

SPECIFICATION

FLUIDIZED BED INCINERATOR

TECHNICAL FIELD

The present invention relates to a fluidized bed incinerator wherein municipal solid waste, industrial waste, and the like is introduced into a fluid medium which is in a fluid state, and the waste is heated and incinerated.

BACKGROUND ART

As shown in Fig.10, a conventional fluidized bed waste incinerator comprises: a combustion chamber 2 and a freeboard space 3 formed in a main furnace unit 1; a waste inlet 4 formed in the front wall 1a of the main furnace unit 1; an ash discharge outlet 6 formed in the rear base portion of the main furnace unit 1; a discharging device 5 provided at this ash discharge outlet 6, which discharges incinerated ash and incombustible material whilst leaving the fluid medium S; and a plurality of dispersive air pipes 7 arranged mutually in parallel passing through the lower portion of the combustion chamber in a horizontal direction.

In the composition described above, the heated fluid medium S is caused to become fluid by means of dispersive air injected into the fluid medium S in the furnace main unit 1 from dispersive air pipes 7. Waste to be incinerated is introduced via

the waste inlet 4 and mixes into the fluid medium S, and the waste is heated, fluidized and then combusts in a combustion zone in the upper portion of the combustion chamber 2. Incinerated ash is carried to the ash discharge outlet 6 by the downward movement of the fluid medium S, and then discharged.

The dispersive air pipes 7 pass through side walls 1b of the main furnace unit 1 transversely in a horizontal direction. Adjacent dispersive air pipes 7 are spaced to have a gap of approximately 100 - 150 mm between each other. There are cases where large items of incombustible material or linear items of incombustible material, such as wire or the like, which are larger than this gap, may be present in the waste introduced into the incinerator, or large lumps of clinker may form during incineration. In these cases, there arises a problem that such items will accumulate above the dispersive air pipes 7, due to the narrow gaps between the dispersive air pipes, and will not be discharged from the ash discharge outlet 6, thereby rendering the incinerator inoperable.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide a fluidized bed incinerator whereby large items of incombustible material, linear items of incombustible material, large lumps of clinker and the like can be discharged smoothly.

In order to achieve this object, the fluidized bed incinerator according to the present invention is characterized

in that it comprises an ash discharge outlet formed in the base portion of a furnace main unit; a plurality of dispersive air pipes for combustion containing a large number of dispersive air holes formed therein, which project respectively in a cantilever fashion from mutually opposing side walls in an oblique downward direction at the lower portion of a combustion zone of the furnace main unit; and an incombustible material discharge space formed between the ends of these dispersive air pipes for combustion.

Furthermore, the invention is also characterized in that it comprises an ash discharge outlet formed in the base portion of a furnace main unit; a plurality of dispersive air pipes for combustion containing a large number of dispersive air holes formed therein, which project in a cantilever fashion from a side wall in an oblique downward direction at the lower portion of a combustion zone of the furnace main unit; and an incombustible material discharge space formed between the ends of these dispersive air pipes for combustion and a side wall.

According to the composition described above, since solid items of incombustible material and linear items of incombustible material present in waste for incineration and introduced into the fluid medium, or large lumps of clinker formed in the fluid medium, are guided in a downward direction on the inclined dispersive air pipes for combustion and are discharged from the incombustible material discharge space to the ash discharge outlet, then incombustible material of this kind can be discharged smoothly without accumulating on the dispersive air

pipes for combustion. Furthermore, this composition is characterized in that the angle of inclination of the dispersive air pipes for combustion is set to be in a range of 3° - 30° .

According to the composition described above, by setting the angle of inclination of the dispersive air pipes for combustion in a range of 3° - 30° , incombustible material on the dispersion pipes can be guided downwards smoothly and discharged from the incombustible material discharge space to the ash discharge outlet without any accumulation thereof, and furthermore, there is no detrimental effect on dispersion of the fluid medium.

Moreover, the invention is characterized in that the incombustible material discharge space in the composition described above comprises a normal incombustible material discharge space having a narrow width, and a large incombustible material discharge space having a broad width.

If only a large incombustible material discharge space is provided, which is wide and capable of discharging large items of incombustible material, there is a risk that the fluidity of the fluid medium will be impaired. According to the composition described above, however, it is possible for large items of incombustible material to be discharged without impairing the fluidity of the fluid medium, by providing both a large incombustible material discharge space for large items and a narrow incombustible material discharge space for normal items.

In addition, the dispersive air pipes for combustion in the composition described above are characterized in that they are each provided with: a large number of main dispersive air holes

formed along the barrel thereof, through which dispersive air is emitted, and an end dispersive air hole formed in the end thereof, through which dispersive air is emitted towards the incombustible material discharge space.

According to the composition described above, by emitting dispersive air towards the incombustible material discharge space from the end dispersive air holes in this way, incombustible material on the dispersive air pipes for combustion is caused to flow towards the incombustible material discharge space, and moreover, this incombustible material is able to drop down without creating resistance, and the flow of the fluid medium is promoted when this material drops.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is a side section showing a first embodiment of a fluidized bed waste incinerator according to the present invention;

Fig.2 is a planar section of the same fluidized bed waste incinerator;

Fig.3 is a side section of the same fluidized bed waste incinerator;

Fig.4 is a diagram showing dispersive air pipes for combustion in the same fluidized bed waste incinerator;

Fig.5 is a side view showing a further installation structure for the same dispersive air pipes for combustion;

Fig.6 is a section taken along A - A in Fig.5;

Fig.7 is a side section showing a second embodiment of a fluidized bed waste incinerator according to the present invention;

Fig.8 is a planar section of the same fluidized bed waste incinerator;

Fig.9 is a planar section showing a third embodiment of a fluidized bed waste incinerator according to the present invention; and

Fig.10 is a side section showing a conventional fluidized bed waste incinerator.

