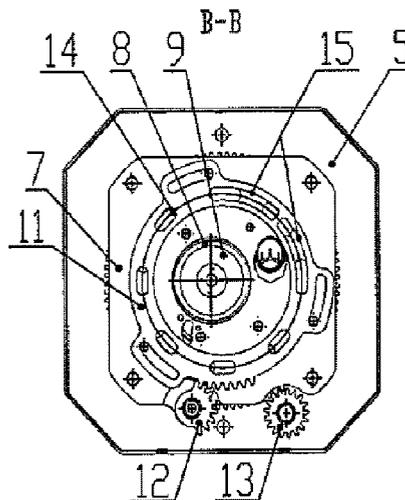




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(54) **Titre : BRULEUR DE CHAUDIERE A COMBUSTIBLE SOLIDE**
 (54) **Title: SOLID FUEL BOILER BURNER**



(57) **Abrégé/Abstract:**

The subject of the invention is a solid fuel boiler burner, used in central heating boilers for building structures and in other heat exchangers. A Solid fuel boiler burner has a rotary combustion chamber (1) mounted in the casing (2), which is equipped with aeration ducts (26) and (27) and this unit is connected by hooks (29) with a gear wheel (6) which is mounted rotationally between two cage bearings (18), the gear wheel (6) and the compensating and pressure plate (7) having openings (14) and (15) for the inflow of air from the blower chamber (24) through an adjustable screen (11) which controls the ratio of primary to secondary air injected into the ducts (26) and (27), moreover the worm fuel feeder (9) has an axially placed aeration duct (16), with outlet in the combustion chamber (1).

Abstract

The subject of the invention is a solid fuel boiler burner, used in central heating boilers for building structures and in other heat exchangers.

A Solid fuel boiler burner has a rotary combustion chamber (1) mounted in the casing (2), which is equipped with aeration ducts (26) and (27) and this unit is connected by hooks (29) with a gear wheel (6) which is mounted rotationally between two cage bearings (18), the gear wheel (6) and the compensating and pressure plate (7) having openings (14) and (15) for the inflow of air from the blower chamber (24) through an adjustable screen (11) which controls the ratio of primary to secondary air injected into the ducts (26) and (27), moreover the worm fuel feeder (9) has an axially placed aeration duct (16), with outlet in the combustion chamber (1).

SOLID FUEL BOILER BURNER

The subject of the invention is a solid fuel boiler burner, used in central heating boilers for building structures and in other heat exchangers.

In known solutions a rotary fuel transporter, located between the chute unit and the combustion chamber is monolithic. The air supplied by the chute duct is dampened by the mass of the fuel in the transport duct.

In other known solutions a grate of the bottom chute is formed by a ring-shaped or rectangular frame plate, placed above the combustion chamber outlet opening. The solid fuel is pushed and moves onto the grate and combusts. Combustion products in the form of ash are pushed off the grate area by the fresh fuel and fall into the ash pan chamber.

A burner presented in the Polish patent application P 394233 is known, characterised in that a rotary chamber with a diameter lower than the blower chamber has a fuel feeder inlet, advantageously above the rotary chamber, and an open outlet in the ash pan chamber zone, moreover in its cylinder surface it has openings, covered from the inside of the drum with shielding elements, attached to the internal surface of the drum from the side the fuel moves in, creating above the openings a chamber with a gap placed on the side of the shielding element opposite to the fuel movement direction.

This burner requires periodical inspection, and in special cases during a failure, replacement of the unit. This burner has a permanently attached

closing plate, to which elements of the fittings are mounted. Access to the elements of the fittings is possible after the closing plate is dismantled.

Air flow drag, related also to the size of fuel pellets, significantly decreases the amount of fuel delivered to the combustion zone, and requires the use of higher powered supply fans, which may reduce the efficiency of the combustion process.

The presented solution eliminates the aforementioned inconveniences.

The essence of the invention, which is a solid fuel boiler burner, with a combustion chamber with aeration openings, driven by an electric motor through a transmission gear, and a fuel feeder with an electric motor driving the feeder worm, and fuel chute elements with an outlet in the initial zone of the rotary worm feeder which supplies the fuel to the combustion chamber, as well as blower elements which supply air to the zone below and/or above the layer of burning fuel, characterised in that the worm fuel feeder has an axially placed aeration duct, with an inlet composed of openings located in the zone of the blower chamber, and an outlet in the combustion area, whereas the rotary combustion chamber is mounted on a gearwheel mounted between two cage bearings seated between the main plate and the pressure plate, moreover between the combustion chamber and the chamber casing aeration ducts are placed, connected by openings in the gearwheel with the blower chamber, having openings with a screen.

