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(54) **Non-clogging nozzle**

(57) The present invention relates to a nozzle (1) and the use of such a nozzle (1) comprising two areas (3, 4) at a fluid outlet end (2) of the nozzle (1) wherein a first area (3) comprises an opening (3) for the outlet of the

main part of the fluid and a second area (4) where material of an reduced permeability compared to the first area (3) is provided to influence the flow of the fluid flowing through that second area (4) to change the fluid characteristic at the outlet end (2) of the nozzle (1).

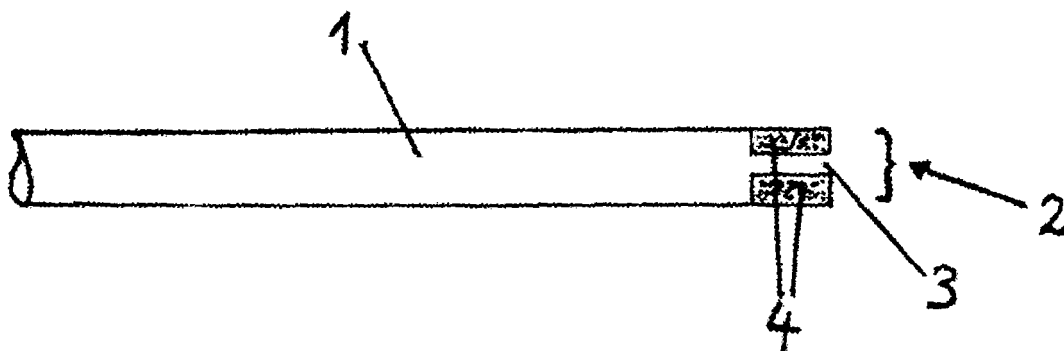


Fig.

Description

[0001] The present invention relates to a nozzle with a fluid outlet end.

[0002] There are a lot of different types of nozzles with different fluid characteristics at the outlet end where a fluid leaves a nozzle. Turbulences are known to occur in the outer area of the flow when leaving the nozzle. In dusty environments this could cause a build-up of dust particles around the nozzle outlet, especially when a high velocity nozzle is used. The build-up could cause clogging of the nozzle outlet or part of it. Therefore, it may happen that the flow out of the nozzle is disturbed or even interrupted. This should be avoided by all means.

[0003] A common measure to avoid clogging is to reduce the speed of the flow leaving the nozzle. However, a high velocity of the flow leaving the nozzle has certain advantages which are to be considered.

[0004] For example, a nozzle used as a burner in a metal melting furnace, e.g. as an oxy-fuel or air burner in the aluminium industry, will be much more effective if the gases leave the nozzle with a high velocity. High velocities implicate the advantage of recirculating exhaust gases that will reduce the maximum flame temperature, which in turn will reduce the NO_x-emission and the dross formation (oxidation of aluminium, for example).

[0005] Due to the above-mentioned advantages of high fluid velocities, it is an object of the present invention to create a nozzle which is adapted to its use in dusty environments even for high fluid velocities whereby problems with clogging of the nozzle are to be avoided.

[0006] In accordance with the present invention this object is solved by a nozzle comprising two areas at a fluid outlet end of the nozzle wherein a first area comprises an opening for the outlet of the main part of the fluid and a second area where material of a reduced permeability compared to the first area is provided to influence the flow of the fluid flowing through that second area to change the fluid characteristic at the outlet end of the nozzle.

[0007] The present invention is useful for all kinds of nozzles from simple pipes with constant, narrowed or widened diameter at an outlet end to nozzles of a certain shape and flow characteristic such as laval or venturi nozzles, for example.

[0008] As an example for a material of reduced permeability all material having pores should be considered. There are materials with natural or induced pores. Fine pored materials as well as micro-pores can be of great advantage. Also semipermeable materials can be useful.

[0009] The inventive nozzle is capable of being used with all known fluids like gases and liquids. For example fuel gas, air, oxygen or liquid fuels are to be mentioned.

[0010] In an embodiment of the present invention the second area surrounds the first area.

[0011] In a preferred embodiment of the present invention the material of reduced permeability is a sintered material, especially a sintered metal.

