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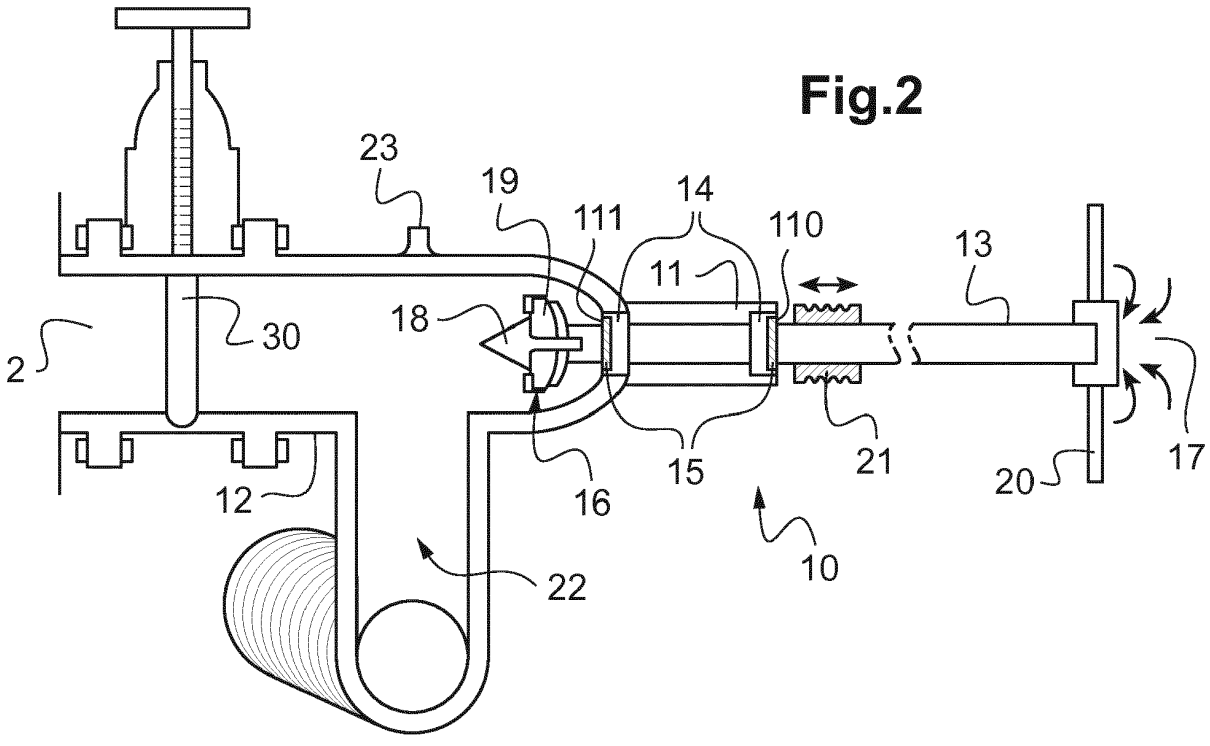
(54) DEVICE AND METHOD FOR SAFELY REMOVING BLOCKING MATERIALS IN AN INCINERATOR ASH QUENCH DRAIN PIPE

(57) A device 10 for removing a blocking material in a quenched ash extractor drain pipe 2 of an incineration system is provided. The device 10 comprises: a pipe 11; a connecting part 12 configured to connect the pipe 11 to a gate valve 30 of the quenched ash extractor drain pipe 2; and a ram 13 with a first end 16 configured to break the blocking material and to be slidably guided through the pipe 11 into the quenched ash extractor drain pipe 2. Hence the device 10 provides an improved solution to remove more safely and effectively the hot water from a quenched ash extractor 222 then therefore the blockage of incinerator bottom ashes in the quenched ash extractor 222 of the incineration system.

Fig.2



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Description

TECHNICAL FIELD

[0001] The present invention relates generally to the field of incineration systems.

[0002] The present invention relates more particularly to a device for removing blocking materials in a quenched ash extractor water drain pipe of an incinerator therefore allowing hot water to safely drain from the quenched ash extractor and clear any blocked material within the quenched ash extractor, an incineration system comprising said device, and a method of operating said device.

BACKGROUND ART

[0003] There is a known incineration system which treats commercial, industrial or municipal wastes. A moving grate incinerator is one typical incineration system for municipal solid wastes (MSWs), where the moving grate enables the movement of the waste through the combustion chamber to be optimized to allow an efficient and complete combustion. The waste is introduced by a waste crane through the "throat" at one end of the grate, then dried and burnt on the grate at a high temperature (about 850 to 950 °C) accompanied with a supply of combustion air. The waste then moves down over the descending grate to the ash pit in the other end, where treated with water for cooling and cleaning out.

[0004] With such an incineration system, some solid wastes remain not burned on the grate. Remaining solid wastes, so-called incinerator bottom ashes (IBAs), consist of unburned organic material (char), large pieces of metal, glass, ceramics, and inorganic fine particles, etc. Those IBAs are collected in a quenched ash extractor, which may be a chute and also referred to as a quench pit or a deslagger, beneath the burnout section of the grate. The quenched ash extractor is filled with water for cooling down the IBAs.

[0005] The quenched ash extractor regularly undergoes blockage because the refuse burnt in the incinerator may contain non-conforming materials including large piece of wood, mattresses, metallic frames, etc., or due to unburnt material floating on the surface of the water forming a raft which prevents IBA sinking into the ash extractor. Such blockage due to unburned or poorly combusted IBAs in the quenched ash extractor may require the whole system to shutdown for removing it.

[0006] In case of such blockage, manual maintenance operation is needed to remove the quench water and blocking materials in the quenched ash extractor. In order to access the blockage, a safety valve is used to open the quenched ash extractor. However, extremely hot water flows from the opened hole, which may result in casualties and severe injuries for the operator. The conventional safety valves do not allow controlling such manual maintenance operation in an efficient way, and does not allow removing and solving the blockage itself.

[0007] By way of example, WO 02/29322 discloses that fluxing agents are added to the waste in order to prevent such blockage. However, such fluxing agents might not be effective for certain non-conforming materials contained in the blockage and adding the fluxing agents can be potentially harmful may again impair the safety for the operator.

[0008] Thus there is a need for an improved method for removing more efficiently and safely the hot water to allow clearing of such blocking IBAs in the incineration system.

SUMMARY OF INVENTION

[0009] It is an objective of the present invention to solve all or part of the above-cited problems in the prior art.

[0010] Such an objective of the present invention can be achieved with, according to a first aspect of the present invention, a device for removing a blocking material in a quenched ash extractor drain pipe of an incineration system allowing hot water to drain from a quenched ash extractor, particularly to clear a floating blockage within the ash extractor or to dislodge non-conforming material within the ash extractor, comprising:

- a pipe;
- a connecting part configured to connect the pipe to a gate valve of the quenched ash extractor drain pipe;
- a ram with a first end configured to break the blocking material and to be slidably guided through the pipe into the quenched ash extractor drain pipe; and
- evacuation means configured to allow the evacuation of said broken blocking material from said quenched ash extractor drain pipe.

