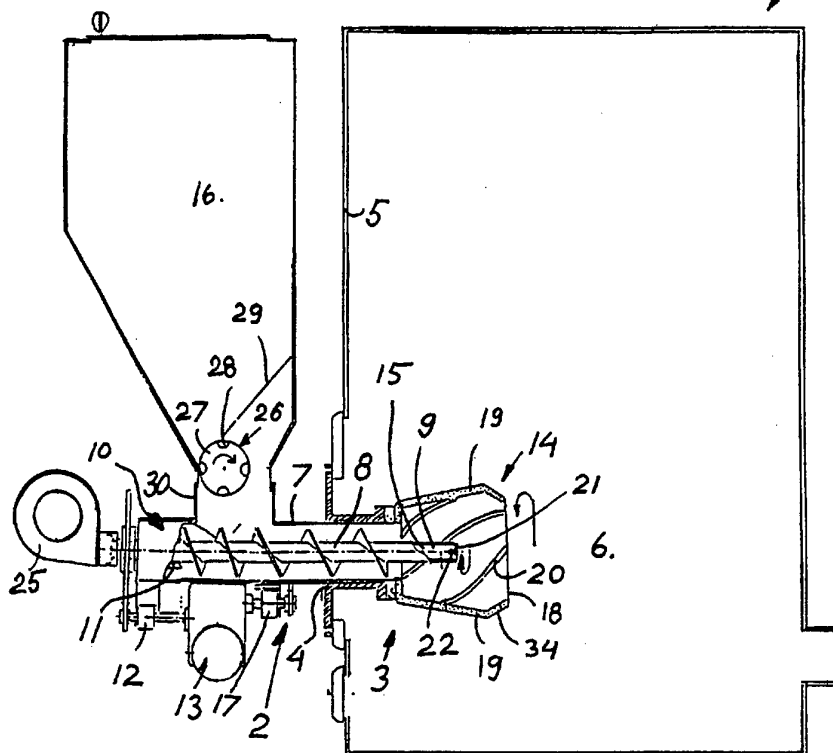


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(54) Title: SOLID FUEL BURNER**(57) Abstract**

The invention relates to a solid fuel burner (2), mountable on a boiler furnace (1), the forward portion (3) of the burner being insertable through an opening (4) in the casing (5) of the furnace (1) such as to extend into the combustion zone (6) thereof. The burner (2) includes a tubular main body (7) accommodating a feed screw (8) for the solid fuel, the free end (9) of the screw terminating in the forward portion (3) of the burner (2), the other closed end (10) of the burner being rotatably mounted in a bearing (11); a drive means (12) for rotating the feed screw (8) inside the main body (7); an ignition chamber (14) disposed at the forward end portion (3), one open end of the ignition chamber meeting up with the main body (7) and the feed screw (8) terminating within the chamber; an air supply duct (15) with its delivery end in the chamber (14) for supplying combustion air to the fuel, and an inlet (30) in the main body (7) giving access to the screw and thus permitting the supply of fuel from a solid fuel container (16) to the feed screw (8).



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Solid Fuel Burner

5 The present invention relates to a burner for solid fuel,
e.g. in the form of pellets, and is intended for mounting on
a boiler furnace, the forward portion of the burner being
insertable through an opening in the furnace casing such as
to extend into the combustion zone of the furnace.

10

During recent years the use of different alternatives to oil
firing has become more and more usual, especially for heat-
ing dwellings. In such cases, wood chips or other solid fuel
have come into use, a suitable arrangement being adopted to
15 feed the fuel to the combustion zone in the furnace. In
order to avoid a costly and laborious installation, new
types of burner have been developed for these alternative
fuels, and these burners can complement an existing oil
burner, or be mounted on the furnace in its stead.

20

A problem with the new varieties of burners is obtaining a
regulated, continuous and disturbance-free feed of the solid
fuel to the combustion zone of the furnace, without unneces-
sary breakdown in operation, as well as complete combustion
25 of the fuel.

The object of the present invention is to achieve a burner
of the kind mentioned above, where the mentioned problems
have been eliminated, while at the same time it is simple in
30 construction and cheap to produce. The distinguishing fea-
tures of the invention are disclosed in the accompanying
claims.