It is advantageous when the aeration duct has an injector ending with openings in the outlet zone.

It is also advantageous when the gearwheel is connected with the combustion chamber (by catches), whereas and with the casing by hook catches.

It is also advantageous when the air inflow openings have a screen to adjust the amount of secondary air.

It is also advantageous when the aeration openings on the surface of the combustion chamber are placed along a helix.

Moreover it is advantageous when the fuel duct at the edge of the fuel chute is provided with slotted openings with a screen.

Additionally it is advantageous when the aeration ducts are formed by lengthwise plates - ribs, which are placed between the internal surface of the casing and the external surface of the combustion chamber..

The use of the solution presented in the invention enables the following technical and utility effects:

- the possibility of feeding the air from the blower chamber to the combustion zone as two streams, primary stream passing through the combustion bed and secondary air for aftercombustion of the flame above the bed.
- the possibility of ejector aspiration of flue gases for aftercombustion,
- increase of combustion efficiency,
- combustion products meet all the flue gas cleanliness standards,

- possibility of using for burners supplying combustion chambers with various design,
- maintenance-free during normal operation of the burner,
- self-cleaning of the aeration ducts within the casing unit,
- easy and rapid access to all burner elements,
- significant shortening of burner downtime required for maintenance and overhaul works,
- the possibility of adjusting the ejector aspiration of flue gas and adjusting the amount of air forced through the fuel feeder aeration duct,
- the possibility of burning fuels with significant ash content,
- low construction costs and convenient operation.

The subject of the invention, in an example, but not limiting, implementation was presented in diagrams on a figure, showing on fig. 1 the whole cross-section along the burner, on fig. 2 the burner in a top view, on fig. 3 view of the combustion chamber drive unit and the combustion chamber in the B-B cross-section from fig. 2, on fig. 4 the C-C cross-section from fig. 1, on fig. 5 the "D" detail from fig. 1 demonstrating the bearings, on fig. 6 the combustion chamber with disassembled casing, on fig. 7 the combustion chamber connected to the gearwheel, on fig. 8 one of the versions of connection of the gearwheel to the combustion chamber, on fig. 9 a cross-section of the fuel supply duct with the fuel transport and aeration mechanism, and on fig. 10 disassembled casing of the drive unit.

The burner has a rotary combustion chamber 1 which is placed on a casing pipe 2 with a ring 3 closing the front of the burner and with ribs 4, and as a unit is connected to a gearwheel 6, which is powered by a gearwheel of the transmission gear 13 with electric motor not shown on

the figure. The rotary movement of the combustion chamber 1 is thus ensured.

Moreover the chamber from the drive side is closed by a permanent wall - compensating and pressure plate 7, in which an opening is located, to which pellet fuel feeder duct 8 and an ignition heater hot air injection duct are connected.

The fuel in pellet form is fed into the combustion chamber 1 through the fuel feeder duct 8 using a worm feeder 9.

The burner is equipped with a blower chamber 24 closed by a main plate 5, bulkhead plate 37 and casing plate 38, into which air is forced from the fan 17.

In the blower chamber 24 a fuel feeder duct and an ignition heater, as well as a unit for dividing the air into primary air and secondary air are located, not shown on the figure.

The combustion chamber 1 is fed with fuel through the fuel feeder duct 8, which may be equipped with a secondary air aeration openings, whereas the secondary air is fed by the aeration duct 16 inside the worm feeder 9, which may be equipped with an ending with injector tip with openings 35 to ensure aftercombustion of some flue gases.

Openings 36 in the fuel feeder duct 8 wall, covered by screen 39 are used to create a stream which prevents gases from flowing towards the fuel inlet. Aeration openings 10 deliver air to the combustion chamber 1, and the openings 32 which supply air to chamber 1 may be covered by the screen 23 in order to adjust the air stream volume.

The chamber's support by the gearwheel 6 is provided with two ball bearings 18 placed on one side on the burner permanent main plate 5, and on the other side on a permanent compensating and pressure plate 7 with spring-adjustable pressure.