[0011] The device according to the first aspect of the present invention enables the operator of the incineration system to access the built-up IBAs within the drain pipe and break and remove the blockage of the IBAs safely and efficiently, without being exposed to any harmful burning water, steam, oil and/or dust from the quenched ash extractor. Further, it eliminates the need to add any additional fluxing agents as in WO 02/29322 but rather provides a solution to more directly access and remove the blockage itself to allow the hot water to drain from the ash extractor. It may solve the blockage even if certain non-conforming materials may be contained, and may eliminate the need to provide additional parts for application of such fluxing agents with the incineration system. Further yet the device of the present invention may be configured relatively compact in the huge entire incineration system, thus may be conveniently installed in a limited space of the incineration system without adding further spatial requirements.

[0012] In an advantageous embodiment, the evacuation means comprise a draining pipe connected to the connecting part leading to a drain of the incineration sys-

tem. The device according to this embodiment thus enables hot water to be flushed away from the quenched ash extractor to the drain while preventing any casualty or injury of the operator. Also, the device according to this embodiment enables broken blocking materials to be smoothly flushed away from the quenched ash extractor to the drain.

[0013] In an exemplary embodiment, preferably the pipe may be connected to the connecting part via at least one bush comprising a liquid proof and/or dust proof seal. The device according to this embodiment thus enables a liquid-tight and/or dust-tight closed system, resulting in an improved safety for the operator.

[0014] In particular, the ram comprises a breaking means at a first end, said first end being configured to be slidably guided through the pipe into the quenched as extractor.

[0015] Preferably the ram may comprise a spike at the first end. The device according to this embodiment thus enables removing the blockage in the quenched ash extractor drain pipe more efficiently and effectively with the spike penetrating and crushing the built up IBAs.

[0016] In the above exemplary embodiment, preferably the spike may be surrounded by a cutting means. Preferably yet the cutting means may comprise a cutting head and/or a cutter mill. The device according to those embodiments facilitates removing the blockage in the quenched ash extractor drain pipe by adding more breaking forces to the spike at the first end of the ram.

[0017] In another exemplary embodiment, preferably the ram may comprise a handle at a second end opposed to the first end. The device according to this embodiment thus enables an operator to use such a handle to move the ram more easily and efficiently without too much effort.

[0018] In another exemplary embodiment, the device may further comprise a slide hammer mounted on the ram. The device according to this embodiment thus enables the operator to remove the ram from the quenched ash extractor drain pipe more easily even if the ram should become stuck within the drain pipe by the built up IBAs.

[0019] In yet another exemplary embodiment, preferably the connecting part may further comprise a water tap on its outer surface for flushing at high pressure water into the device. The device according to this embodiment thus enables to safely wash away broken blocking materials and/or ashes "stuck" on the first end of ram. In other words, the water tap allows to restore the "breaking efficiency" of the device, while preserving the safety of the operator, as the system is a closed system. In addition, the water tap is very advantageous as it allows to wash the first end of the ram very rapidly, i.e. within a matter of seconds, so that removing the stuck broken blocking materials does not significantly slow down the operating of the device of this embodiment. Therefore, cleaning operations may be repeated to improve the efficiency of the breaking of the blocking materials, while not significantly slowing down the method of the invention.

[0020] Preferably the ram may be configured as a stainless steel ram or as chrome plated ground mild steel ram. The device according to this embodiment enables an improved strength and an improved corrosion resistance, the water in the quenched ash extractor being particularly corrosive.

[0021] As an alternative solution, the ram could be made of a chrome plated milled steel ram.

[0022] Preferably the ram may be configured as one of a threaded ram, an electric motor driven ram, hydraulically driven ram and a pneumatically driven ram. The device according to this embodiment facilitates removing the blockage in the quenched ash extractor drain pipe by increasing the breaking forces of the ram to break the built up IBAs within the drain pipe and allow the hot water to be removed safely.

[0023] According to a second aspect, there is also provided an incineration system comprising:

a quenched ash extractor, a quenched ash extractor drain pipe (2) configured to collect and cool down ashes during combustion process; and

a device according to any one of the above embodiments, configured to be connected to said quenched ash extractor.

[0024] According to a third aspect, there is also provided a method for operating a device according to any one of the above embodiments, for removing a blocking material in a quenched ash extractor drain pipe of an incineration system to allow safe draining of the hot water from the ash extractor, comprising steps of:

a) connecting the device through the connecting part to the gate valve of the quenched ash extractor;

b) opening the gate valve of the quenched ash extractor;

c) sliding the ram through the pipe into the quenched ash extractor; and

d) cutting the blocking material within the drain pipe and gate valve with a first end of the ram to allow the hot water to drain.

[0025] In an exemplary embodiment, preferably the method may further comprise steps of:

e) closing the gate valve of the quenched ash extractor; and

f) removing the device from the quenched ash extractor.

[0026] In another exemplary embodiment, preferably the method may further comprise a step of repeating the steps c) and d).

[0027] In yet another exemplary embodiment, the method may further comprise a step of flushing water

into the device, gate valve, ash extractor drain pipe and the quenched ash extractor drain pipe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The above and other objects, features and advantages of the present invention will be made apparent from the following description of the preferred embodiments, given as non-limiting examples, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic view of a conventional incineration system.
Fig. 2 is a block diagram of a device according to an embodiment of the present invention, connected to a quenched ash extractor of the incineration system.
Fig. 3 shows exemplarily a bush.
Fig. 4 shows exemplarily a first end of the ram with a spike surrounded by a cutting means.
Fig. 5 shows exemplarily a slide hammer provided around the ram.
Fig. 6 shows exemplarily a water tap provided on the connecting part of the device.
Fig. 7 is a flow chart illustrating a method according to an embodiment of the present invention.
Fig. 8 is a schematic view of an incineration system comprising a device according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0029] Hereinafter an embodiment of the present invention is described with reference to the accompanying drawing, in which the same components are indicated with the same reference numerals.

[0030] Fig. 1 a schematic view illustrating an exemplary conventional incineration system. The incineration system 1 may be a moving grate incinerator, sometimes also referred to as a Municipal Solid Waste Incinerator (MSWI) commonly used for MSWs.

[0031] As shown in Fig. 1, a quenched ash extractor 222 is situated at the downstream of the moving grate 1 and residual IBAs 3 unburnt, non-conforming waste or poorly combusted material after the combustion process on the grate 1 have built up or become stuck in the quenched ash extractor 222. Being left unsolved, those IBAs 3 would build up and prevent any ash falling into the ash extractor and the entire facility would therefore have to be shut down.

[0032] The device according to the present invention enables removing such blockages built up in the quenched ash extractor 222 by safely and efficiently breaking up the built up IBAs 3 into smaller pieces which are located within the water drain pipe 2 and therefore allowing the water to be removed safely from the ash extractor 222 and therefore dislodging the blockage thus preventing any c entire system shutdown.

[0033] An exemplary embodiment of the present invention is now described with reference to Fig. 2.

