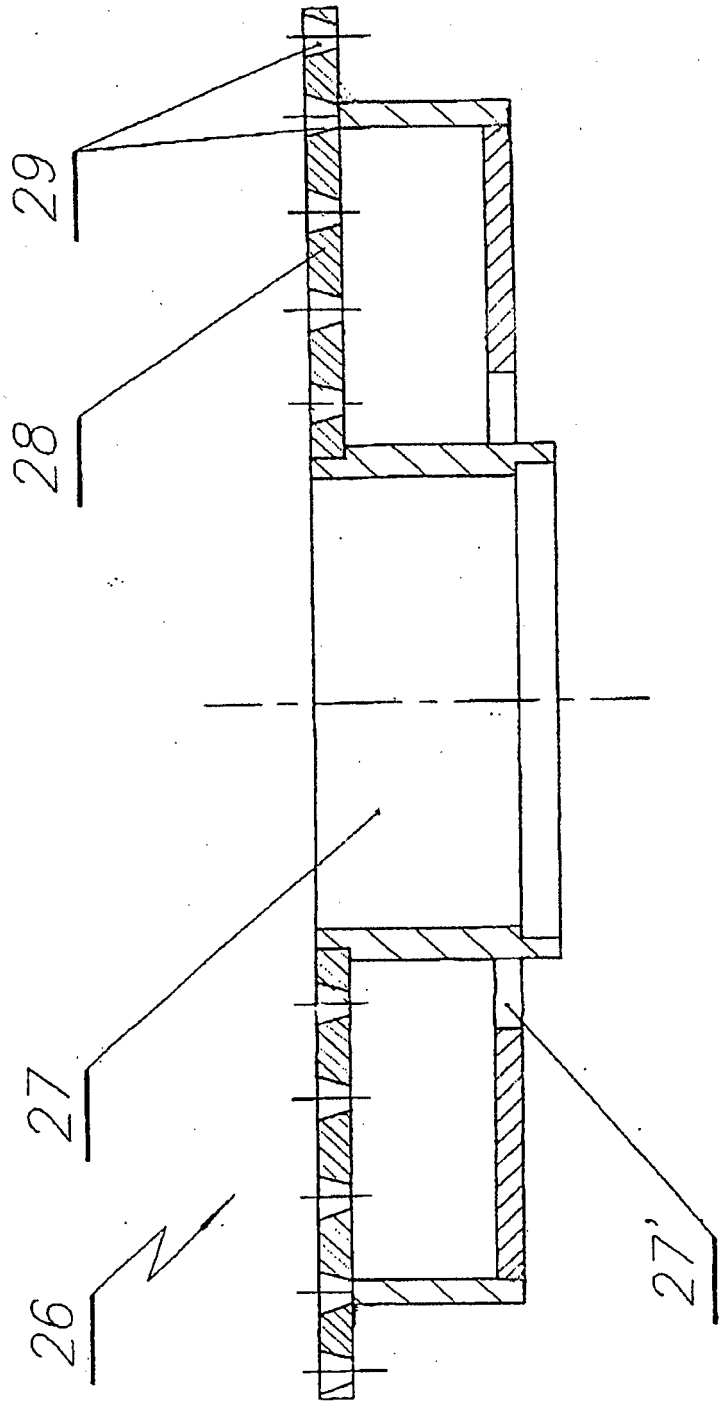


Fig. 8

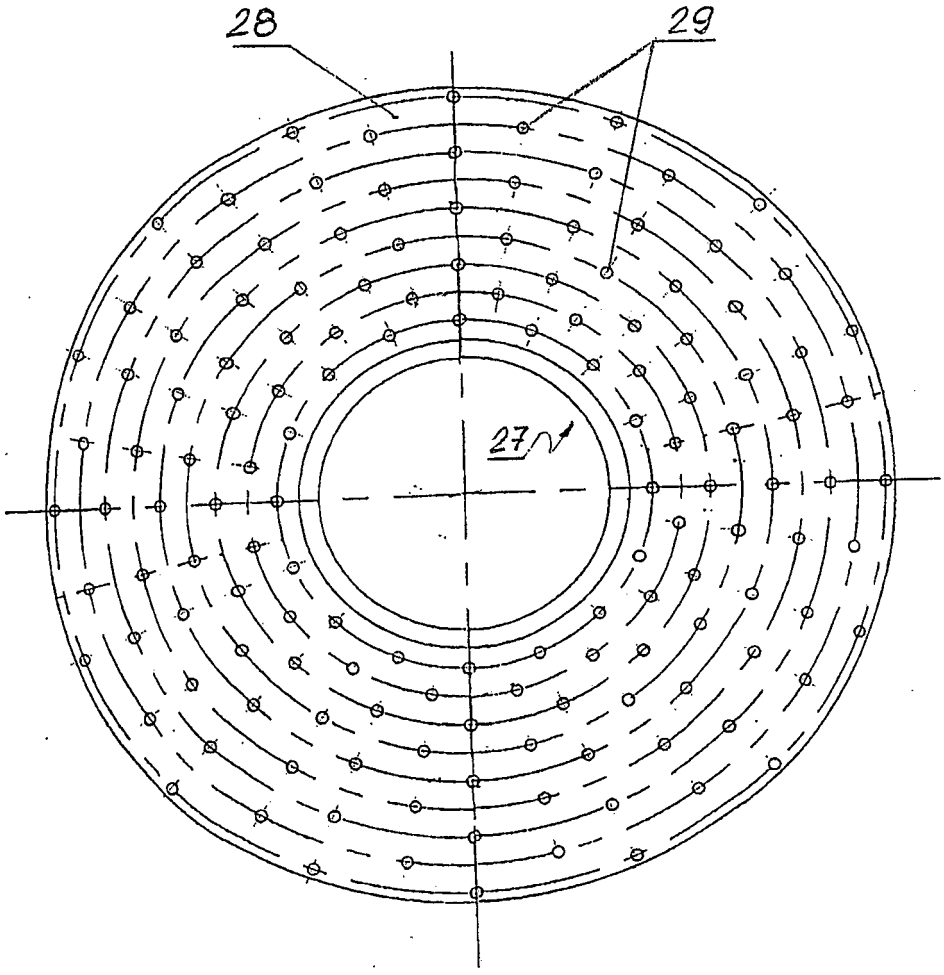


Fig. 9