Due to the inventive burner there is now obtained very
35 reliable, disturbance-free and continuous feeding of the
solid fuel towards the combustion zone in the furnace. Since
there is a very effective mixture of primary combustion air
and fuel, the air being blown towards the combustion zone,
and since this is in combination with slow rotation of the

burner ignition chamber, very effective combustion is obtained for the furnace. Secondary air is fed to the forward part of the ignition chamber, and in this way the temperature inside the chamber can be controlled by balancing the primary air with the secondary air, while rotation of the chamber prevents ash from collecting in it. So as to further eliminate any build-up of ash in the chamber, it may be provided with a plurality of helically formed ridges or fins extending towards its opening. The use of a separate feed means that freely deposits the fuel at the inlet of a feed screw included in the burner ensures that back-firing is prevented, which could occur should there be operational stoppages or disturbances.

15

The invention will now be described in more detail, with the aid of some embodiment examples, and with reference to the accompanying drawings, where:

20 Fig. 1 is a schematic cross-section in elevation of a solid fuel burner in accordance with the invention, where it is mounted on a boiler furnace.

Fig. 2 illustrates an alternative embodiment example of the forward part of the feed screw implemented as a cone, with holes for the passage of primary air.

Fig. 3 illustrates an alternative embodiment of an ignition chamber, and

30

Fig. 4 is a schematic cross-section in elevation of another alternative embodiment of the inventive burner.

In Fig. 1 there is illustrated a preferred embodiment of a solid fuel burner 2, preferably for pellets. The burner is mounted instead of an oil burning unit on a boiler furnace casing 1. The forward portion 3 of the burner 2 is inserted in an opening 4 in the casing 5 and extends into the combustion zone 6 of the furnace 1. To advantage, the fuel may

be pellets, which may comprise timber waste such as bark, sawdust and the like.

5 The burner 2 includes a tubular body 7, through which extends a feed screw 8 for feeding the fuel through the body. The free end 9 of the screw 8 terminates in the forward portion 3 of the burner 2, and the opposite, closed end 10 of the screw 8 is rotatably carried by a bearing 11. Rotation of the screw 8 is enabled via a drive means 12 by a motor situated in a housing 13 fixed to the body. In certain applications of the invention, the forward, free end 9 of the screw 8 may be arranged stationarily, in which case the screw 8 may be attached to a separate, unillustrated tube mounted for rotation on the tube forming the air supply duct 15. An ignition chamber 14 is disposed on the forward portion 3 of the burner 2, the chamber 14 accommodating the end of the screw 8 and is connected to the open end of the body 7. This chamber 14 is also in communication with the duct 15, which supplies it with primary air for enabling fuel combustion. The solid fuel is stored in a container 16 mounted on the body 7 and is taken to the feed screw 8 via an inlet 30 in the body.

25 To obtain favourable ignition and combustion of the solid fuel the ignition chamber 14 is rotatably mounted at the forward portion 3 of the burner 2. An unillustrated motor disposed in the motor housing 13 is coupled to a drive means 17 for causing the ignition chamber 14 to rotate very slowly, e.g. 1 rpm, the motor rpm being regulatable to obtain optimum rotational speed of the chamber in relation to combustion. As will be seen from the drawing, the ignition chamber 14 is somewhat conical in shape, with wall portions 19 diverging towards its open end 18. On the inside of the chamber body these portions are provided with at least one helical fin or ridge 20. When the chamber body is mounted horizontally, it can be implemented with a radially inwardly directed flange 34 for preventing incompletely combusted fuel from prematurely falling out of the chamber. In the

example illustrated in Fig. 1, the duct 15 extends the full length of the hollow screw shaft, including the closed portion 10 of screw 8 and burner body 7, connection to a blower 25 being arranged at portion 10. The blower 25 is fixed to the body 7 and adapted to blow primary air through the duct 15 to the free forward end 9 of the screw shaft, which does not have any helical flight in this region. The shaft end is closed off by an end wall 21, and its forward end portion 9 is perforated with a plurality of combustion air exit holes 22. In some cases the end wall 21 may also be provided with air exit holes 22 for combustion air.

In an alternative embodiment illustrated in Fig. 2, the screw free end 9 is implemented in the form of a cone 23, with its curved surface having the openings 24 of obliquely forwardly directed air exit ducts and decreasing diameter towards the mouth of the ignition chamber 14. The blower 25 can of course be disposed remote from the burner 2, in which case there is a suitable connection means between them.

A fuel feed regulating means 26 can be disposed between the fuel container 16 and burner 2 for adjusting the amount of fuel fed to the screw 8. The means 26 includes a rotatable wheel 27, which may be driven by an unillustrated motor at a desired revolutionary rate. In the periphery of the wheel 27 there are a plurality of recesses 28 arranged consecutively, and with the aid of a guide plate 29 in the container 16 the recesses catch given amounts of fuel and deliver them to the feed screw 8 via the inlet 30.