[0034] The device 10 of the present invention comprises a pipe 11.

[0035] The pipe 11 is an elongated hollow tube and may be made of for example steel, bronze, or any suitable material in view of resistance against the high temperature and durability, etc.

[0036] The length and the dimension of the pipe 11 may be configured appropriately for the sake of ease of operation and/or safety for the operator.

[0037] The pipe 11 is configured to be connected to a gate valve 30 of the quenched ash extractor drain pipe 2 via a connecting part 12.

[0038] One end of the connecting part 12 is configured to be fixed to the gate valve 30 of the quenched ash extractor drain pipe 2 with one or more bolts or screws in a liquid-proof and/or dust-proof way.

[0039] The connecting part 12 comprises an inner space to receive or accommodate therein a ram 13 as described below.

[0040] It should be appreciated that the gate valve 30 of the quenched ash extractor drain pipe 2 may be any type of the standard valve known and commonly used in the art of the field of incinerator, for example a globe valve, a ball valve, a butterfly valve or a lambda port valve, etc.

[0041] Thus the end portion of the connecting part 12 of the device 10 to be fixed to the gate valve 30 may be configured accordingly in conformity with the specification of the gate valve 30.

[0042] Preferably, any adapter or interposing means can be further employed to make the connecting part 12 of the device 10 compatible to a different dimension and/or shape of the gate valve 30 of the quenched ash extractor drain pipe 2.

[0043] Further the pipe 11 comprises at least one bush 14, also referred as bushing. As used herein, the bush or bushing is intended to mean a bearing or a nested sleeve which can be inserted into the pipe 11 as generally considered by a person skilled in the art of the field of mechanics.

[0044] As exemplarily shown in Fig. 3, such at least one bush 14 comprises a liquid proof and/or dust proof seal 15. Thus the bush 14 may assure that the pipe 11 is kept water-tight, oil-tight and dust-proof so that an operator handling the device 10 will not be exposed to any harmful burning water from the quenched ash extractor 222.

[0045] The number of bushes 14 is not limited to 1 or 2 but 3 or more bushes may be employed as needed. However, it might be preferable to provide at least one bush at the proximal end 111 where the pipe is connected to the connecting part so that the connection between the pipe and the connecting part is tightly sealed.

[0046] Further it might be preferable to provide another bush at the distal end 110 of the pipe so as to provide tight seal between the inner circumference of the pipe 11 and the outer circumference of the ram 13 described be-

low.

[0047] By way of example only, in an embodiment illustrated in Fig. 2 and to be hereinafter described, two bushes 14 are seated within the pipe 11, specifically a first bush at the proximal end 111 where the pipe 11 is connected to the connecting part 12 and a second bush at the distal end 110 of the pipe 11. However, the number and/or the position of the bush(es) 14 are not limited thereto but rather any other number and/or the position of the bush(es) 14 might be conceivable appropriately.

[0048] The bush 14 may be made of for example, but not limited to, bronze or leaded bronze and may comprise a grease nipple to allow lubrication.

[0049] Through the above-described pipe 11, a ram 13 is slidably guided into the connecting part 12, and thus into the quenched ash extractor drain pipe 2 for accessing the IBAs 3 built up in the quenched ash extractor drain pipe 2. That is, the pipe 11 may serve as a guide for the ram 13 to move into the quenched ash extractor drain pipe 2.

[0050] As used herein, the ram is intended to mean a plunger- or piston-like feature to force or drive with a heavy impact, as generally considered by a person skilled in the art in the field of mechanics.

[0051] However, it might be conceivable to employ any dimension or shape of the ram 13 as long as it can be slidably guided through the pipe 11 in to the quenched ash extractor drain pipe 2.

[0052] The ram 13 is also free in rotation in the pipe 11, so it can be either slid and/or rotated into the quenched ash extractor drain pipe 2.

[0053] By way of example only, the ram 13 may be configured as a threaded ram or rod with its external surface knurled or notched in order to increase the breaking forces by the rotating ram 13 moved into the quenched as extractor drain pipe 2, but not limited thereto.

[0054] Alternatively, the ram 13 may be configured to be electric motor driven, hydraulic driven or pneumatically driven.

[0055] These exemplary embodiments may provide further breaking forces with the ram 13 to facilitate breaking the built up IBAs 3.

[0056] The ram 13 may be made of for example chrome plated steel, stainless steel or bronze but not limited thereto.

[0057] As described above, the ram 13 slides through the bush(es) 14 within the pipe 11. The bush 14 may provide a tight seal 15 between the inner circumference of the pipe 11 and the outer circumference of the ram 13 so that any harmful burning water, steam, oil or dust will escape therefrom, without preventing smooth sliding of the ram 13 through the pipe 11.

[0058] A first end 16 of the ram 13 which is to be inserted into the quenched ash extractor drain pipe 2 is configured to break the blocking material, i.e. the built up IBAs within the quenched ash extractor drain pipe 2.

[0059] As an exemplary embodiment, the first end 16 of the ram 13 comprises a spike 18 configured to penetrate and crush the built up IBAs 3, as exemplarily illustrated in Fig. 4.

[0060] The spike 18 can be made of steel or bronze but not limited thereto.

[0061] As exemplarily shown in Fig. 4, the spike 18 may be surrounded by a further cutting means 19 for adding further crushing forces. Such a cutting means 19 may be configured as a cutting head and/or a cutting mill, for example a carbide milling cutter, but not limited thereto. Any feature like a protrusion, a sharp edged blade or grinder, etc. may be provided with the first end 16 of the ram 13 for adding further physical or mechanical forces to break the built up IBAs within the quenched ash extractor drain pipe 2.

[0062] The ram 13 may be configured as a single integral body, but can be alternatively configured as a nested or telescopic structure. In the latter case only a portion of the ram 13 including the first end 16 may be telescopically extended and slidably inserted into the pipe 11. It should be appreciated that the joints of such telescope-type ram should be rigid and robust enough so that the operator can handle the ram easily and effectively to provide sufficient mechanical forces for breaking the built up IBAs.

[0063] The device 10 of the present invention may further comprise a handle and/or any other leverage means 20 which can be used by the operator to move the ram 13 more easily and efficiently without too much effort. Such a handle and/or any other leverage means 20 can be provided, for example at the other end, namely a second end 17 of the ram 13 which is opposite to the first end 16 and distal to the quenched ash extractor drain pipe 2. However, the handle and/or any other leverage means 20 may be provided at any parts of the device 10 appropriately. The operator may use such a handle 20 as leverage to slide and/or push the ram 13 through the pipe 11 more easily and efficiently. The handle 20 may also be useful to provide grinding forces with the first end 16 for breaking the built up IBAs 3. Preferably a weighted mass may be employed for giving inertia to drive the ram into the built up IBAs within the quenched ash extractor drain pipe 2.

[0064] Preferably the device 10 of the present invention may comprise a slide hammer 21 around the ram 13, for example between the pipe 11 and the handle 20, as exemplarily shown in Fig. 5. The slide hammer 21 may be made of bronze or leaded bronze, etc. but not limited thereto.