DESCRIPTION OF THE EMBODIMENTS

Embodiments of a fluidized bed waste incinerator relating to the present invention are now described. Elements which are the same as in the prior art example are given the same label and description thereof is omitted.

Figs.1 - 4 show a first embodiment, which is a fluidized bed waste incinerator wherein dispersive air pipes for combustion 11 are provided in both side walls 1b, 1c.

The combustion chamber 2 of the furnace main unit 1 consists of a drying and pyrolyzing zone 2a at the side of the waste inlet 4, and a combustion zone 2b located above the ash discharge outlet 6. Dispersive air pipes 8 for pyrolysis which supply dispersive air to the drying and pyrolyzing zone 2a are provided on an inclined base wall 7 below the drying and pyrolyzing zone

2a. Furthermore, a plurality of dispersive air pipes for combustion 11 passing through both side walls 1b, 1c and projecting respectively into the fluid medium S are provided below the combustion zone 2b.

These dispersive air pipes for combustion 11 project from the side walls 1b, 1c in a cantilever fashion at an angle of inclination θ in a downward direction, and are positioned in parallel to each other. An incombustible material discharge space 12 is formed between the ends of these dispersive air pipes for combustion 11.

As shown in Fig.4, a plurality of main dispersive air holes 13 through which dispersive air is emitted in a lateral direction are provided in each dispersive air pipe 11 for combustion in the sides of the shaft thereof. Furthermore, an end dispersive air hole 14, through which dispersive air is emitted into the incombustible material discharge space 12 in the axial direction of the dispersive air pipe 11 for combustion, is formed at the end of each dispersive air pipe 11 for combustion. By means of the dispersive air emitted from these end dispersive air holes 14, the fluid medium is transferred towards the incombustible material discharge space 12, and incombustible material accumulated on the dispersive air pipes for combustion 11 can be caused to flow towards the incombustible material discharge space 12.

Furthermore, these dispersive air pipes for combustion 11 are set to an angle of inclination θ in the range of 3 - 30°. If this angle of inclination θ is less than 3°, then it is



difficult to eliminate accumulation of incombustible material, since the fluid force due the weight of the incombustible material is small. Moreover, if this angle of inclination θ is over 30° , then the fluid medium S will not be dispersed and fluidized effectively by the dispersive air emitted from the main dispersive air holes 13, and therefore it will have a detrimental effect on the dispersion and fluidization of the fluid medium S.

The incombustible material discharge space 12 comprises normal incombustible material discharge spaces 12a having a narrow width d located at the front and rear portions thereof, and a large incombustible material discharge space 12b having a broad width D located in the center portion thereof, corresponding to a position above the ash discharge outlet 5. The width d of the normal incombustible material discharge spaces 12a is set to be approximately 100 - 150 mm or more, for example. The width D of the large incombustible material discharge space 12b is set to be approximately 500 - 800 mm, for example, such that large items of incombustible material can be discharged without difficulty. In this large incombustible material discharge space 12b, dispersion and fluidization of the fluid medium S is not promoted since no dispersive air is supplied.

In the composition described above, waste introduced into the waste inlet 4 is mixed with the fluid medium S in the drying and pyrolyzing zone 2a, fluidized by churning and heating, and then dried and pyrolyzed. Thereupon, the waste is incinerated by

combustion in the combustion zone 2b. The incinerated ash falls down and is discharged by means of the discharging device 5 at the ash discharge outlet 6.

In this case, since the dispersive air pipes for combustion 11 are inclined at an angle, even if the waste contains large or linear items of incombustible material, such items of incombustible material are guided towards the lower ends of the dispersive air pipes for combustion 11, without accumulating thereon. These large or linear items of incombustible material then pass through the incombustible material discharge space 12 and fall downwards, without accumulating or becoming caught, and they are discharged from the ash discharge outlet 6. In this case, the downward movement of incombustible material is further promoted by the dispersive air emitted from the end dispersive air holes 14 into the incombustible material discharge space 12.

According to the first embodiment described above, since dispersive air pipes 11 for combustion project respectively from the side walls 1b, 1c in an oblique downward direction, and since an incombustible material discharge space 12 is formed at the ends of these dispersive air pipes for combustion 11, large or linear items of incombustible material present in the waste, or large lumps of clinker formed inside the furnace, are guided downwards on the dispersive air pipes for combustion 11 and can be discharged through the incombustible material discharge space 12.

Furthermore, since end dispersive air holes 14 are formed in the ends of the dispersive air pipes for combustion 11, the



downward movement of incombustible material is promoted by the dispersive air emitted from these end dispersive air holes 14 into the incombustible material discharge space 12, and incombustible material can be discharged smoothly.