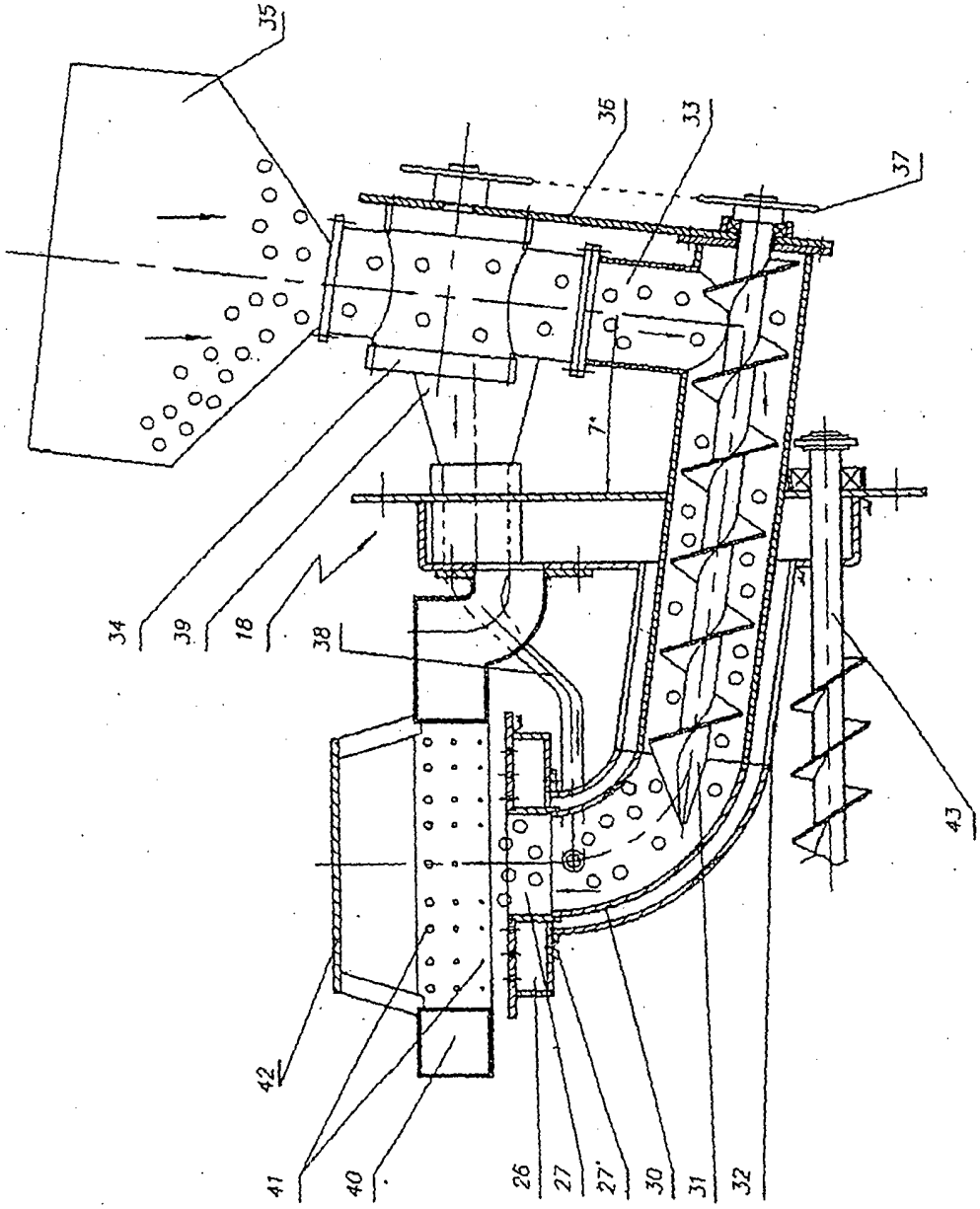


Fig. 10

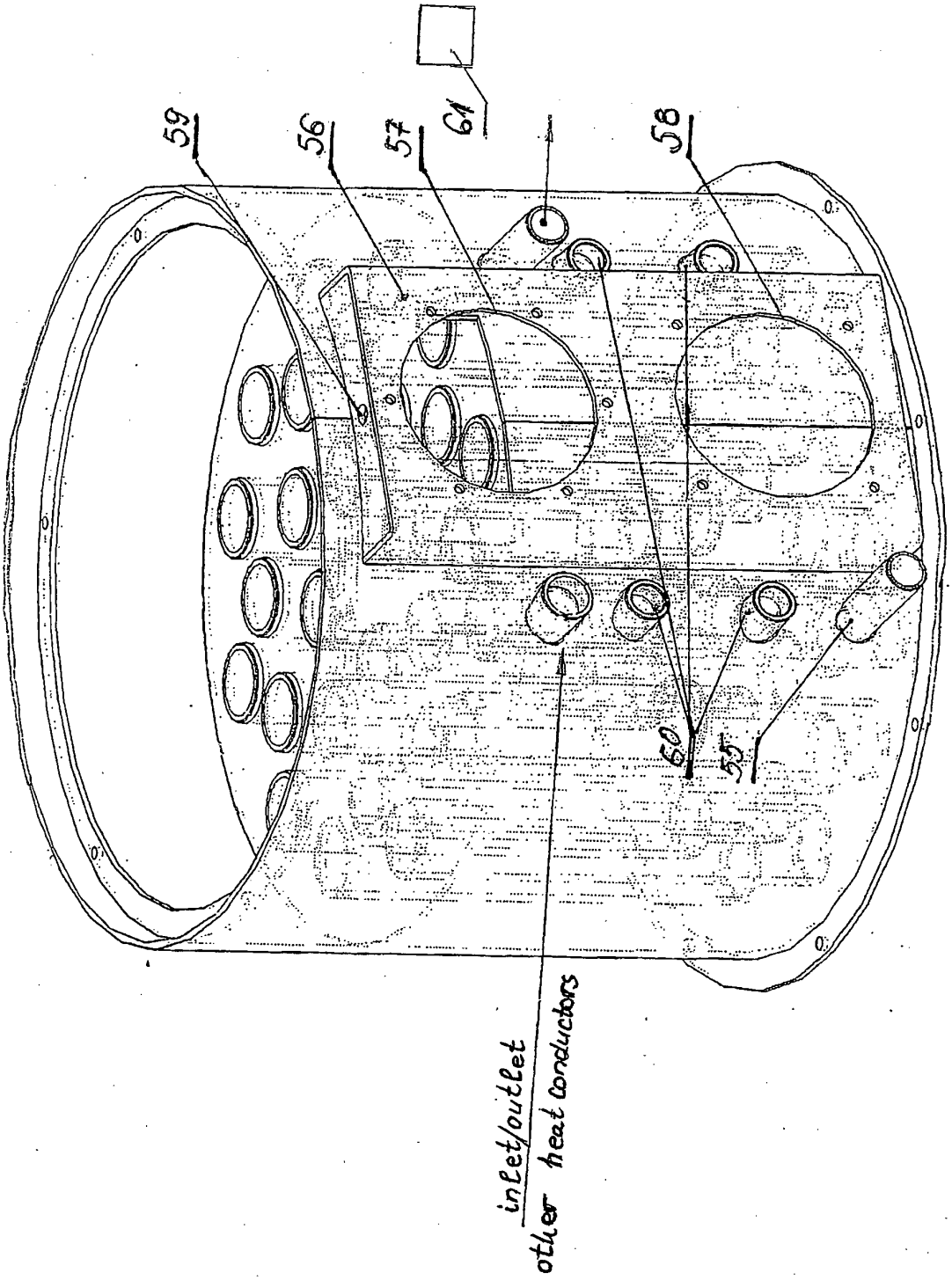