[0065] It might be conceivable for a person skilled in the art to employ any standard slide hammer which is known and commonly used in the art of the field of mechanics. Such a slide hammer 20 may help remove the ram 13 from the quenched ash extractor drain pipe 2 should it become stuck within the built up IBAs 3. Specifically, if the ram 13 is stuck and blocked in the IBAs 3 and cannot be removed from the quenched ash extractor drain pipe 2 with a manpower of the operator, then the slide hammer 21 may be used to hit the handle 20 of the

ram 13 for giving more energy to remove it from the quenched ash extractor drain pipe 2.

[0066] Further the device 10 of the present aspect may comprise isolation locks to prevent the ram 13 being inserted while the quenched ash extractor 222 is in operation. This may provide an additional safety measure.

[0067] The connecting part 12 as described above may comprise one or more final draining pipe(s) 22 advantageously configured to lead the extracted water to the drains of the incineration system and/or the plant in a safe manner without risk of scalding water and ash to persons.

[0068] As exemplarily shown in Fig. 6, a water tap 23 may be provided with the connecting part 12 for flushing high pressure water inside to clear paths within the device 10. The water tap 23 may be provided on the top of the connecting part 12, at the outer surface of the connecting part 12 for example, but not limited thereto. Thus the resulting ashes, metals and any other substances broken up from the built up IBAs within the quenched ash extractor drain pipe 2 with the device 10 of the present invention may be washed and cleared away with the water from the quenched ash extractor drain pipe 2.

[0069] The water tap 23 delivers a relatively high pressure water in order to flush away the broken blocking material, for instance at a pressure of at least 160 bars.

[0070] Subsequently an operation of the device for removing the built up IBAs in the quenched ash extractor drain pipe 2 may be described with reference to Fig. 7 which illustrates a flowchart of the operation.

[0071] First, the device 10 of the present invention is connected to the gate valve 30 of the quenched ash extractor drain pipe 2 while the gate valve 30 is closed S1.

[0072] Specifically, the pipe 11 of the device 10 is connected via the connecting part 12 to the gate valve 30 of the quenched ash extractor drain pipe 2.

[0073] The ram 13 may have been already inserted in the pipe 11, or may be inserted after connecting the pipe 11 to the gate valve 30 via the connecting part 12. With the gate valve 30 of the quenched ash extractor drain pipe 2 closed, there is no communication of liquid and/or dust between the device 10 of the present invention and the quenched ash extractor drain pipe 2, thus the operator may safely connect the device 10 to the quenched ash extractor drain pipe 2 without being exposed to any harmful burning water, steam, oil and/or dust from the quenched ash extractor 222.

[0074] Then the gate valve 30 of the quenched ash extractor drain pipe 2 is opened S2. It is to be noted that the connecting part 12, the pipe 11 and the ram 13 of the device 10 are tightly sealed liquid-proof and/or dust-proof thus the operator will not be exposed to any harmful burning water, steam, oil and/or dust from the quenched ash extractor drain pipe 2 via the gate valve 30. The connection between the gate valve 30 and the connecting part 12 is also securely tight sealed with bolts and/or screws, or any other suitable means.

[0075] After the gate valve 30 is opened, the ram 13, specifically its first end 16 is slidably inserted S3 into the quenched ash extractor drain pipe 2 through the pipe 11 and the connecting part 12 for accessing the built up IBAs within the quenched ash extractor drain pipe 2. That is, only after the gate valve 30 is opened, a flow path and communication between the quenched ash extractor drain pipe 2 and the device 10 of the present invention will be provided.

[0076] Thus the first end 16 of the ram 13 may be advanced into the quenched ash extractor drain pipe 2, passing through the inner space of the connecting part 12.

[0077] The operator may use the handle, and/or any other leverage means 20 to move the ram 13 easily and efficiently without too much effort.

[0078] Then the ram 13 is moved S4, specifically slid, pulled and pushed forward and backward, and/or rotated etc. for giving mechanical forces to its first end to break/crush the built up, hard-packed IBAs within the quenched ash extractor drain pipe 2. For example, the spike 18 at the first end 16 may penetrate the IBAs within the quenched ash extractor drain pipe 2 and/or the cutting mill 19 may grind the IBAs within the quenched ash extractor drain pipe 2 to break them up into smaller pieces.

[0079] When the device 10 comprises the high pressure water tap 23 at the connecting part 12, the high pressure water tap 23 may be opened S5 for allowing the water and the broken materials to flow out of the quenched ash extractor 222.

[0080] The above steps S4 and/or S5 may be repeated independently or alternatingly until the blockage in the quenched ash extractor drain pipe 2 is cleared and the water flows freely inside exiting to drain through the final drain pipe 22 therefore lowering the water level within the quenched ash extractor and clearing the floating blockage within the quenched ash extractor 222.

[0081] Should the ram 13 become stuck in the hard-packed IBAs within the quenched ash extractor drain pipe 2, the slide hammer 21 may be employed for helping move the ram 13.

[0082] After the ram 13 is removed S6 from the quenched ash extractor drain pipe 2, the gate valve 30 of the quenched ash extractor drain pipe 2 is closed again.

[0083] Finally, after firmly closing the gate valve 30, the whole device 10 can be removed S7 from the quenched ash extractor drain pipe 2.

[0084] As described above, the device of the present invention enables the operator of the incineration system to access the built-up IBAs within the quenched ash extractor drain pipe 2 and break and remove the blockage of the IBAs within the quenched ash extractor drain pipe 2 safely and efficiently to allow the hot water to drain from the quenched ash extractor 222, without being exposed to any harmful burning water, steam, oil and/or dust from the quenched ash extractor.

[0085] Further, it is not necessary to add any additional fluxing agents as in WO 02/29322 but rather the device

of the present invention provides a solution to more directly access and remove the blockage within the quenched ash extractor drain pipe 2 itself. Indeed, the device of the present invention may solve the blockage even if certain non-conforming materials may be contained by draining the hot water in a safe manner, and may eliminate the need to provide additional parts for application of such fluxing agents with the incineration system.

[0086] Further yet the device of the present invention may be configured relatively compact in the huge entire incineration system, thus may be conveniently installed in a limited space of the incineration system without adding further spatial requirements.

[0087] Although the above embodiments and specific aspects of the present invention have been described in the context of the moving grate incinerator, the application of the device of the present invention is not limited thereto. Rather the device of the present invention may be used mutatis mutandis for any incineration system to remove the blocking residues in a furnace or incinerator. A person skilled in the art may conceive any modification including adding and/or omitting any feature to/from the device of the present invention for adapting it to different types of incinerator.

Claims

1. A device (10) for removing a blocking material in a quenched ash extractor drain pipe (2) of an incineration system allowing hot water to drain from a quenched ash extractor (222), comprising:

   A pipe (11);
   a connecting part (12) configured to connect the pipe (11) to a gate valve (30) of the quenched ash extractor drain pipe (2);
   a ram (13) with a first end (16) configured to break the blocking material and to be slidably guided through the pipe (11) into the quenched ash extractor drain pipe (2); and
   evacuation means (22) configured to allow the evacuation of said broken blocking material from said quenched ash extractor drain pipe (2).