Moreover, in the mode of implementation described above, if the dispersive air pipes for combustion 11 have insufficient strength with respect to the weight of the fluid medium S and the waste, then as shown in Fig.5 and Fig.6, it is possible to provide sufficient support for the load imposed on the dispersive air pipes for combustion 11 by the fluid medium S, by inserting support plates 16 which pass from the skin plate 1d of the side walls 1b, 1c through fire retardant material 1e, and by joining the upper edges of these support plates 16 securely to the lower side of the dispersive air pipes for combustion 11.

Next, a second embodiment is described on the basis of Fig.7 and Fig.8.

In the second embodiment, dispersive air pipes for combustion 21 of the same structure as those in the first embodiment project at an angle of inclination θ from the rear side wall 1f only, and therefore an incombustible material discharge space 22 is formed between the ends of these dispersive air pipes for combustion 21 and the lower portion of the front side wall 1g.

This incombustible material discharge space 22 comprises a large incombustible material discharge space 22b located in the

center portion thereof, and normal incombustible material discharge spaces 22a located in side portions thereof.

Furthermore, support plates 23 of the same structure as that shown in Fig.5 and Fig.6 are attached to each of the dispersive air pipes for combustion 21. According to this composition, large or linear items of incombustible material, or large lumps of clinker, can be discharged smoothly in a similar manner to the first mode of implementation. It is also possible to reduce material usage and assembly processes, thereby lowering manufacturing costs.

A third embodiment is now described on the basis of Fig.9.

In this fluidized bed incinerator, dispersive air pipes for combustion 31 of the same structure as those in the first embodiment project respectively from the side walls 1b, 1c, and from the rear side wall 1f and the lower front side wall 1g, an incombustible material discharge space 32 being formed between the ends of these dispersive air pipes for combustion 31.

This incombustible material discharge space 32 comprises a large incombustible material discharge space 32b located in the center portion thereof, and normal incombustible material discharge spaces 32a formed along the diagonals thereof.

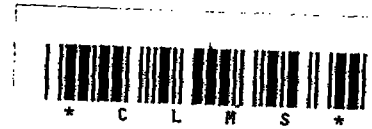
According to the composition described above, large or linear items of incombustible material, and large lumps of clinker, can be discharged smoothly similarly to the first embodiment.



CLAIMS

1. A fluidized bed incinerator comprising:
an ash discharge outlet (6) formed in the base portion of a furnace main unit (1);
a plurality of dispersive air pipes for combustion (11, 31), containing a large number of dispersive air holes (13, 14) formed therein, which project respectively in a cantilever fashion from mutually opposing side walls (1b, 1c) (1c, 1d, 1f, 1g) in an oblique downward direction at the lower portion of a combustion zone (2b) of the furnace main unit (1); and
an incombustible material discharge space (12, 32) formed between the ends of the dispersive air pipes for combustion.
2. A fluidized bed incinerator comprising:
an ash discharge outlet (6) formed in the base portion of a furnace main unit (1);
a plurality of dispersive air pipes for combustion (21) containing a large number of dispersive air holes (13, 14) formed therein, which project in a cantilever fashion from a side wall (1f) in an oblique downward direction at the lower portion of a combustion zone (2b) of the furnace main unit (1); and
an incombustible material discharge space (22) formed between the ends of the dispersive air pipes for combustion (21)





and a side wall (1g).

3. A fluidized bed incinerator according to claim 1 or claim 2, wherein the angle of inclination (θ) of the dispersive air pipes for combustion (11, 21, 31) is in the range of 3° - 30° .

4. A fluidized bed incinerator according to claim 1 or claim 2, wherein the incombustible material discharge space (12, 22, 32) comprises normal incombustible material discharge spaces (12a, 22a, 32a) having a narrow width, and a large incombustible material discharge space (12b, 22b, 32b) having a broad width.

5. A fluidized bed incinerator according to claim 1 or claim 2, wherein the dispersive air pipes for combustion (11, 21, 31) are each provided with a plurality of main dispersive air holes (13) formed in the shaft thereof, through which dispersive air is emitted, and an end dispersive air hole (14) formed at the end thereof, through which dispersive air is emitted towards the incombustible material discharge space (12, 22, 32).

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ABSTRACT

A plurality of dispersive air pipes for combustion (11) containing a plurality of dispersive air holes and projecting in a cantilever fashion from the side walls (1b, 1c) in an oblique downward direction are provided in the lower portion of a combustion zone (2b) of a furnace main unit (1) which includes an ash discharge outlet (6) formed in the base portion thereof, and an incombustible material discharge space (12) is formed between the ends of the dispersive air pipes for combustion (11). As a result, incombustible material accumulating on the dispersive air pipes for combustion (11) is guided to the incombustible material discharge space (12) and then discharged.