Fig. 11

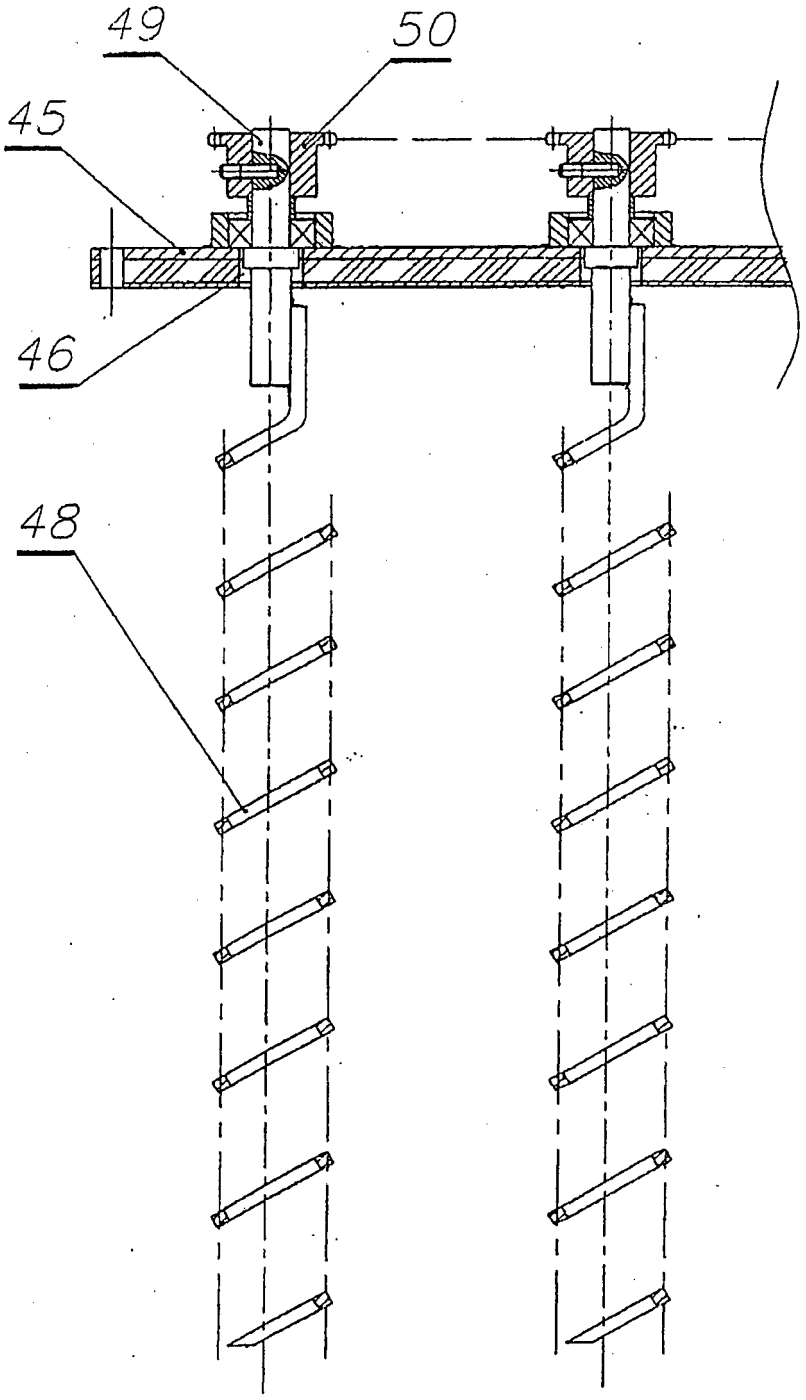


Fig. 12

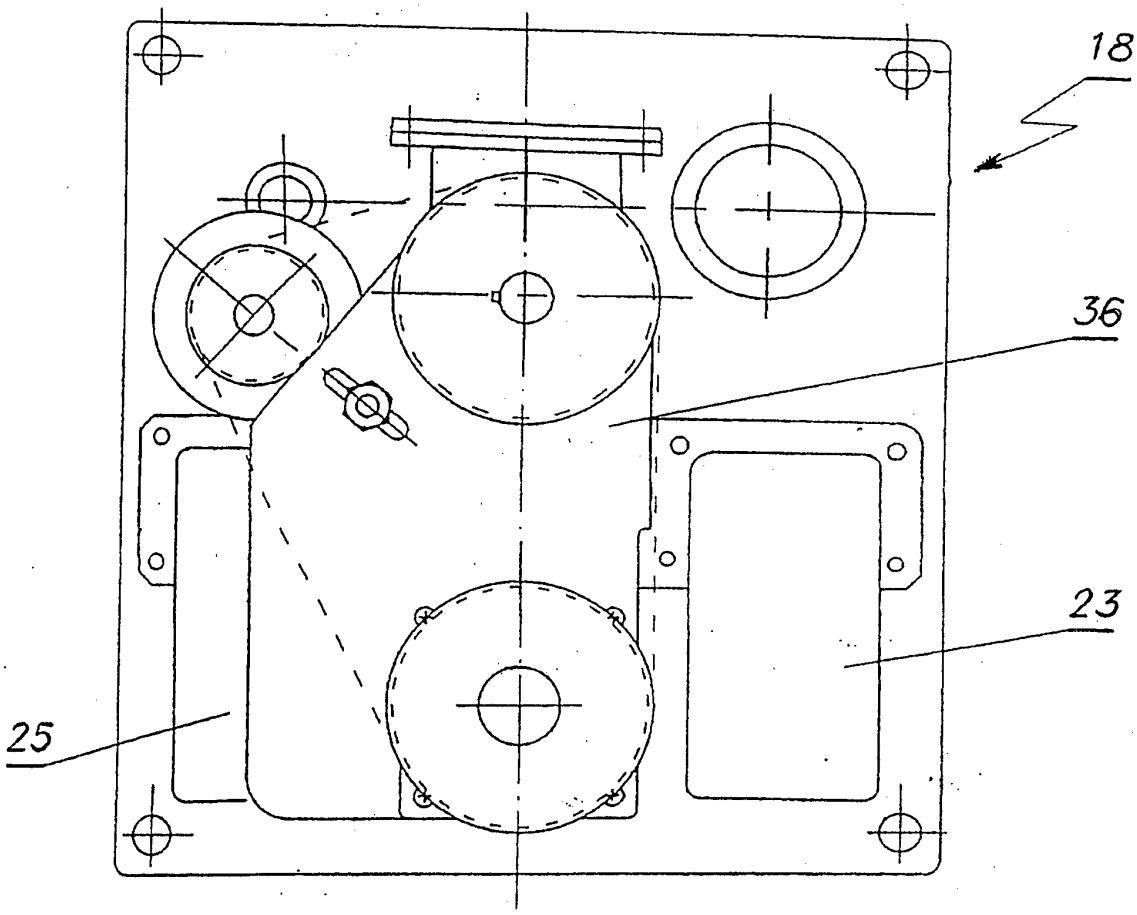