2. The device (10) according to claim 1, wherein said evacuation means (22) comprise a final draining pipe (22) connected to the connecting part (12), advantageously leading to a drain of the incinerator system.

3. The device (10) according to claim 1 or 2, wherein the pipe (11) is connected to the connecting part (12) via at least one bush (14) comprising a liquid proof and/or dust proof seal (15).

4. The device (10) according to any one of claims 1 to 3, wherein the ram (13) comprises a spike (18) at the first end (16).

5. The device (10) according to claim 4, wherein the spike (18) is surrounded by a cutting means (19).

6. The device (10) according to claim 5, wherein the cutting means (19) comprises a cutting head and/or a cutter mill.

7. The device (10) according to any one of claims 1 to 6, wherein the ram (13) comprises a handle (20) at a second end (17) opposed to the first end (16).

8. The device (10) according to any one of claims 1 to 7, further comprising a slide hammer (21) mounted on the ram (13).

9. The device (10) according to any one of claims 1 to 8, wherein the connecting part (12) further comprises a water tap (23) on its outer surface for flushing at high pressure water into the device (10).

10. The device (10) according to any one of claims 1 to 9, wherein the ram (13) is configured as a stainless steel ram.

11. The device (10) according to any one of claims 1 to 10, wherein the ram (13) is configured as one of a threaded ram, an electric motor driven ram, a hydraulically driven ram and a pneumatically driven ram.

12. An incinerator system comprising:

    a quenched ash extractor (222), a quenched ash extractor drain pipe (2) configured to collect and cool down ashes during combustion process; and
    a device (10) according to any one of claims 1 to 11, configured to be connected to said quenched ash extractor drain pipe (2).

13. A method for operating a device according to any one of claims 1 to 11, for removing a blocking material in a quenched ash extractor drain pipe (2) of an incineration system to allow safe draining of the hot water from the ash extractor (222), comprising steps of:

    a) connecting the device (10) through the connecting part (12) to the gate valve (30) of the quenched ash extractor drain pipe (2);
    b) opening the gate valve (30) of the quenched ash extractor drain pipe (2);
    c) sliding the ram (13) through the pipe (11) into the quenched ash extractor drain pipe (2); and
    d) cutting the blocking material within the drain

pipe (2) and gate valve (30) with a first end of the ram (13) to allow the hot water to drain.

14. The method according to claim 13, further comprising steps of:

e) closing the gate valve (30) of the quenched ash extractor (222); and
f) removing the device (10) from the quenched ash extractor (222).

15. The method according to claim 13 or 14, further comprising a step of repeating the steps c) and d).

16. The method according to any one of claims 13 to 15, further comprising a step of flushing water into the device (10) and the quenched ash extractor drain pipe (2).

