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(54) **Method for combustion of combustible material.**

(57) A method for combustion of combustible material comprising carbonaceous fuel and plastic material with an oxygen containing gas and possibly also a moderator gas, which are fed to and through a burner separately and wherein the feed of plastic material feed is subjected to heating.

A burner for the combustion of combustible material with an oxygen containing gas in a combustion zone comprising a central channel and outlet for supplying a solid, combustible material to the combustion zone,
at least one first substantially annular channel disposed coaxially with said central channel and having an outlet to supply an oxidant gas flow to the combustion zone,
a second annular channel being disposed coaxially with said central channel and located outside said first annular channel, the central channel being connected to a supply of finely divided solid plastic waste material, and the second annular channel being connected to a supply of carbonaceous fuel.

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The invention relates to a method for combustion of combustible material comprising carbonacious fuel and plastic material with an oxygen containing gas and also a moderator gas.

Such a method is known from EP-A-328794. According to this known method fuel is mixed with the oxygen containing gas and thereupon burned. As such this is a satisfactory process. However if special fuel has to be buerned, such as pulverized or granulated waste plastic material, this fuel can not be burned so easily, especially not when the production of contaminating gas or ashes have to be avoided and the combustion must be as complete as possible.

It is therefor an object of the invention to provide a method wherein these problems can be avoided.

This object is achieved in that the carboniceous fuel and the plastic material is subjected to heating. By separating the supply of the fuel and the plastic material, the ignition of the plastic materisl is somewhat delayed with respect to the ignition of the fuel, whereby an improved burning is botained. This can be explained by the fact that the plastic material is additionally preheated in the flame before its ignition starts whereby higher temperatures are present during the burning, thereby avoiding production of unwanted by-products.

The invention also relates to a burner for preforming the method comprising a central channel and outlet for supplying a solid combustible material to the combustion zone and at least one first substantially annular channel disposed coaxially with said central channel and having an outlet to supply an oxidant gas flow to the combustion zone.

In this known device at the outlet of the channels the fuel is mixed with the oxygen containing gas and burned.

Mixing the two substances, fuel and plastic waste before burning will generally cause problems in the transport of the mterials.

It is an object of the invention to provide a burner these problems are avoided.

This object is achieved in that a second annular channel is provided disposed coaxially with said central channel and located outside said first annular channel, the central channel being connected to a supply of finely divided solid plastic material and the second annular channel being connected to a supply of carbonaceous fuel.

By separating the supply of the primary (carbonaceous) fuel and secondary (plastic) fuel, the transport problems can be overcome. Moreover it provides the possibility to introduce the different fuels at different temperatures thereby increasing this efficiency of the combustion.

In EP-A 108425 there is disclosed a burner comprising a central channel and outlet for fuel, an annular channel disposes coaxially with said central channel for supplying fuel and intermediate supply means for an oxidant gas. Strictly speaking the burner according to the invention is different from this known burner as it does not possess three coaxial annular supplies for fuel, oxidant and fuel because the oxidant gas is supplied by a number of separate circular outlets. But the invention is basicly different from this known burner in that the two fuel channels are connected to the same supply of carbonaceous fuel.

Preferably a third annular channel is disposed coaxially between said central channel and said second annular channel and said third channel is connected with a supply of moderator gas.

In this way it is possible to operate the burner in such a way that the ignition of the secondary fuel is retarded so that it will only burn in mixed condition with the primary fuel, thereby increasing the efficiency of the combustion.

Other characteristics and advantages of the invention will become clear from the following description, reference being made to the annexed drawing showing a schematic cross-section of a burner according to the invention.

In the drawing the burner is generally indicated with the reference numbered 10. The burner 10 has a central channel 11 with a circular cross-section disposed along a longitudinal axis 12 and having a discharge outlet 13 for supplying a finely divided solid fuel such as waste plastic, pulverized coal, mixed combustible waste material etc. to a combustion zone 15. The channel 11 is limited by an annular wall 14. Parallel to the axis 12 and concentrically surrounding the annular wall 14 there is provided an annular wall 16. The annular walls 14 and 16 together define an annular channel 17 having a discharge outlet 18 for supplying a moderator gas to the combustion zone 15. As moderator gas can be used steam, carbon dioxide or nitrogen or a mixture thereof.