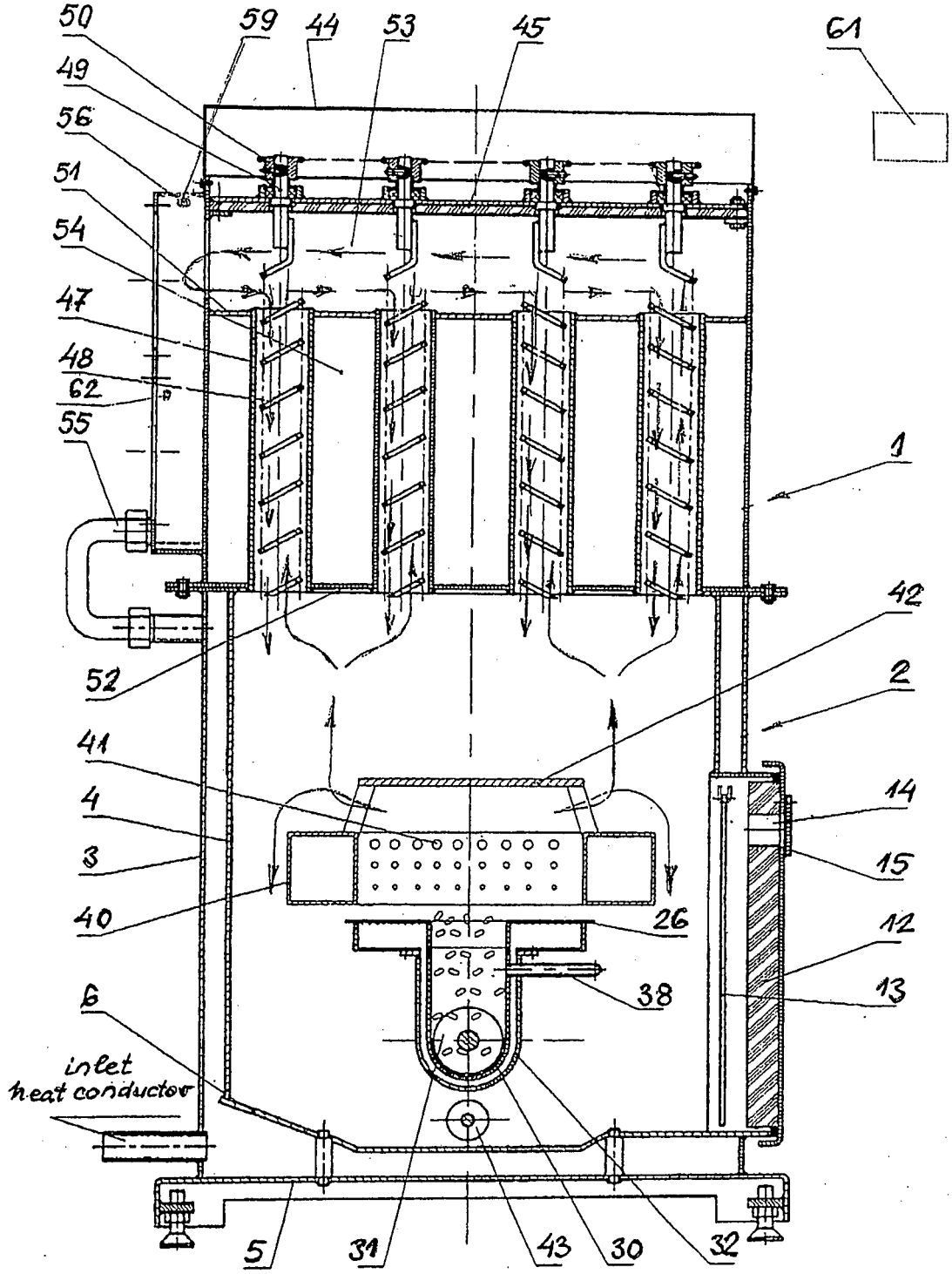


Fig. 13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1
42
52
2
41
4
3
40
14
15
26
12
38
13
6
inlet
heat conductor
5
31
43
30
32

Fig. 14

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- AT 402850 B **[0002]**
- WO 2006008762 A **[0002]**