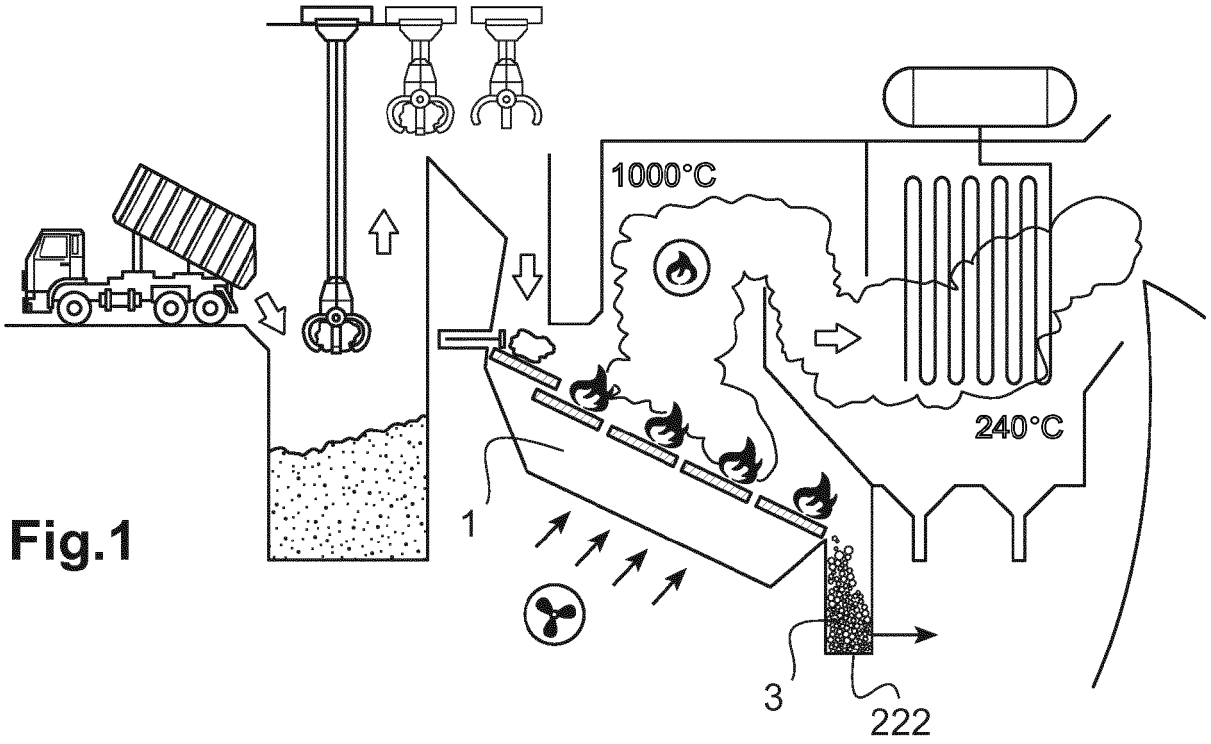

1000°C
240°C
1
3
222

Fig.1

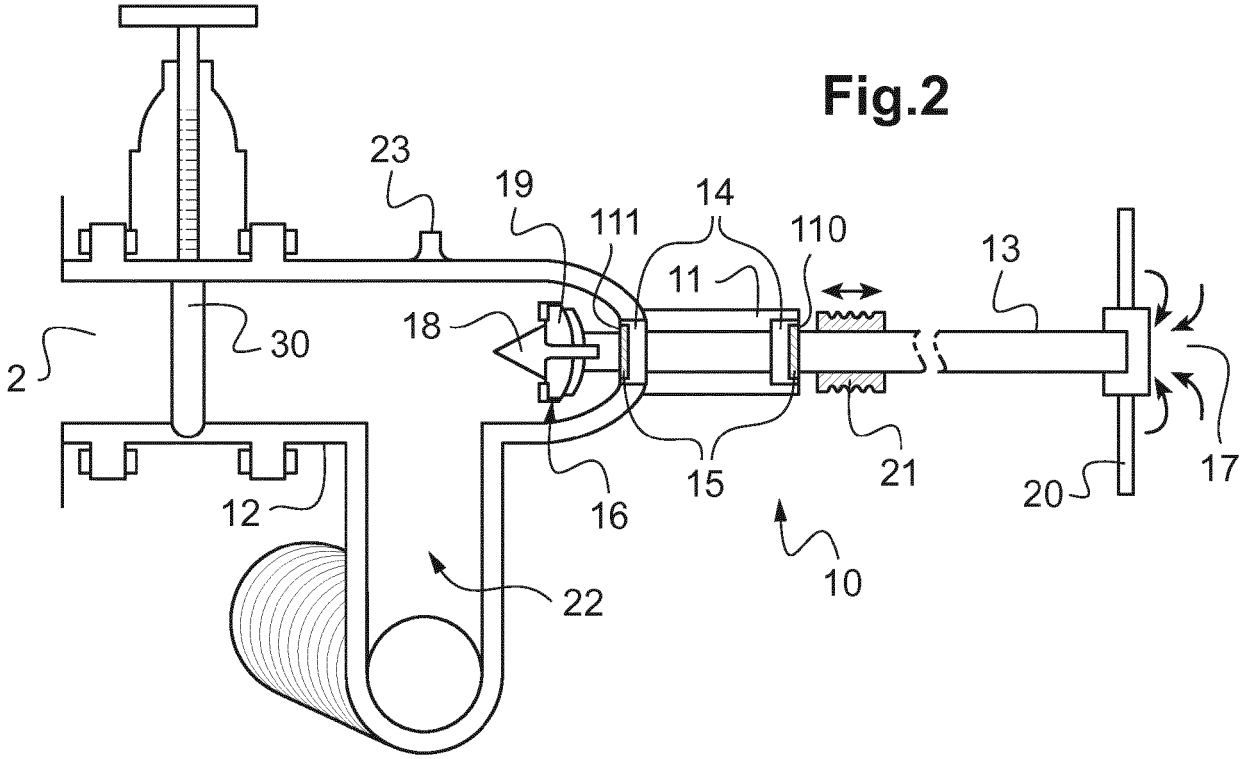

23
19
111
14
110
13
11
18
2
30
12
16
15
21
20
17
22
10

Fig.2

Fig.3

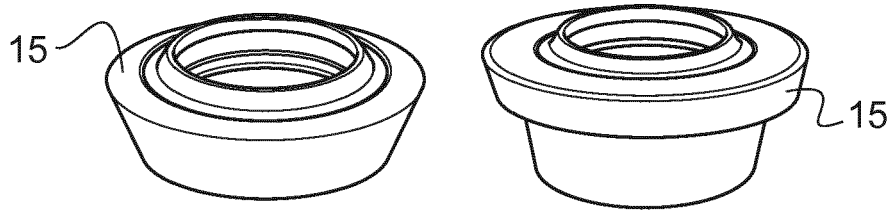


