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(54) Apparatus for blasting dry ice

(57) The invention relates to an apparatus for blasting dry ice comprising a compressed air supply (1), an ice pellet supply (2), a mixer (3,4,5) for mixing ice pellets and compressed air and an outlet (6) to which a blasting pistol can be connected, which mixer (3,4,5) comprises a disc (5), rotatably disposed between two non-rotatable plates (3,4), and wherein the compressed air supply (1) and the ice pellet supply (2) each debouch in a first of the non-rotatably disposed plates (3), and wherein the outlet connects to the oppositely disposed second non-rotatable plate (4), and wherein the rotatable disc (5) has one or several holes which during rotation of the disc (5) alternatingly connect to the ice pellet supply (2,2') on the one hand and the compressed air supply (1) and the outlet (6) on the other hand, wherein the compressed air supply (1) has at least two outlets (1', 1'') in the first non-rotatable plate (3). The outlet (6) is provided with at least two inlet openings (6',6'') in the second non-rotatable plate (4), arranged in pairs opposite to the outlet openings (1',1'') of the compressed air supply (1) in the first non-rotatable plate (3), so as to form through-passages when the hole or holes in the disc (5) are aligned with the outlet openings (1',1'') of the compressed air supply (1).

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Description

[0001] The invention relates to an apparatus for blasting dry ice comprising a compressed air supply, an ice pellet supply, a mixer for mixing ice pellets and compressed air and an outlet to which a blasting pistol can be connected, which mixer comprises a disc, rotatably disposed between two non-rotatable plates, and wherein the compressed air supply and the ice pellet supply each debouch in a first of the non-rotatably disposed plates, and wherein the outlet connects to the oppositely disposed second non-rotatable plate, and wherein the rotatable disc has one or several holes which during rotation of the disc alternatingly align with the ice pellet supply on the one hand and the compressed air supply and the outlet on the other hand, wherein the compressed air supply has at least two outlets in the first non-rotatable plate.

[0002] Such an apparatus is known from the Dutch patent NL-C-1015216, and is used for blasting solid frozen carbon dioxide granules, also called pellets, with great force onto a surface to be cleaned.

[0003] It is the object of the invention to improve the known apparatus such that a more powerful and more even blast is obtained. To this end the apparatus according to the invention is characterised, in that the outlet is provided with at least two inlet openings in the second non-rotatable plate, arranged in pairs opposite to the outlet openings of the compressed air supply in the first non-rotatable plate, so as to form through-passages when the hole or holes in the disc are aligned with the outlet openings of the compressed air supply.

[0004] Surprisingly, it has been shown that by doubling the number of inlet openings of the outlet, a dry ice blast twice as powerful is produced, while the amount of ice pellets supplied is the same as with an apparatus of the prior art. A further increase of the number of inlet openings of the outlet will even better this result. Referring to the foregoing, the person skilled in the art will be able to choose the number of inlet openings, so that a further explanation with regard to its implementation is not necessary.

[0005] A further advantage obtained with the apparatus according to the invention is that the blast is not only more powerful but also more even and free of pulsation in the discharged dry ice blast.

[0006] The above-mentioned advantages are achieved while maintaining the favourable properties of the apparatus known from the cited prior art. In brief these advantages are as follows.

[0007] A small amount, from 1m^3/min., of compressed air enables the apparatus according to the invention to produce a powerful blast at a dry-ice consumption ranging from only 5 kg/hour up to a maximum of 40 kg/hour.

[0008] When in use, the apparatus according to the invention produces a sound pressure of approximately 79 dB(A) at a standard operating pressure of 5 bars.

[0009] The working performance of the apparatus according to the invention is further advanced by the disc being provided with a series of holes positioned at regular distances from each other and equidistanced from the centre of the disc.

[0010] The invention will now be further elucidated with reference to the drawing of a non-limiting exemplary embodiment of the apparatus according to the invention.

[0011] The drawing shows in:

- Fig. 1 a schematic cross section of the active components of the apparatus according to the invention.
- Figs. 2 and 3, respectively, a cross-section of the non-rotatable upper plate and lower plate of the apparatus according to the invention.

[0012] Identical reference numbers in the figures refer to similar components.