The rotary combustion chamber 1 which is placed on a casing pipe 2 with a ring 3 closing the front of the burner and with ribs 4 forms a unit connected to a gearwheel 6, which is powered by a gearwheel 13 of the transmission gear with electric motor not shown on the figure, and thus the rotary movement of the combustion chamber is ensured. The gearwheel 6 is connected to the combustion chamber 1 and casing 2 unit with hook catches 29.

Air from the ducts 26 and 27 is fed through openings 10 in the combustion chamber 1. Separation of the air volume into individual ducts is performed by a system of openings in the gearwheel 17 and the compensating and pressure plate 7 and appropriate openings 14 and 15 covered by the screen 11 using rotation of the gearwheel 12.

Fuel feeder duct 8 may be equipped with a secondary air aeration openings 32, 33 and 36. Whereas the secondary air is fed by an aerating duct 16 inside the worm feeder 9, which may be equipped with an ending with injector openings 35 to ensure aftercombustion of some flue gases. Whereas the openings 36 in the fuel feeder duct 8 wall are used to create a stream which prevents gases from flowing towards the fuel inlet. Whereas the aeration openings 32 and 36 may be covered by the screen 23 and 39 in order to adjust the air stream volume.

The burner is equipped with a blower chamber 24 closed by the main plate 5, bulkhead plate 37 and casing plate 38, into which air is forced from the fan 17.

In the blower chamber 24 a fuel feeder duct 8 and an ignition heater, as well as a unit for dividing the air into primary air and secondary air are located.

Primary air is understood to be air fed under the combusted bed and passes through the bed, whereas secondary air is the air fed over the bed into the flame zone, used for aftercombustion of the volatile parts.

The primary air ducts 26 and the secondary air ducts 27 are used to supply air to the bed 25. The ducts change their function due to rotation, acting as primary air ducts when under the bed and as secondary air ducts when moving above the bed as a result of rotation.

The combustion chamber 1 rotates during operation along with its casing 2, and this unit is placed on the gearwheel 6 placed on two cage bearings 18 placed axially in relation to the combustion chamber axis 1.

The combustion chamber 1 with its casing 2 has a structure which enables its rapid assembly and disassembly using catch hooks 29 and may be locked with a locking element 20 according to fig. 6 and may also have a version according to fig. 8.

The combustion chamber 1 also has a protective element 30 fig. 6 which protects the combustion chamber against sliding out and which enables the transmission of its rotation together with the casing 2 using the rib 28.

The fuel feeder duct 8 in the fuel discharging section to the combustion chamber 1 is equipped with aeration openings 36 which ensure swirling on the circumference of the fuel feeder duct's 8 cylinder generator line. The slotted openings may be equipped with versions acc. to fig. 9 in the form oblique, parallel or perpendicular to the cylinder generator line.

The aeration openings 36 and 32 acc. to fig. 9 may be covered by screens, respectively 39 and 23 by sliding them along the fuel feed duct 8 axis or by their rotation on the cylinder part of this duct.

The fuel worm feeder 9 may have in its axis an aerating duct 16 with an afterburner ending with holes 35. The worm elements may be constructed of metal or ceramics.

The fuel feeder worm 9 may have in its axis an aerating duct 16 with an afterburner ending with a bell ending version (open).

Adjustment of the amount of secondary air to primary air is performed through throttling the flow of air with openings 14 and 15 fed into the secondary air ducts by decreasing or increasing the inner diameter of the openings using the diaphragm 11 moved by the gearwheel 12.

The main plate 5 and the bulkhead plate 37 of the blower chamber 24 are equipped with slotted openings 40 — acc. to fig. 10 on the line connecting them to casing plate 38, which is equipped with splines 41 which enter the plates and fix the position of these elements.

Rotary combustion chamber 1 may be also made of heat-resistant steel or of ceramics.

The combustion chamber 1 rotates during operation along with its casing 2, and this unit is mounted on gearwheel 6.