FIG.1

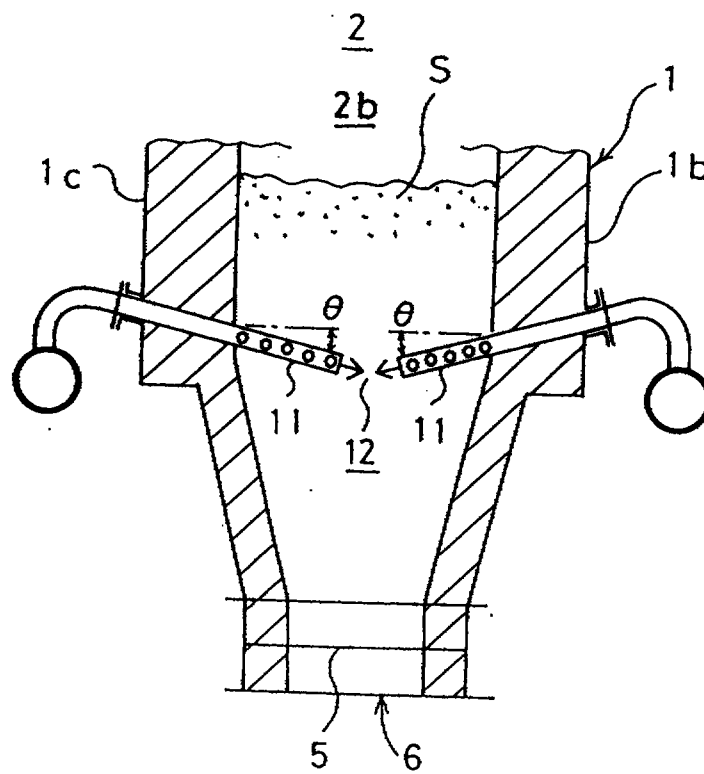


FIG.2

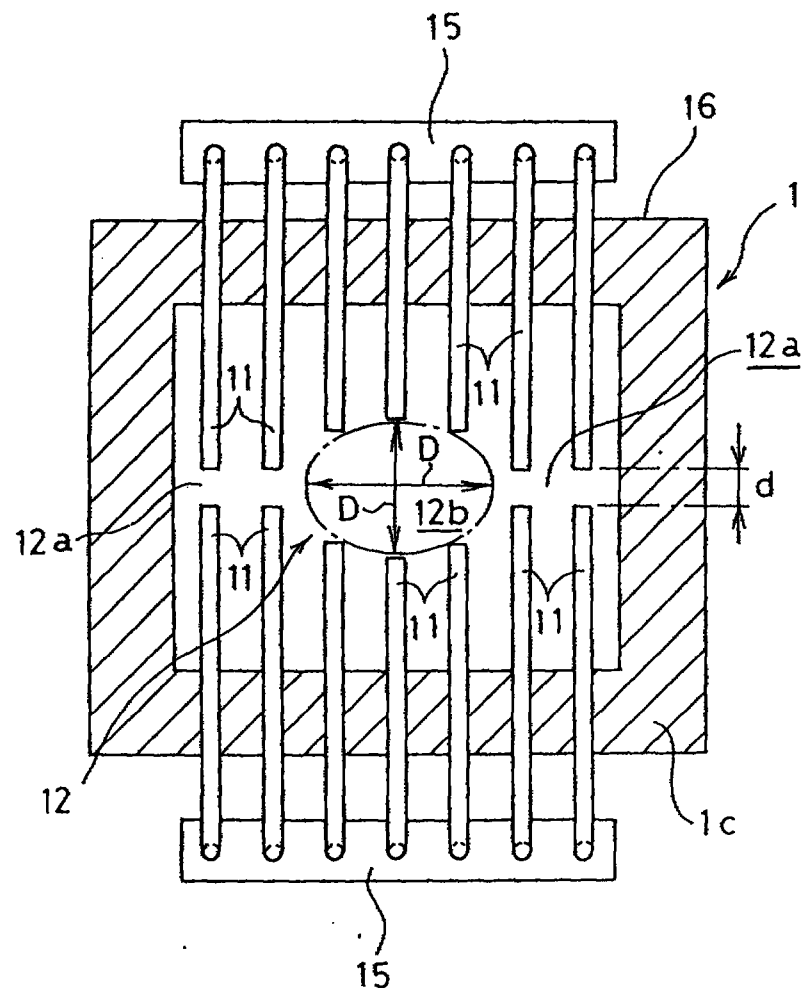


FIG.3

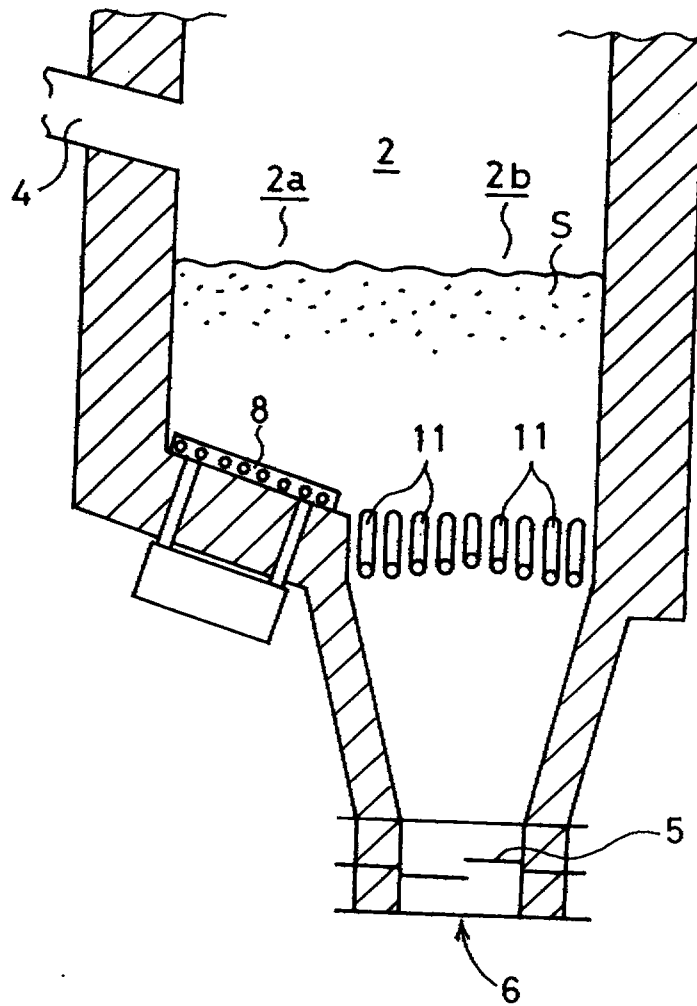


FIG.4