In Fig. 3 there is illustrated an alternative embodiment of the ignition chamber 14 for the burner 2. Here, the chamber 14 is given a conical shape, the wall 31 of which converges towards its opening 32. Helically extending fins 33 can be fixed to the inside of the wall 31 to prevent ash building up in the chamber 14.

In Fig. 4 there is an illustration of an inventive burner embodiment where the ignition chamber body is arranged with an exterior duct system 35 comprising at least one annular duct 35 with openings 36 into the ignition chamber and at the mouth of it. Secondary air 37 is blown into the system from a secondary blower 38 and this air will be preheated by the chamber body as it passes through the system 35 until it reaches the outlet openings 36.

10

Temperature in the ignition chamber 14 can be regulated by the preheated secondary air 37 so that it does not get too high, and this is effected by balancing the primary air 39 coming through the air supply duct 15 against the secondary air 37, thus obtaining optimum combustion. In this example the solid fuel is delivered to the feed screw 8 via a fuel regulating device in the form of a small dosing screw 40.

CLAIMS

5 1. A burner for solid fuel, intended for mounting on a boiler furnace (1), the forward portion (3) of the burner being insertable through an opening (4) in the furnace casing (5) and extending into the combustion zone (6) of said furnace (1), the burner (2) including a tubular main
10 body (7) accommodating a feed screw (8) for the fuel, the free end (9) of the screw terminating in the forward portion (3) and its other, closed end (10) being rotatably mounted in a bearing (11), a drive means (12) for rotating the feed screw (8) inside the body (7), an ignition chamber (14)
15 disposed at the forward portion (3) of the burner body (7) with the feed screw end and air supply duct (15) terminating in the chamber (14) for supplying primary air for ignition and combustion of the fuel, and finally an inlet (30) in the main body (7) for access to the feed screw (8) for deliver-
20 ing solid fuel from a fuel container (16) to the feed screw, **c h a r a c t e r i z e d i n** that the supply duct (15) for primary combustion air is formed in, and extends through the centre of the feed screw (8) and terminates inside the ignition chamber (14).

25

2. Burner as claimed in claim 1, **c h a r a c t e - r i z e d i n** that the free forward end (9) of the air supply duct (15) has the form of a tube stationarily disposed relative to the feed screw (8), with its end closed
30 off by an end wall (21) and its periphery perforated by a plurality of holes (22) for the passage of primary combustion air.

3. Burner as claimed in claim 1, **c h a r a c t e - r i z e d i n** that the free forward end (9) of the air supply duct (15) and the feed screw (8) is in the form of a cone (23) converging in a forward direction, with its curved surface having obliquely, forwardly directed ducts with exit
35 holes (24) for primary combustion air.

4. Burner as claimed in claim 1, c h a r a c t e -
r i z e d i n that at the closed portion (10) of the feed
screw (8) and main body (7) the air supply duct (15) is
5 connected to a blower (25) carried by the body (7) and
adapted to blow air into said duct (15).

5. Burner as claimed in claim 1, c h a r a c t e -
r i z e d i n that along its curved surface the body of
10 the ignition chamber (14) has at least one duct (35) for
secondary air (37) which, in a preheated state and assisted
by a blower (38) can be fed out from exit openings (36) in
the forward portion of the ignition chamber (14), said
secondary air and the primary combustion air supplied via
15 the duct (15) being mutually adjustable for regulation of
the temperature in the ignition chamber (14).

6. Burner as claimed in claim 1, c h a r a c t e -
r i z e d i n that a fuel feed regulating means (26) is
20 disposed between the fuel container (16) and feed screw (8)
for regulating the amount of fuel supplied per time unit to
the burner (2).

7. Burner as claimed in claim 6, c h a r a c t e -
25 r i z e d i n that the regulating means (26) comprises a
rotatable wheel (27), in the periphery of which there are a
plurality of consecutive recesses (28), there being a guide
plate (29) in the container (16) arranged such that with its
help the recesses (28) catch given amounts of fuel for
30 delivery in portions to the feed screw (8) via the inlet
(30).