Claims

1. Solid fuel boiler burner, with a combustion chamber with aeration openings, driven by an electric motor through a transmission gear, and a fuel feeder with an electric motor driving a feeder worm and fuel chute elements with an outlet in the initial zone of the rotary worm feeder which supplies the fuel to the combustion chamber, as well as blower elements which supply air to a zone below and/or above the layer of burning fuel, wherein a rotary combustion chamber mounted in a casing is equipped with aeration ducts and this unit is connected by hook catches with a gearwheel which is mounted rotationally between two cage bearings, the gearwheel and a compensating and pressure plate having openings for the inflow of air from a blower chamber through an adjustable screen which controls the ratio of primary to secondary air injected into the ducts, and wherein the worm fuel feeder has an axially placed aeration duct with an outlet comprising openings in the combustion chamber.
2. Burner in accordance with claim 1, wherein the fuel feeder aeration duct has in its outlet zone an injector ending with injector ending openings.
3. Burner in accordance with claim 1, wherein the gearwheel is connected with the combustion chamber and the casing by the hook catches.

4. Burner in accordance with claim 1, wherein the adjustable screen is configured to adjust the amount of secondary air injected into the ducts relative to primary air.
5. Burner in accordance with claim 1, wherein aeration openings on the surface of the combustion chamber are placed along a spiral line.
6. Burner in accordance with claim 1, wherein fuel feeding duct at the edge of the fuel chute is equipped with slotted openings which may be covered by the screen.
7. Burner in accordance with claim 1, wherein the aeration ducts are formed by longitudinal plates - ribs , which are placed between the internal surface of the casing and the external surface of the combustion chamber.