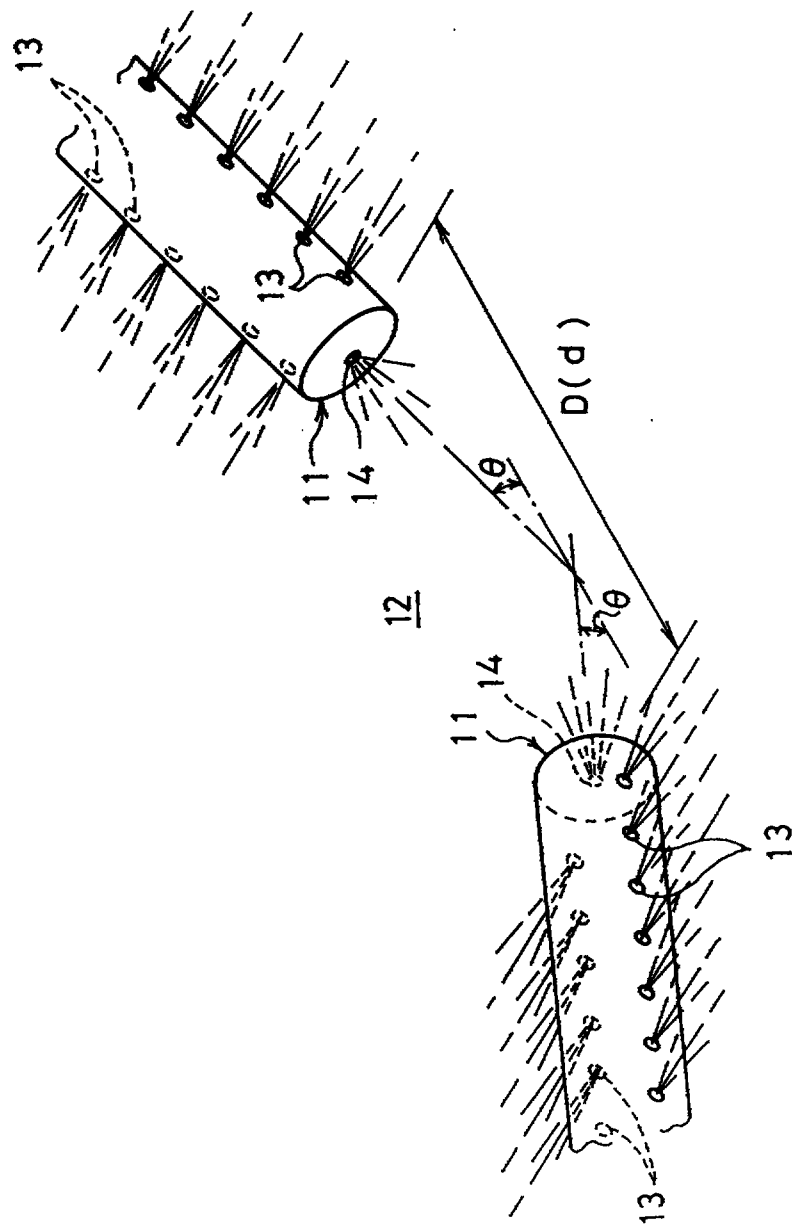


FIG.5

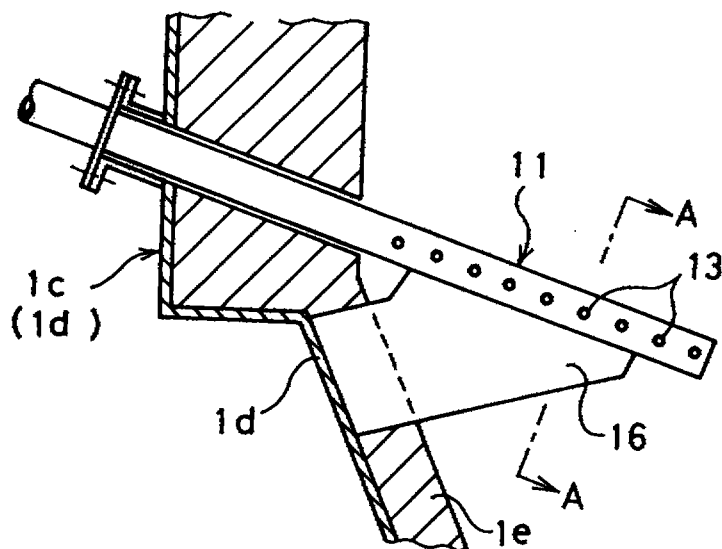


FIG.6

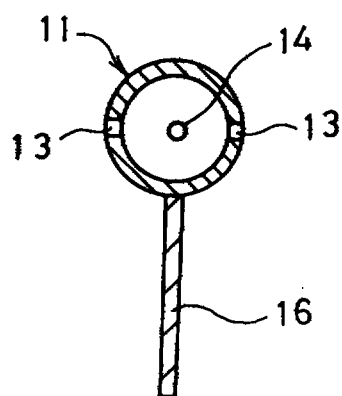


FIG.7

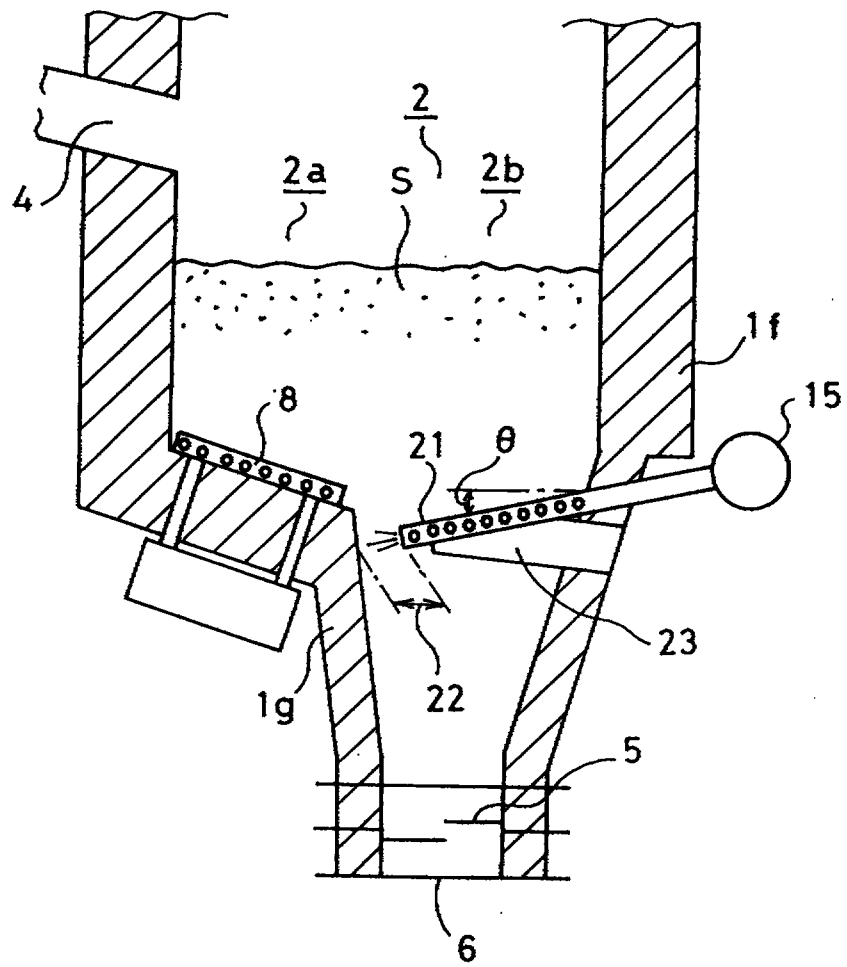