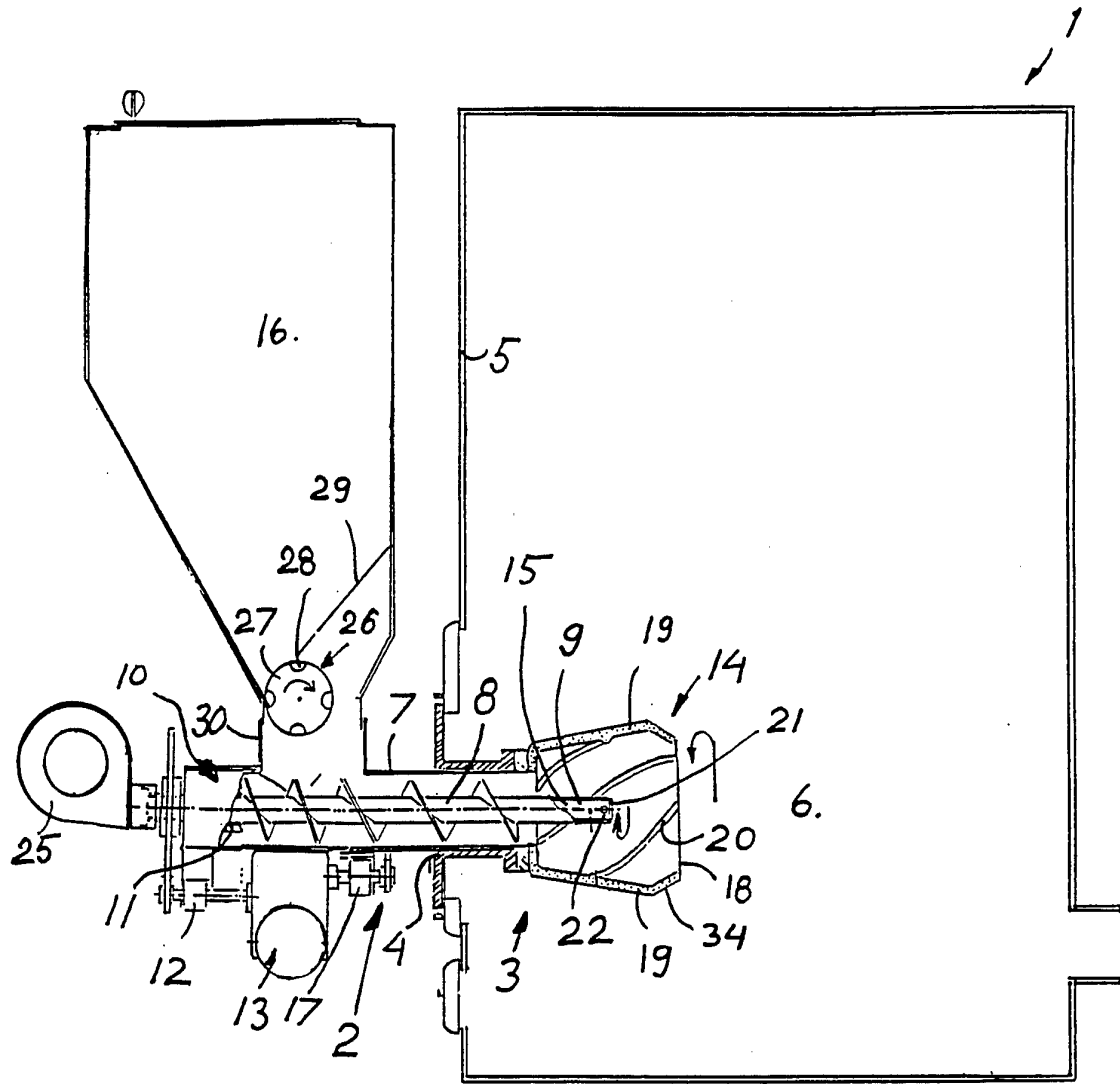


Fig. 1

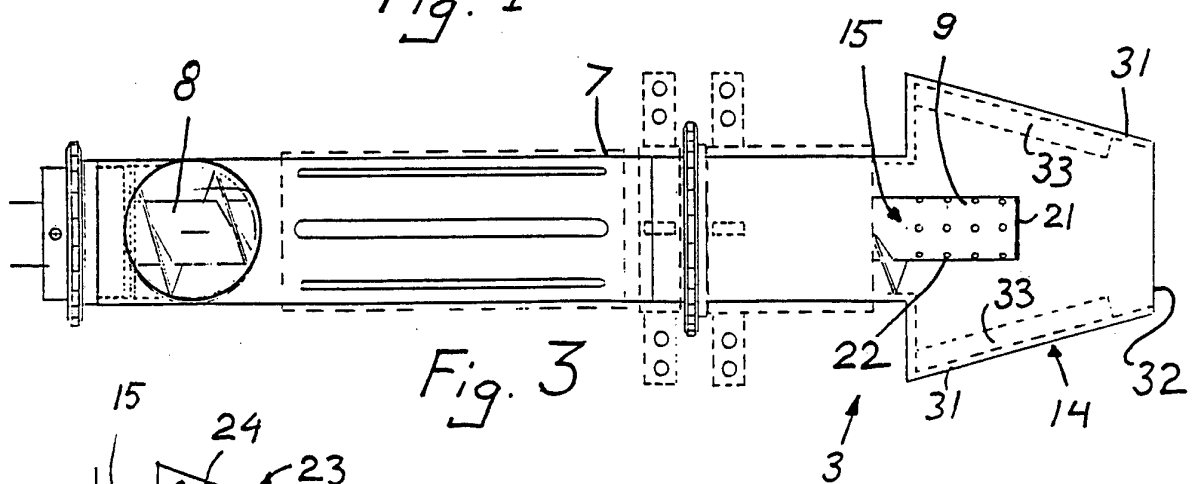


Fig. 3

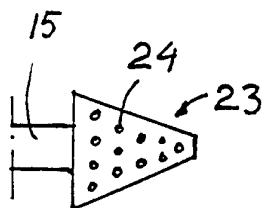


Fig. 2

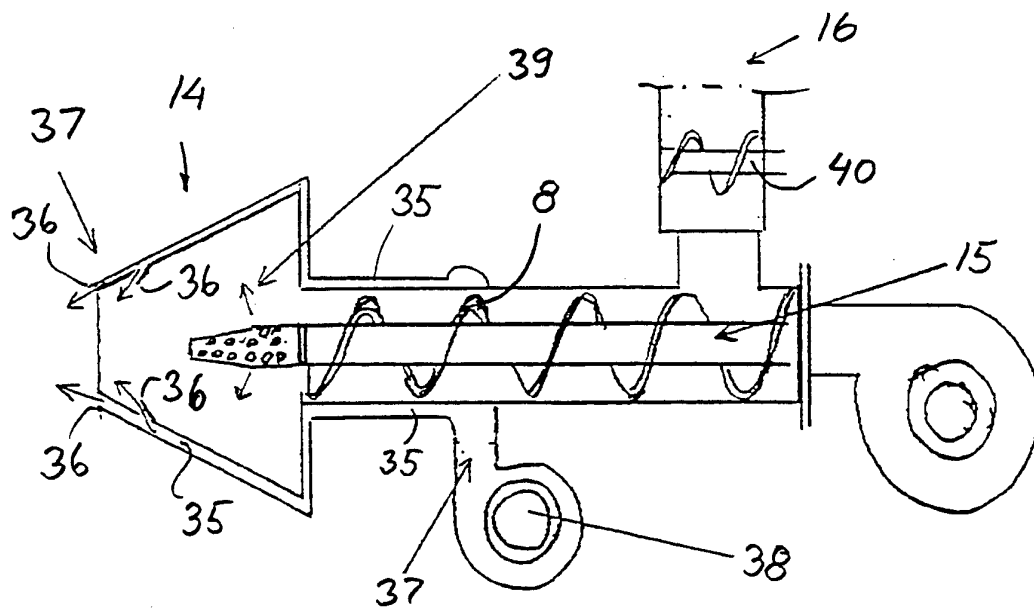


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC5: F23B 1/32, F23L 1/00, F23K 3/00

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A1, 0415539 (EVANS, M. ET AL), 6 March 1991 (06.03.91), column 3, line 49 - column 4, line 7, figures 1,4 --	1-4
A	DE, C2, 3247242 (MAGNUSSON, J.), 23 May 1991 (23.05.91), column 2, line 43 - column 3, line 17, figure 1 --	1-4
A	NO, B, 154069 (PARCA NORRAHAMMAR AB), 1 April 1986 (01.04.86), page 10, line 10 - line 29; page 11, line 32 - page 12, line 32, figures 1-11 --	1,5,6

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A	EP, A1, 0346531 (HALL, J.), 20 December 1989 (20.12.89), figure 1 --	1
A	DE, A1, 3727006 (GEBRÜDER WEISS KG), 23 February 1989 (23.02.89), figure 1 -- -----	1

INTERNATIONAL SEARCH REPORT
Information on patent family members

26/02/94

International application No.
PCT/SE 94/00069

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NO-B- 154069	01/04/86	NONE	
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