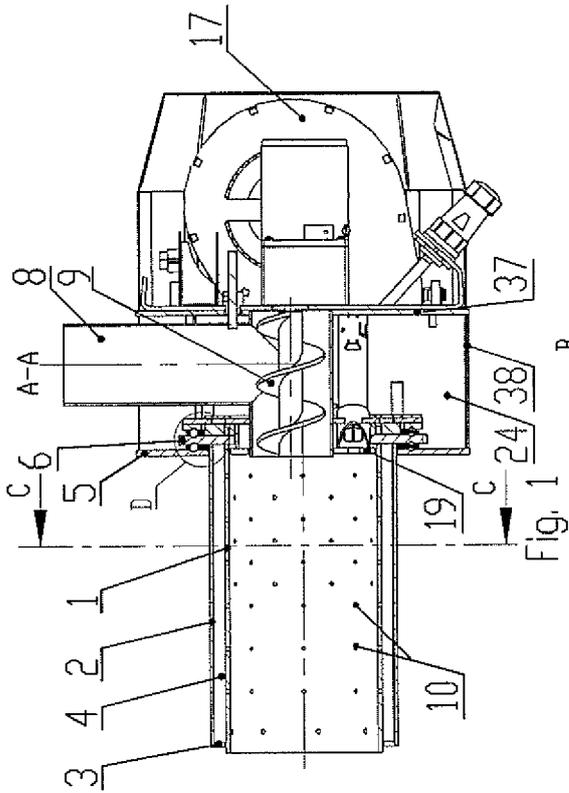


Fig. 1

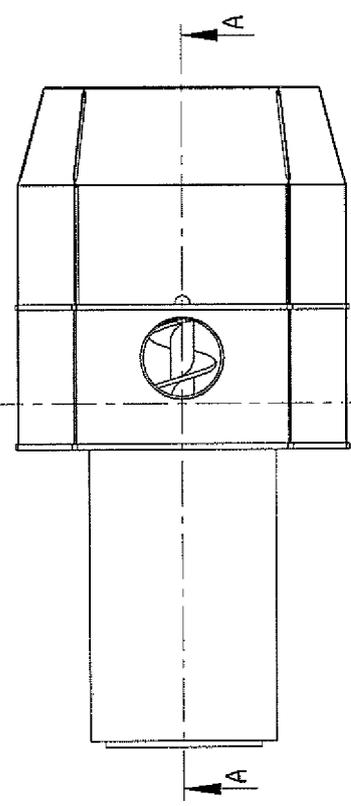


Fig. 2

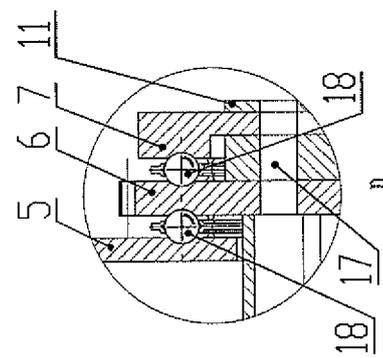


Fig. 5

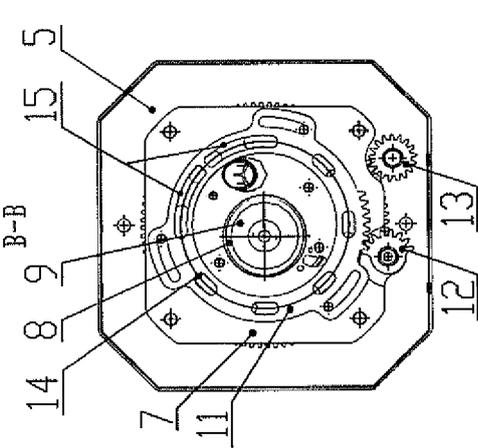


Fig. 3

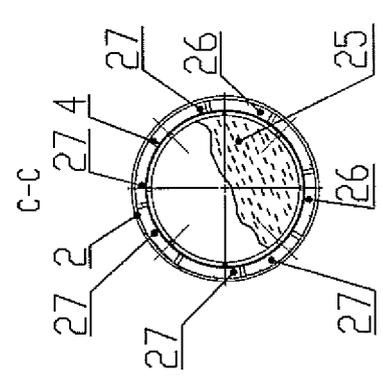
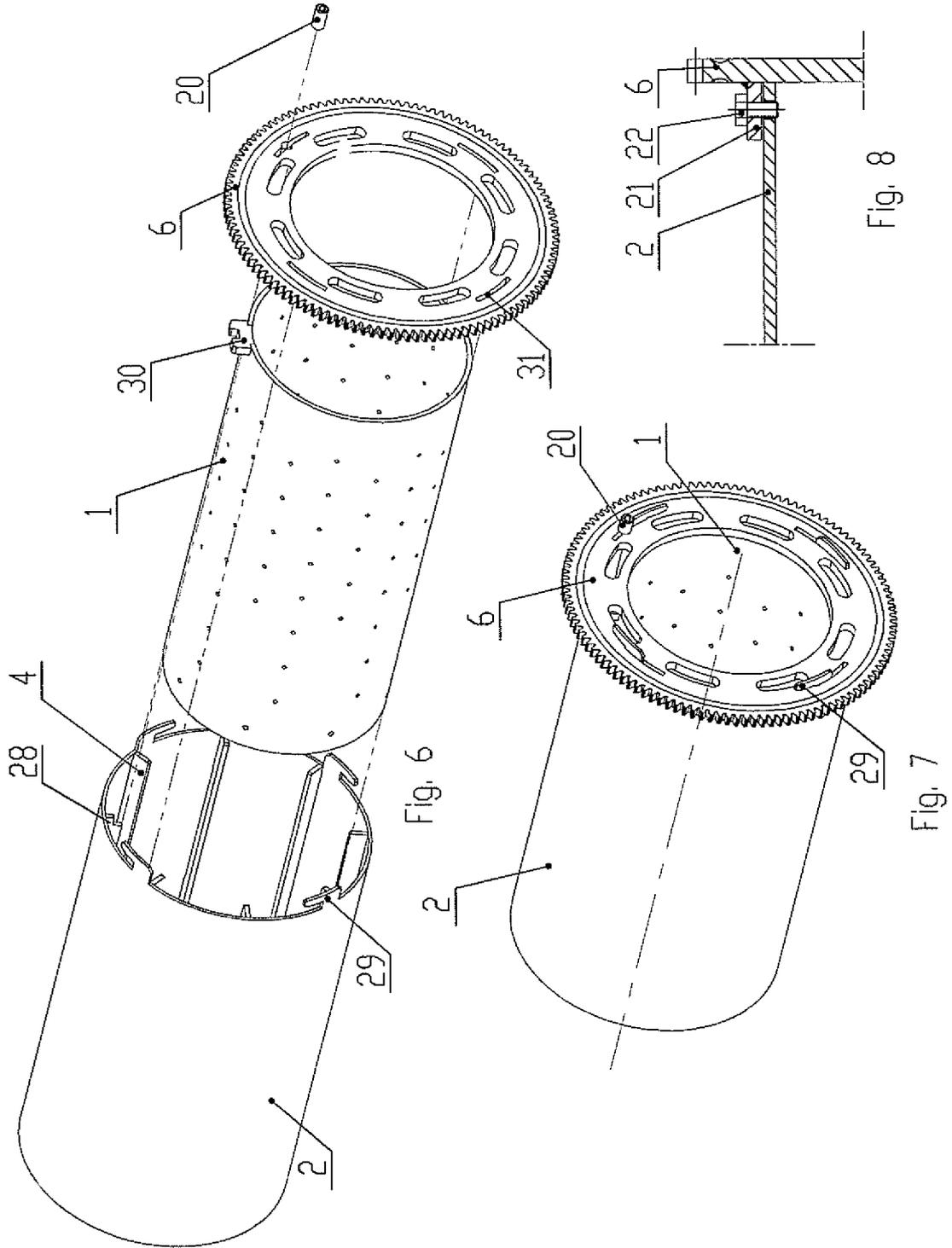