FIG.8

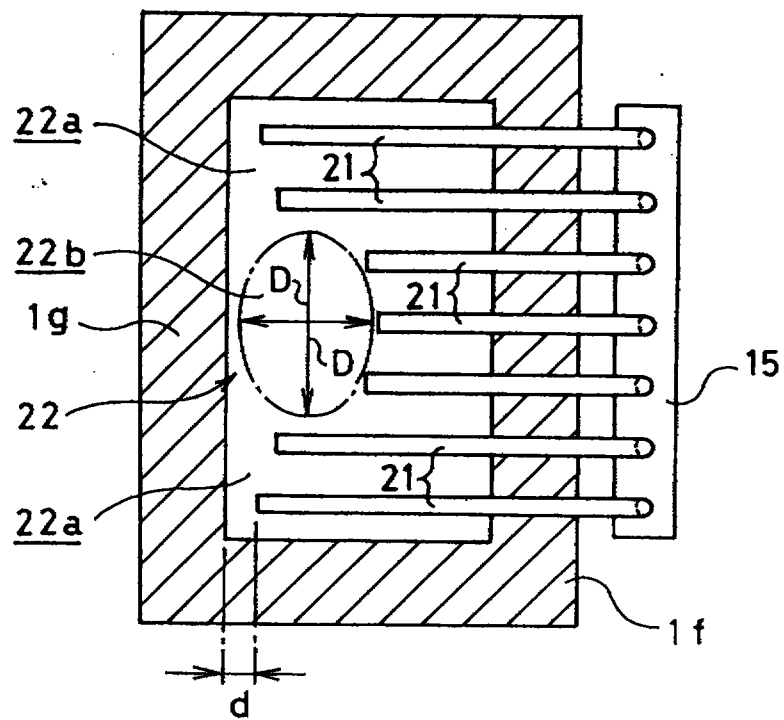


FIG.9

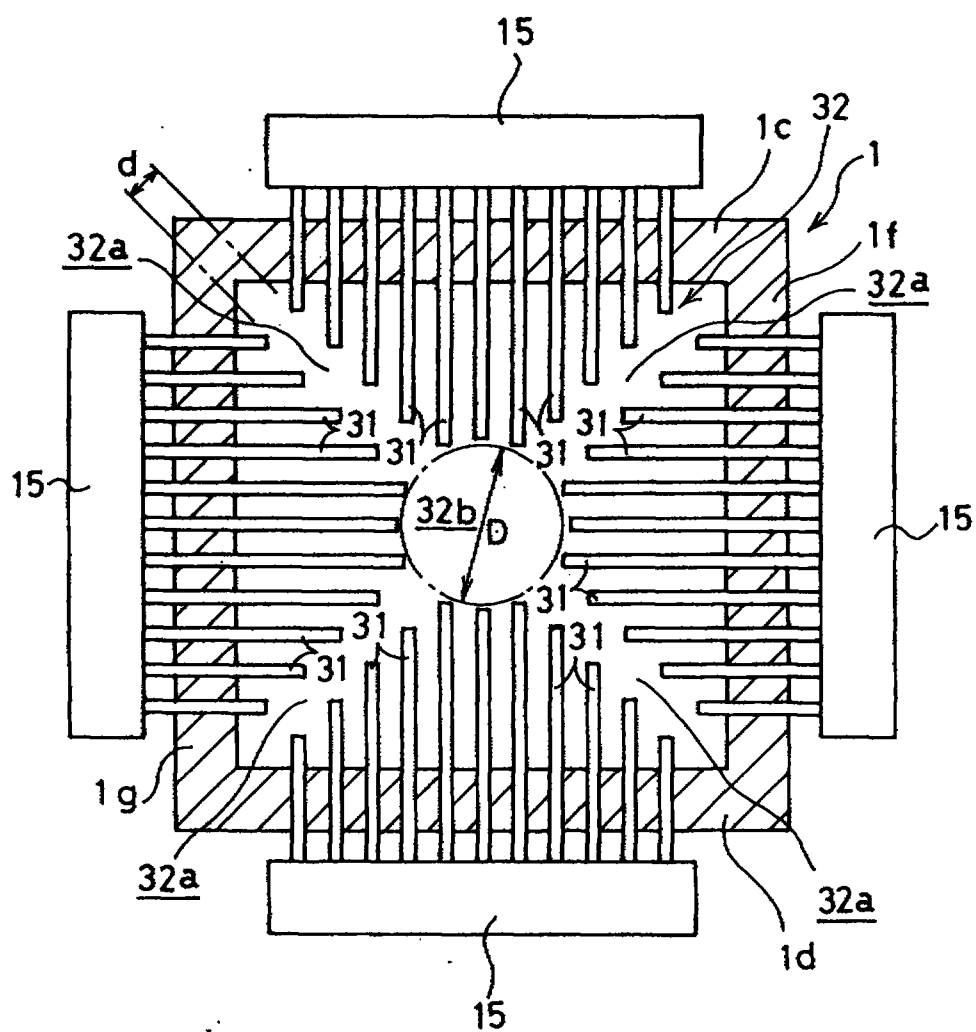
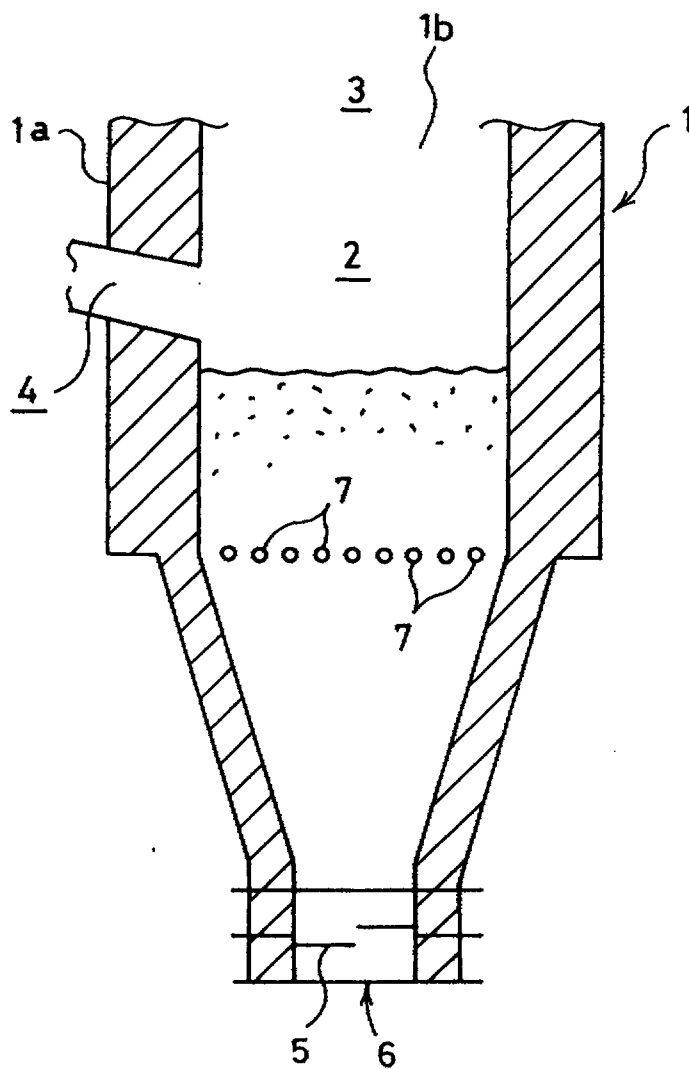


FIG.10



2a. Furthermore, a plurality of dispersive air pipes for combustion 11 passing through both side walls 1b, 1c and projecting respectively into the fluid medium S are provided below the combustion zone 2b.