Fig.4

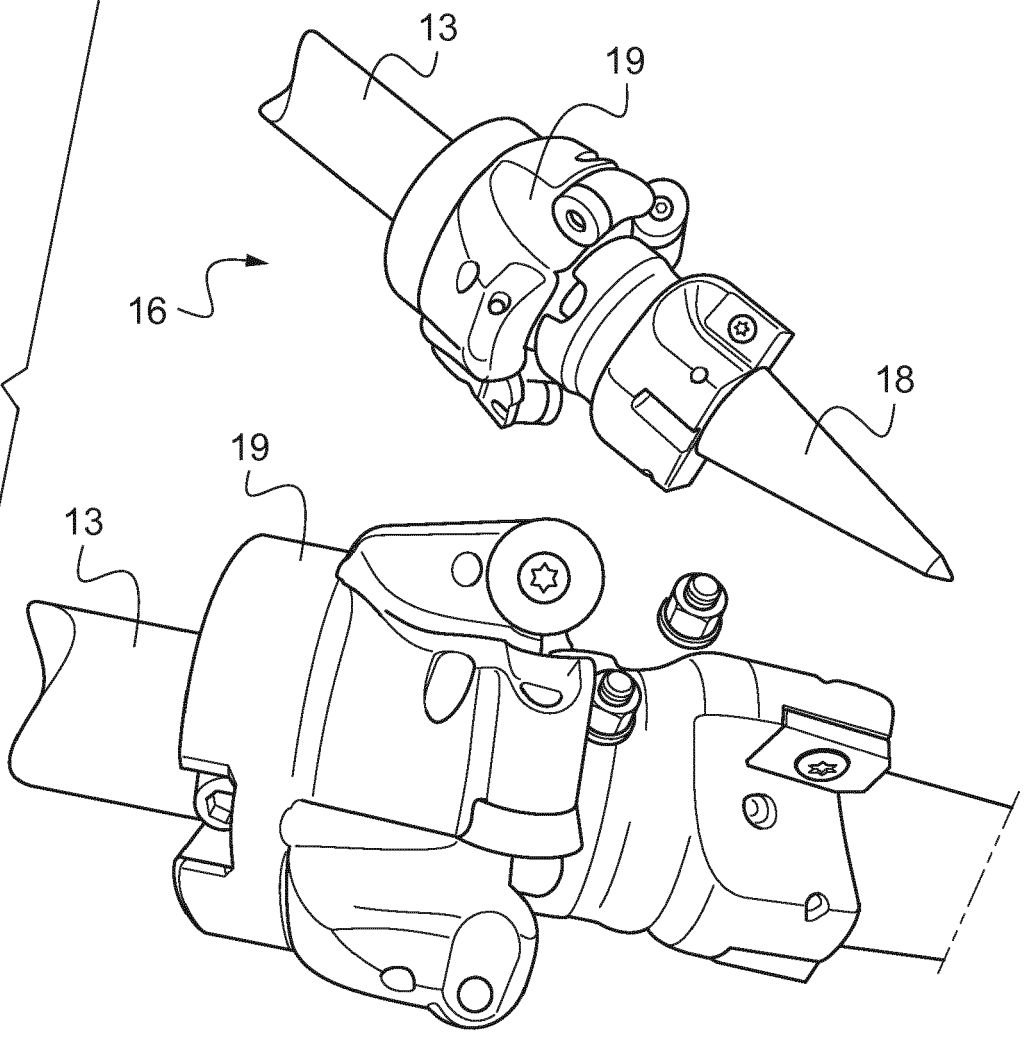


Fig.5

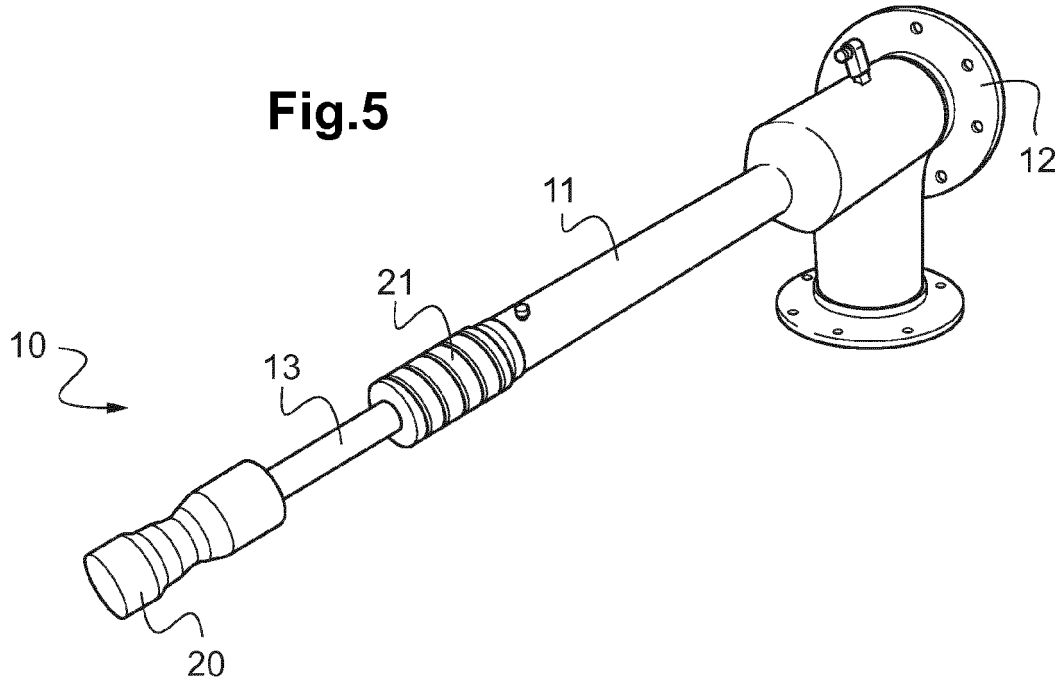

10
11
12
13
20
21

Fig.7

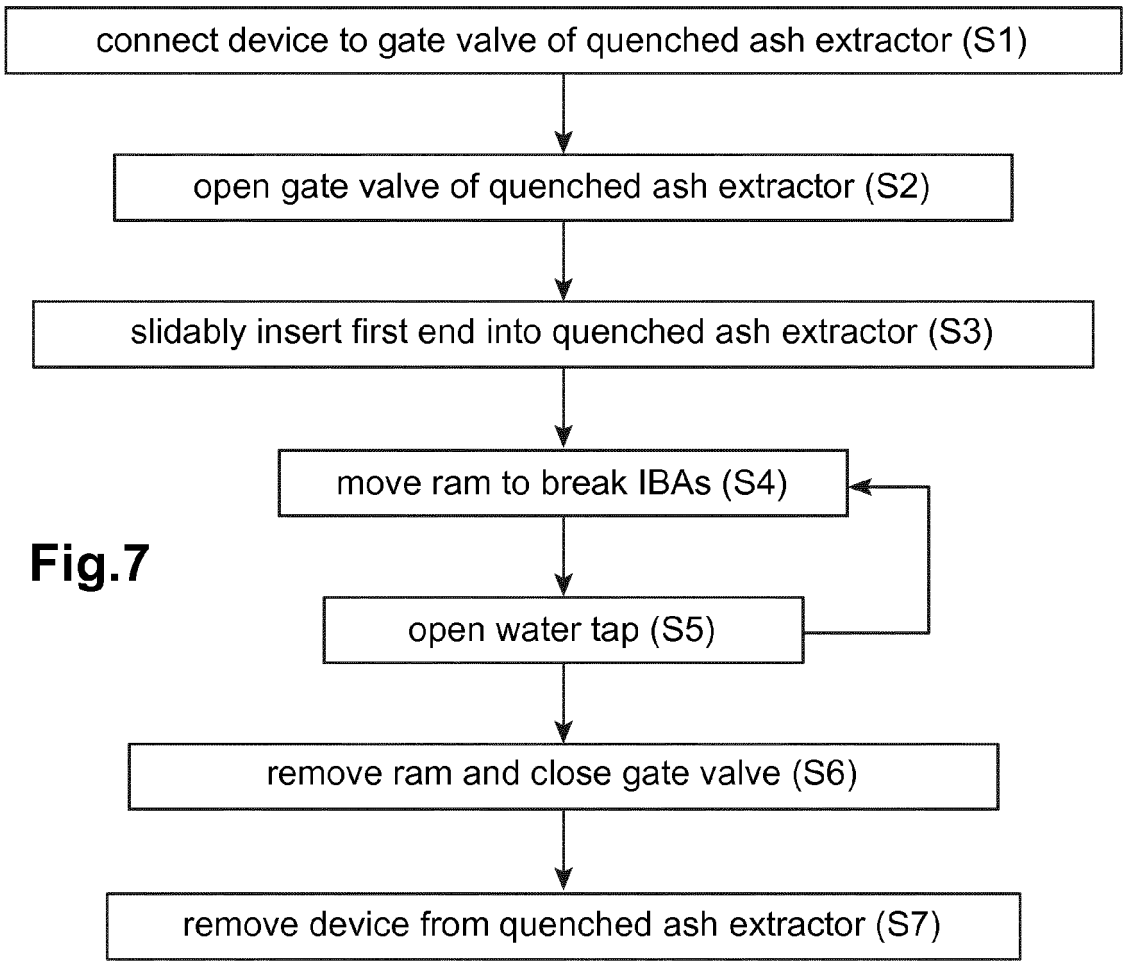
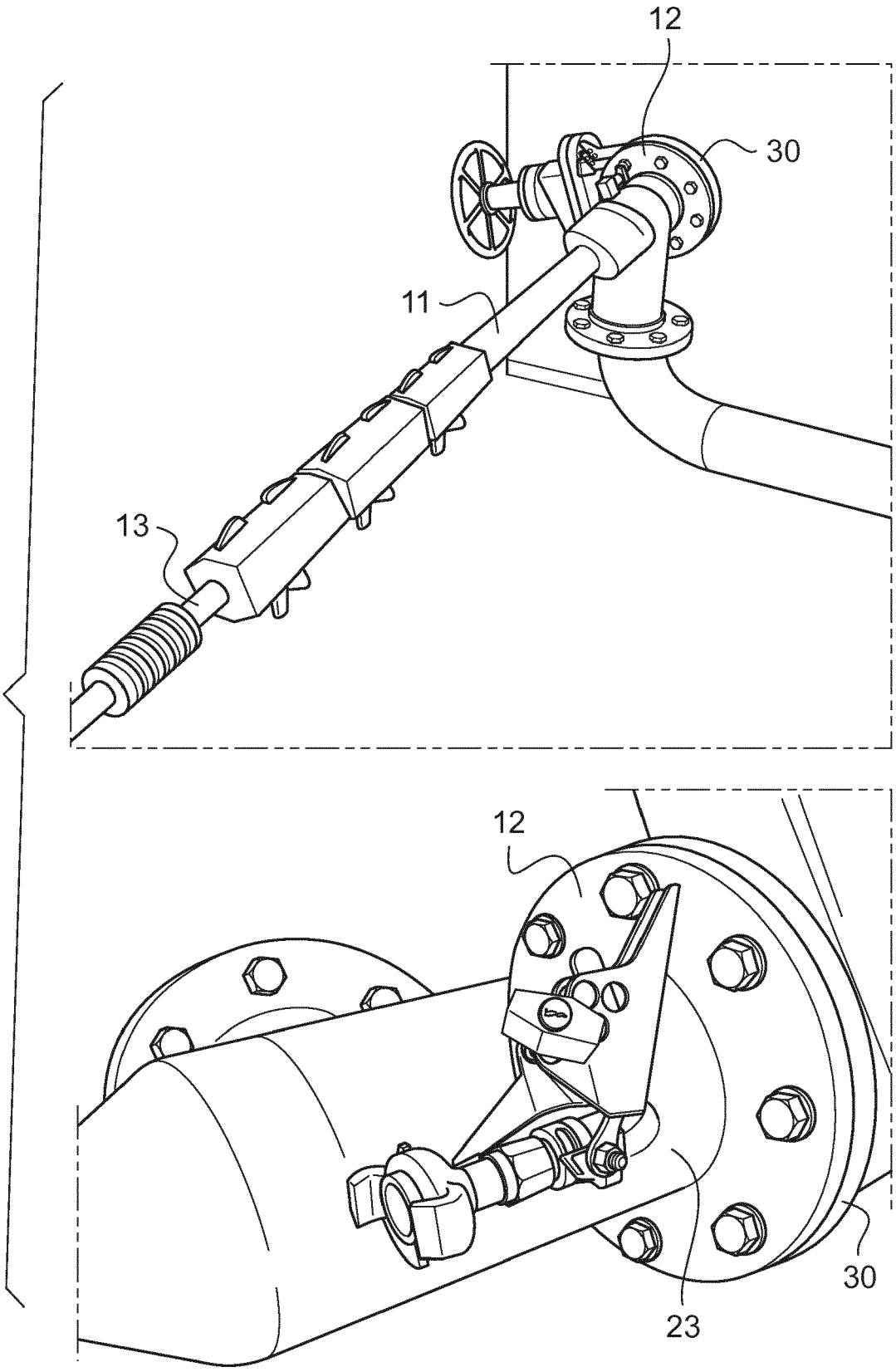