[0013] Referring first to Fig. 1 showing the active components of the apparatus according to the invention. These include a dual compressed air supply 1 generally connected to a common compressed air source (not shown), an ice pellet supply 2 embodied as a hopper, a mixer 3, 4, 5 for mixing the ice pellets and compressed air, and an outlet 6 to which a blasting pistol can be connected. The mixer 3, 4, 5 comprises a rotatable disc 5 disposed between non-rotatable plates 3 and 4. As can be seen in the figure, both the compressed air supply 1 and the ice pellet supply 2 each debouch in one of the non-rotatably disposed plates 3, 4, in the case illustrated this is the upper plate 3. These outlet openings are clearly shown in Fig. 2 carrying the reference numbers 1', 1'' and 2', respectively.

[0014] Referring partly also to Fig. 3, the other non-rotatably disposed plate, i.e. the lower plate 4, is provided with two inlet openings 6' and 6'' for the outlet 6. In a manner quite clear to the person skilled in the art and therefore not further illustrated in the drawing, the rotatable disc 5 is provided with one or several holes which during rotation of the disc 5 alternatingly align on the one hand with the ice pellet supply 2 and on the other hand with the compressed air supply 1 and the outlet 6. As clearly shown in connection with Fig. 2 and Fig. 3, the inlet openings 6' and 6'' of the outlet 6 are disposed in pairs in the extended direction of the outlet openings 1' and 1'' of the compressed air supply 1, such that when the hole or the holes align with the outlet openings 1', 1'' of the compressed air supply 1 they form through-passages. In a manner that is obvious to the person skilled in the art, the disc 5 is preferably provided with a series of holes at regular distances from one another and equidistanced from the centre of the disc, so that when the disc is being rotated, such a through-passage can be realised at high frequency.

[0015] Both Fig. 1 and Fig. 2 show that the compressed air supply 1 comprises two outlet openings 1' and 1'' positioned diametrically in relation to one anoth-

er. In this way the compressed air load on the rotatable disc is symmetrical, allowing it to rotate with the least possible friction between the non-rotatably disposed plates 3 and 4. Fig. 1 further shows that the non-rotatably disposed plates 3 and 4 are fixed in relation to one another by means of fixing pins 7. These pins further serve to fasten the plates 3 and 4 to each other. The pins 7 are further provided with spring rings 8 exerting a slight upward pressure that pushes the non-rotatably disposed plates 3 and 4 toward each other, so as to avoid leakage loss between these non-rotatable plates 3 and 4 and the rotatable disc 5. Fig. 1 further schematically shows that the rotating disc 5 is coupled with an air-operated engine 9. In this connection the Figs. 2 and 3 show slots 10 provided in the upper plate 3 and the lower plate 4, for venting excess driving air. The apparatus according to the invention produces an excellent, constant blast that is virtually free of pulsation.

Claims

1. An apparatus for blasting dry ice comprising a compressed air supply (1), an ice pellet supply (2), a mixer (3, 4, 5) for mixing ice pellets and compressed air and an outlet (6) to which a blasting pistol can be connected, which mixer (3, 4, 5) comprises a disc (5), rotatably disposed between two non-rotatable plates (3, 4), and wherein the compressed air supply (1) and the ice pellet supply (2) each debouch in a first of the non-rotatably disposed plates (3), and wherein the outlet connects to the oppositely disposed second non-rotatable plate (4), and wherein the rotatable disc (5) has one or several holes which during rotation of the disc (5) alternatingly align with the ice pellet supply (2, 2') on the one hand and the compressed air supply (1) and the outlet (6) on the other hand, wherein the compressed air supply (1) has at least two outlets (1', 1") in the first non-rotatable plate (3), **characterised in that** the outlet (6) is provided with at least two inlet openings (6', 6") in the second non-rotatable plate (4), arranged in pairs opposite to the outlet openings (1', 1") of the compressed air supply (1) in the first non-rotatable plate (3), so as to form through-passages when the hole or holes in the disc (5) are aligned with the outlet openings (1', 1") of the compressed air supply (1).