These dispersive air pipes for combustion 11 project from the side walls 1b, 1c in a cantilever fashion at an angle of inclination θ in a downward direction, and are positioned in parallel to each other spaced so that ash can be discharged therebetween. An incombustible material discharge space 12 is formed between the ends of these dispersive air pipes for combustion 11.

As shown in Fig.4, a plurality of main dispersive air holes 13 through which dispersive air is emitted in a lateral direction are provided in each dispersive air pipe 11 for combustion in the sides of the shaft thereof. Furthermore, an end dispersive air hole 14, through which dispersive air is emitted into the incombustible material discharge space 12 in the axial direction of the dispersive air pipe 11 for combustion, is formed at the end of each dispersive air pipe 11 for combustion. By means of the dispersive air emitted from these end dispersive air holes 14, the fluid medium is transferred towards the incombustible material discharge space 12, and incombustible material accumulated on the dispersive air pipes for combustion 11 can be caused to flow towards the incombustible material discharge space 12.

Furthermore, these dispersive air pipes for combustion 11 are set to an angle of inclination θ in the range of 3 - 30°. If this angle of inclination θ is less than 3°, then it is

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- ☐ Abstract : paged to paged

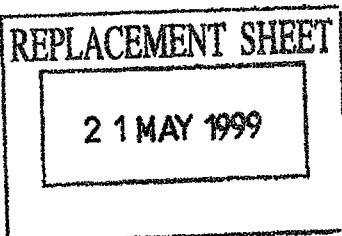
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combustion in the combustion zone 2b. The incinerated ash falls down between the parallel dispersive air pipes for combustion 11 and through the incombustible material discharge space 12 and is discharged by means of the discharging device 5 at the ash discharge outlet 6.

In this case, since the dispersive air pipes for combustion 11 are inclined at an angle, even if the waste contains large or linear items of incombustible material, such items of incombustible material are guided towards the lower ends of the dispersive air pipes for combustion 11, without accumulating thereon. These large or linear items of incombustible material then pass through the incombustible material discharge space 12 and fall downwards, without accumulating or becoming caught, and they are discharged from the ash discharge outlet 6. In this case, the downward movement of incombustible material is further promoted by the dispersive air emitted from the end dispersive air holes 14 into the incombustible material discharge space 12.

According to the first embodiment described above, since dispersive air pipes 11 for combustion project respectively from the side walls 1b, 1c in an oblique downward direction, and since an incombustible material discharge space 12 is formed at the ends of these dispersive air pipes for combustion 11, large or linear items of incombustible material present in the waste, or large lumps of clinker formed inside the furnace, are guided downwards on the dispersive air pipes for combustion 11 and can be discharged through the incombustible material discharge space 12.

Furthermore, since end dispersive air holes 14 are formed in the ends of the dispersive air pipes for combustion 11, the



**CLAIMS****1. A fluidized bed incinerator comprising:**

an ash discharge outlet (6) formed in the base portion
of a furnace main unit (1);

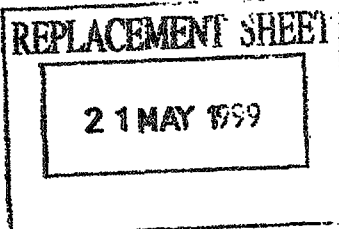
a plurality of dispersive air pipes for combustion
(11, 31), containing a large number of dispersive air holes
(13, 14) formed therein, which project respectively in a
cantilever fashion from mutually opposing side walls (1b, 1c)
(1c, 1d, 1f, 1g) in an oblique downward direction at the lower
portion of a combustion zone (2b) of the furnace main unit
(1) and are positioned in parallel to each other spaced so
that ash can be discharged therebetween; and

an incombustible material discharge space (12, 32)
formed between the ends of the dispersive air pipes for
combustion (11, 31);

wherein the ash discharged between the parallel
dispersive air pipes for combustion (11, 31) is discharged
through a space under the dispersive air pipes for combustion
(11, 31) toward the ash discharge outlet (6), and incombustible
material on the dispersive air pipes for combustion (11, 31) is
discharged through the incombustible material discharge space
(12, 32) toward the ash discharge outlet (6).

2. A fluidized bed incinerator comprising:

an ash discharge outlet (6) formed in the base portion of
a furnace main unit (1);





a plurality of dispersive air pipes for combustion (21),
containing a large number of dispersive air holes (13, 14) formed
therein, which project in a cantilever fashion from a side wall (1f)
in an oblique downward direction at the lower portion of a
combustion zone (2b) of the furnace main unit (1) and are positioned
in parallel to each other spaced so that ash can be discharged
therebetween; and

an incombustible material discharge space (22) formed
between the ends of the dispersive air pipes for combustion (21) and
a side wall (1g);

wherein the ash discharged between the parallel dispersive
air pipes for combustion (21) is discharged through a space under the
dispersive air pipes for combustion (21) toward the ash discharge outlet (6),
and incombustible material on the dispersive air pipes for combustion
(21) is discharged through the incombustible material discharge
space (22) toward the ash discharge outlet (6).