connect device to gate valve of quenched ash extractor (S1)
open gate valve of quenched ash extractor (S2)
slidably insert first end into quenched ash extractor (S3)
move ram to break IBAs (S4)
open water tap (S5)
remove ram and close gate valve (S6)
remove device from quenched ash extractor (S7)

Fig.6



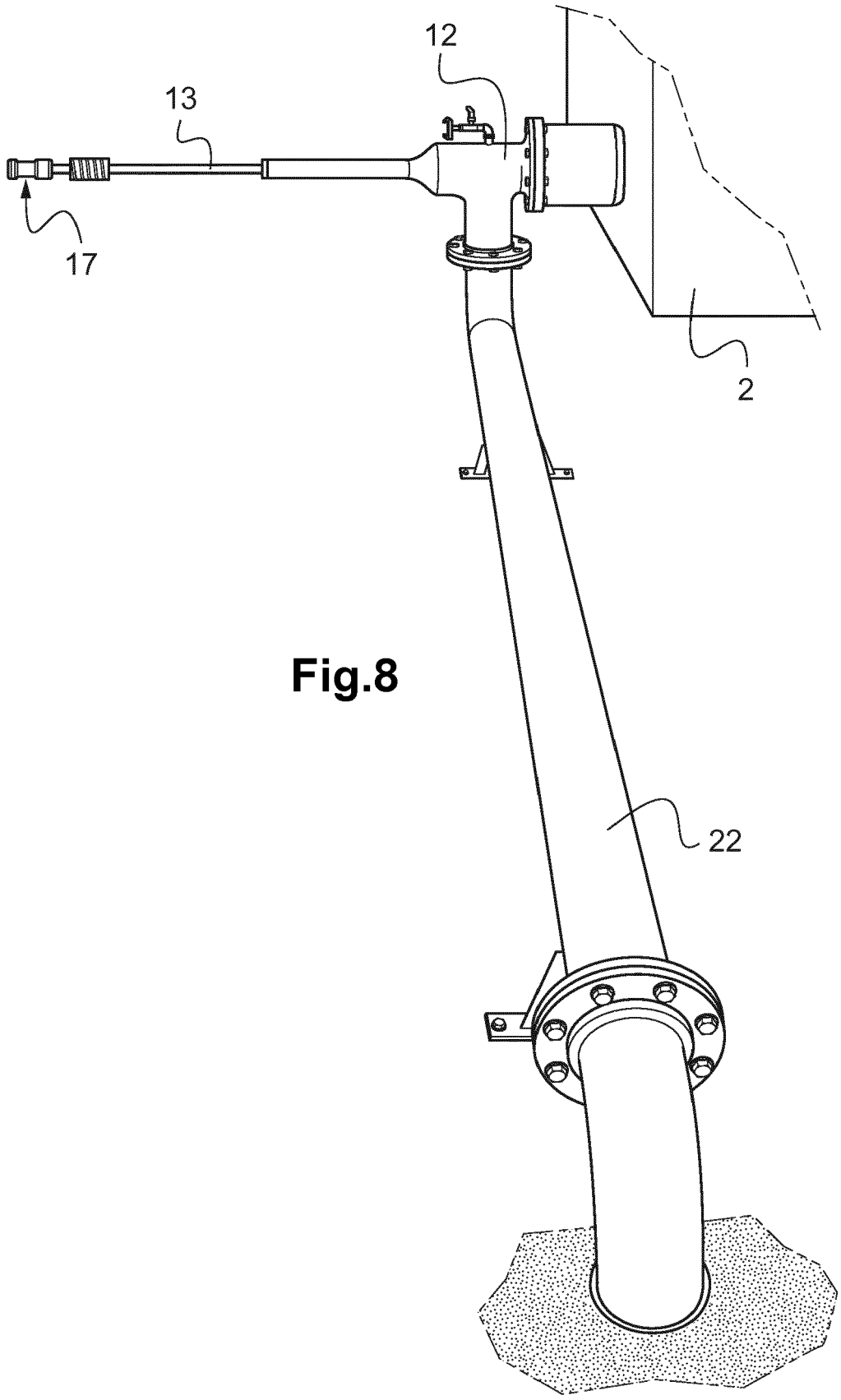


Fig.8

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EUROPEAN SEARCH REPORT

Application Number
EP 19 30 5545

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 647 287 A (KUENNEN LARRY E [US] ET AL) 15 July 1997 (1997-07-15) * column 2, line 13 - column 8, line 64 * * figures 1-8 *	1-4,7-16	INV. F23J1/02
X	JP S59 158851 U (CHIYODA MARUNOUCHI, NATSUO SHIOYA) 24 October 1984 (1984-10-24) * the whole document *	1-3,7, 11,12	
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TECHNICAL FIELDS SEARCHED (IPC)

F23J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 July 2019	Rudolf, Andreas

CATEGORY OF CITED DOCUMENTS

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11-07-2019

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