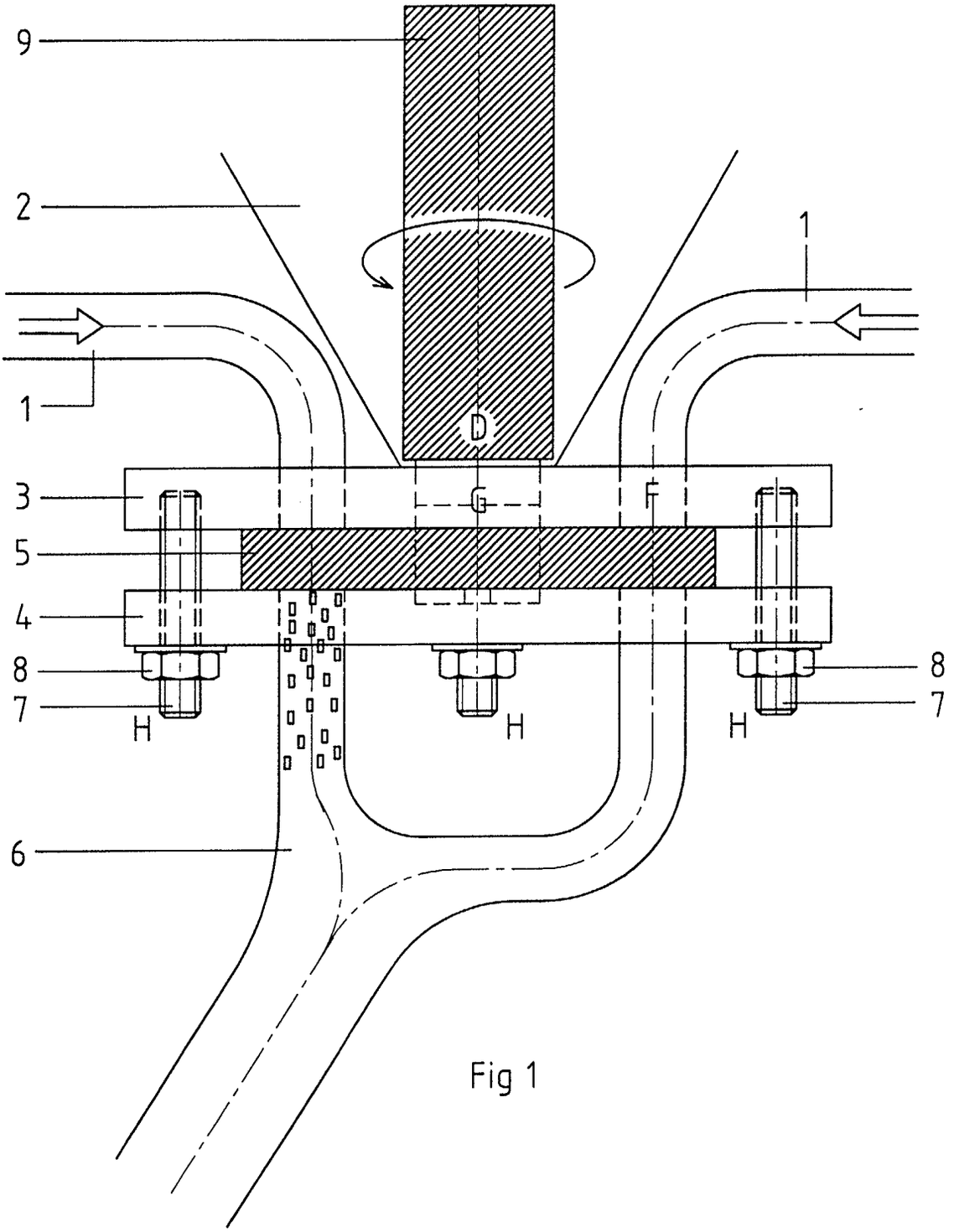

Fig 1

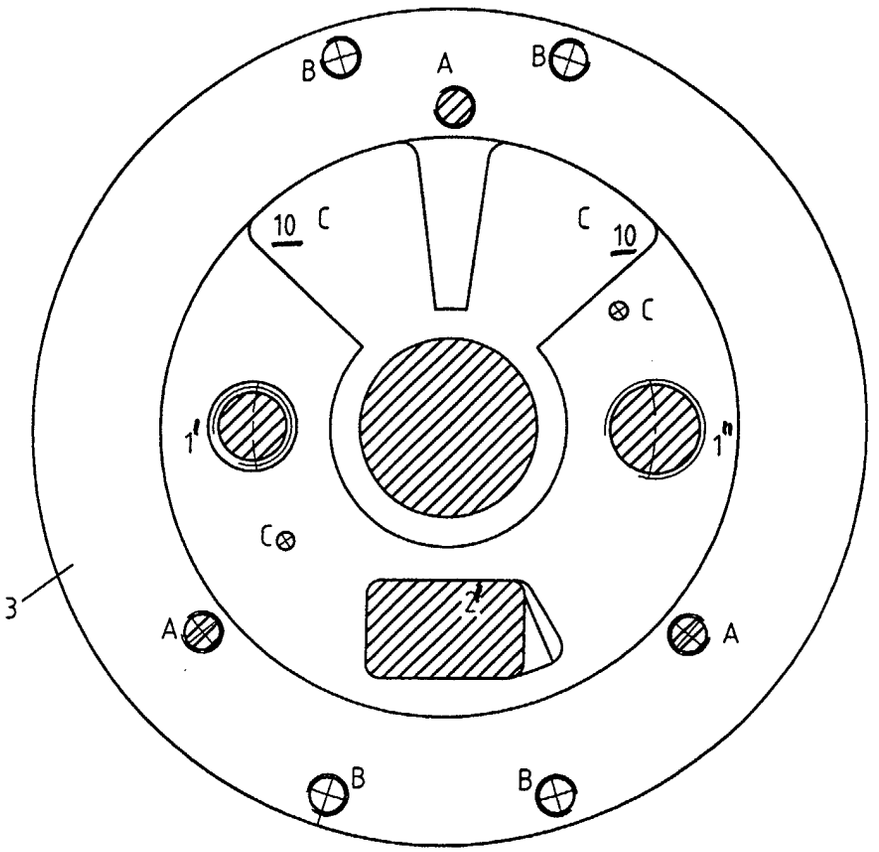

Fig 2

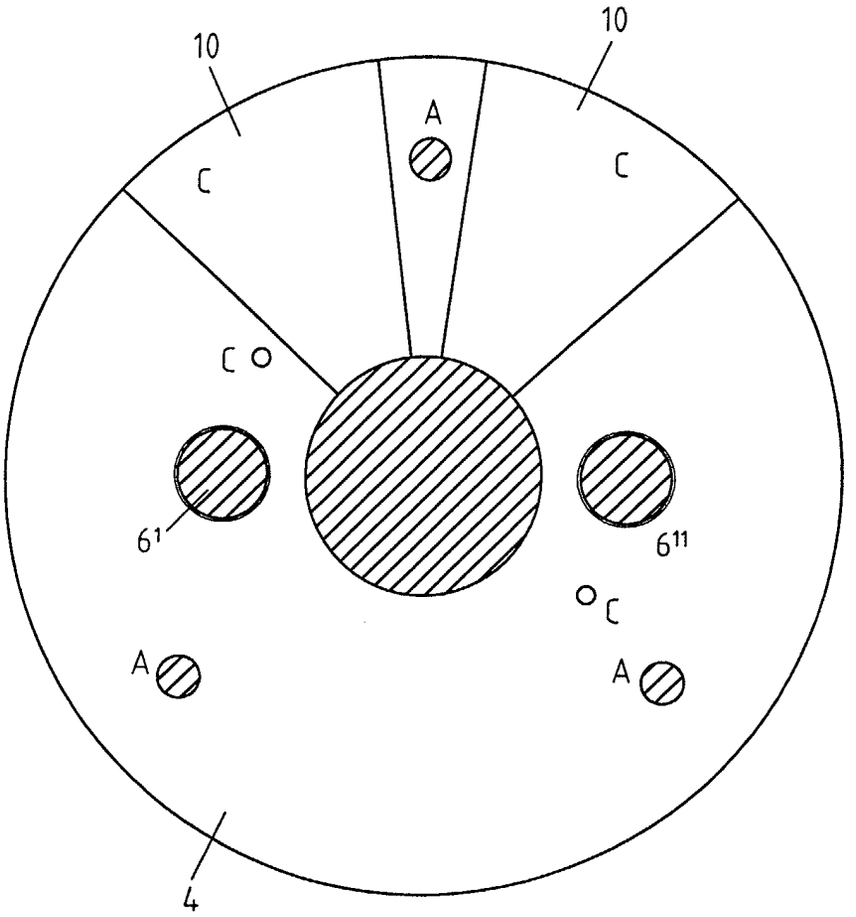

Fig 3

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EUROPEAN SEARCH REPORT

Application Number
EP 03 07 5359

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 June 2003	Popma, R

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 07 5359

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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16-06-2003

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