[0012] In a further preferred embodiment of the present invention a material of reduced permeability is chosen with a permeability adapted to change the fluid characteristic in such a way that the outlet end of the nozzle is kept clear of clogging material.

[0013] In accordance with the present invention the object of the present invention is also solved by the use of a nozzle according to any of the claims 1 to 4 in a melting furnace, especially in a metal or glass melting furnace.

[0014] The present invention has the advantage of creating a nozzle that is not subject to dust build-up around the nozzle outlet even if high fluid velocities are used in a very dusty environment. Therefore, the need for nozzle cleaning is reduced and high velocity nozzles can be used in environments which are not recommended for the use of common high velocity nozzles. All former described further advantages of high velocity nozzles naturally come along with the present invention.

[0015] An embodiment of the present invention is described in greater detail below with reference to the figure, wherein the

Figure shows a nozzle according to the present invention.

[0016] The figure shows a nozzle 1 formed as a pipe of constant diameter. The nozzle 1 has an outlet end 2 with an opening 3 as a first area 3 and a second area 4 where the material of reduced permeability is placed. In this example, the nozzle 1 comprises a sintered material of reduced permeability in area 4. The opening 3 can be created by drilling a hole 3 into the sintered material. This is a very simple method to build a nozzle according to the present invention. For example, the sintered material is attached to the outlet end of a pipe with a diameter of 2 cm and filling the last 2 cm of that pipe in length. A hole of 4 mm in diameter drilled into the sintered material concentrically to the pipe forms the opening 3. The sintered material has a permeability adapted to influence the flow of the fluid flowing through the second area 4 to change the fluid characteristic at the outlet end 2 of the nozzle 1 in such a way that the outlet end 2 of the nozzle 1 is kept clear of clogging material that might otherwise obstruct the flow.

Claims

1. Nozzle (1) comprising two areas (3, 4) at a fluid outlet end (2) of the nozzle (1) **characterized in that** a first area (3) comprises an opening (3) for the outlet of the main part of the fluid and a second area (4) where material of a reduced permeability compared to the first area (3) is provided to influence the flow of the fluid flowing through that second area (4) to change the fluid characteristic at the outlet end (2) of the nozzle (1).

2. Nozzle (1) according to claim 1, wherein the second area (4) surrounds the first area (3).
3. Nozzle (1) according to claim 1 or 2, wherein the material of reduced permeability is a sintered material, especially a sintered metal. 5
4. Nozzle (1) according to any of the claims 1 to 3, wherein a material of reduced permeability is chosen with a permeability adapted to change the fluid characteristic in such a way that the outlet end (2) of the nozzle (1) is kept clear of clogging material. 10
5. Use of a nozzle (1) according to any of the claims 1 to 4 in a melting furnace, especially in a metal or glass melting furnace. 15

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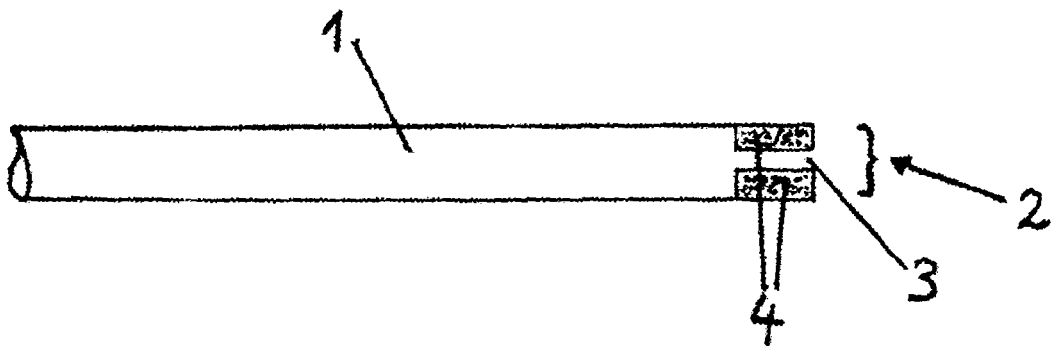


Fig.



European Patent
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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 September 2006	Examiner Coquau, Stéphane
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 06 00 7313

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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