Concentrically arranged around the wall 16 is an annular wall 20, defining together with the annular wall 16 an annular channel 21. The annular channel 21 has an outlet 22 for supplying an oxidant gas to the combustion zone 15. The oxidant gas will be oxygen-containing gas, or optionally a mixture of oxygen-containing gas with a moderator gas such as e.g. steam or carbon dioxide.

As represented in the drawings, the channels 11, 17 and 21 all have annular cross-sections, the surface of which gradually decreases as seen in the desertion of the combustion zone. In this way a speed increase towards the outlets will be the result.

Concentrically around the wall 20 there is arranged a hollow wall number 25, which defines together with the wall 20 an annular channel 26

having an outlet 27 for supplying a liquid fuel such as oil into the combustion zone 15. The outer part of the wall 20 is near the outlet inclined so as to intersect the central axis 10 at a distance from the outlet 13. In the same way the inner part of the wall number 25 is inclined in 00 as to form a part which is parallel thereto.

The hollow wall member 25 consists of an inner wall 30 and an outer wall 31 connected near the outlet by a frontwall portion 32. The inner well 30 is substantially parallel to the wall 20 and firms one wall of the channel 26. The front wall portion 32 is from the outer wall 31 curved gradually inwardly and is flushed with the outlet side wall of the burner 10, at the place when it is connected to the innerwall 30.

Inside the hollow space defined by the two walls 30 and 31 a dividing wall 34 is provided which extends to nearly to the frontwall portion 32 and is curved in accordance therewith.
In this way two channels 36 and 37 are formed interconnected near the front wall position 32 by a passage 38 for a coolant liquid.

Claims

1. A method for combustion of combustible material comprising carbonacious fuel and plastic material with an oxygen containing gas and possibly also a moderator gas,
characterised in that
the carbonacious fuel and the plastic material are fed to and through a burner separately and that the feed of plastic material feed is subjected to heating.

2. A method according to claim 1
characterised in that
the combustion is a partial combustion of the fuel to produce synthesis gas.

3. A method according to claim 1
characterised in that
the plastic material feed is heated by means of the moderator gas, which preferably comprises steam.

4. A burner for the combustion of combustible material with an oxygen containing gas in a combustion zone comprising a central channel and outlet for supplying a solid, combustible material to the combustion zone,
at least one first substantially annular channel disposed coaxially with said central channel and having an outlet to supply an oxidant gas flow to the combustion zone
characterised by
a second annular channel disposed coaxially with said central channel and located outside said first annular channel, the central channel being connected to a supply of finely divided solid plastic waste material, and the second annular channel being connected to a supply of carbonaceous fuel.