Fig. 4



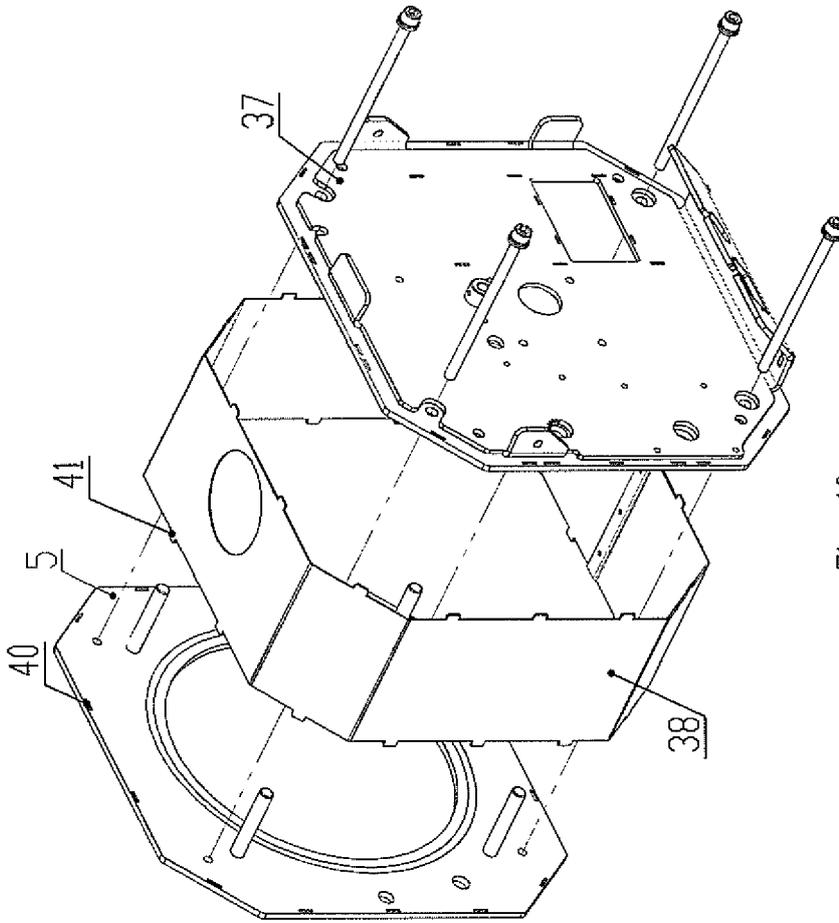


Fig. 10

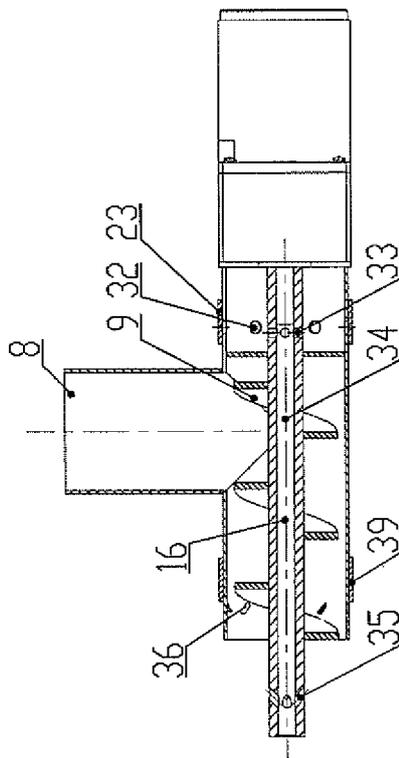


Fig. 9