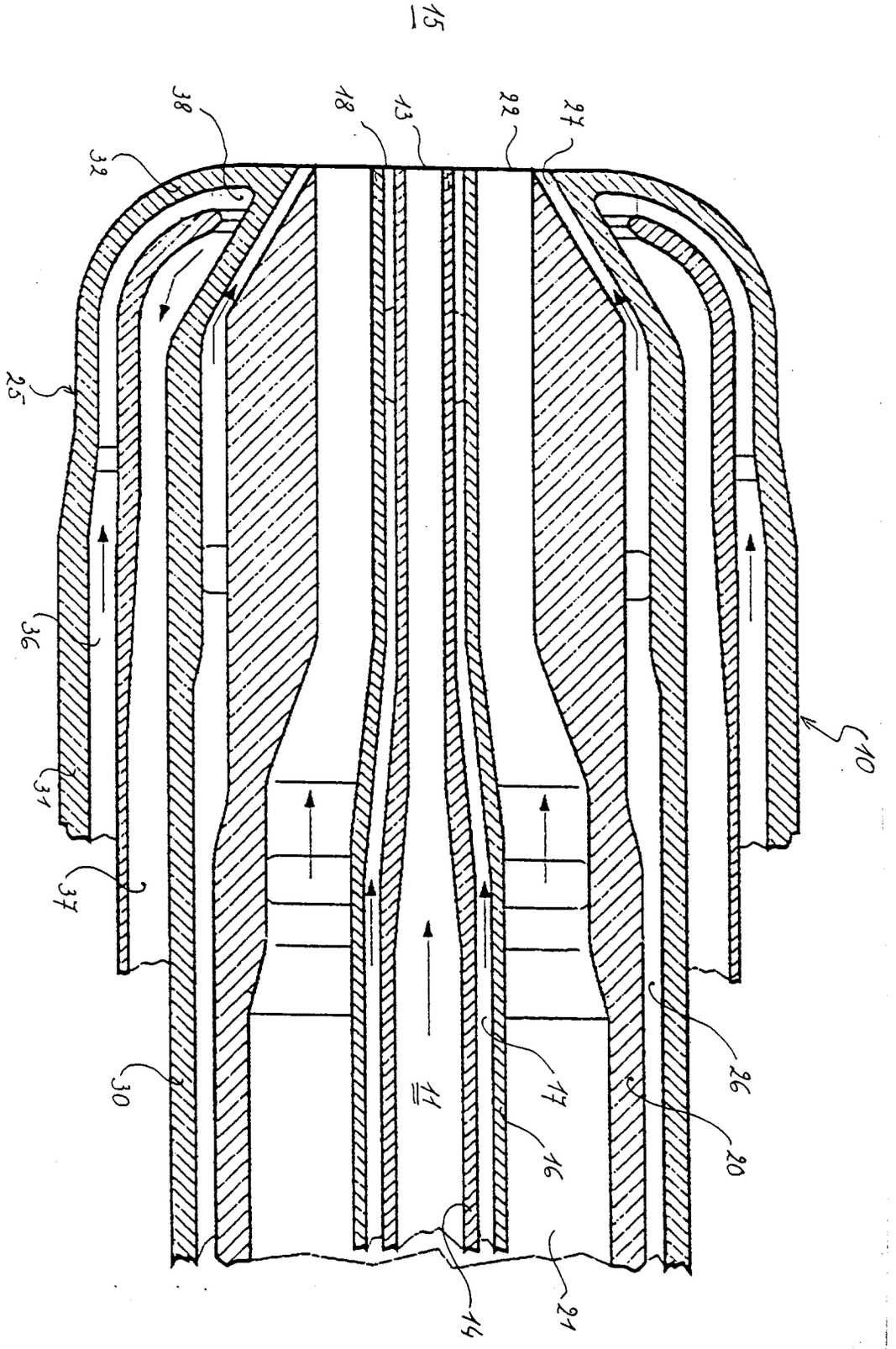
5. A burner according to claim 1,
characterised in that
the second annular channel is inclined so as to direct the fuel flow into the oxidant gas flow.

6. A burner according to claim 1 or 2,
characterised in that
third annular channel is disposed coaxially between said central channel and said second annular channel and in that said third channel is connected with a supply of moderator gas.

7. A burner according to one of the preceding claims,
characterised in that
the moderator gas is steam.

8. A burner according to one of the preceding claims,
characterised in that
the carbonaceous fuel is oil.

9. A burner according to one of the preceding claims,
characterised in that
a cooling system is provided comprising two annular channels which are disposed coaxially and around the second annular channel and which are connected to each other near the outlet of the other channels at the combustion zones.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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1328

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 076 020 (AIR PRODUCTS AND CHEMICALS) * page 1-5 *	1,4,8	C10J3/48 C10J3/46 F23G7/12
X	EP-A-0 205 238 (THE DOW CHEMICAL) * page 4, column 6, line 34 - page 6, column 10, line 13 * * page 8, column 14, line 46 - page 10, column 18, line 8 *	1-5,7,9	
A	DE-U-93 13 518 (STEINMULLER) * page 8; claims 1-3 *	1,4	
A	EP-A-0 595 472 (TEXACO) * page 5, column 33-46 * * page 9-11; claims 1-14 *	1-4	
A	FR-A-2 567 535 (TIJOUX) * page 4; claims 1-5 *	1,4	
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 76 (M-800) & JP-A-63 273 718 (SAKURAI TADASHI) * abstract *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) C10J F23G
A	PATENT ABSTRACTS OF JAPAN vol. 4, no. 105 (M-23) (587) & JP-A-55 063 314 (NIPPON GAISHI) * abstract *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 October 1994	Wendling, J-P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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