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(54) **EXHAUST AIR BLOW-OUT DEVICE**

(57) An exhaust air blow-out device (1) comprising a throttling device (6). The throttling device (6) comprises a nose cone element (7) having an outer contour with aerodynamic shape of a nose cone. The nose cone element (7) is arranged concentrically inside the connector collar (3). The nose cone element (7) comprises a tip (T) directed towards the exhaust air flow and a circular trailing edge (8; 8₁, 8₂, 8₃, 8₄, 8₅) having a second diameter (D₂₋₁ - D₂₋₆) smaller than the first diameter (D₁) defining a circular blow-out gap (9) between the inner surface (3) of the connector collar (2) and the trailing edge (8) of the nose cone element (7) the exhaust air being blown out via said circular gap (9) forming a throttling means. The

second diameter (D₂₋₁ - D₂₋₆) defines the throttling rate. The nose cone element (7) comprises a tip section (9) and a set (S) of adjusting sections (10, 11, 12, 13, 14) connectable successively with the tip section (9) to form an assembly forming the nose cone element (7) having a desired second diameter (D₂₋₁ - D₂₋₆) of the trailing edge (8). Each of the adjusting sections (10, 11, 12, 13, 14) have an outer contour being a part of said nose cone shape and having gradually increasing second diameters (D₂₋₁ - D₂₋₆) of the trailing edges. The number of adjusting sections can be varied for adjusting the exhaust air blow-out rate by adjusting the face area of the blow-out gap (9).

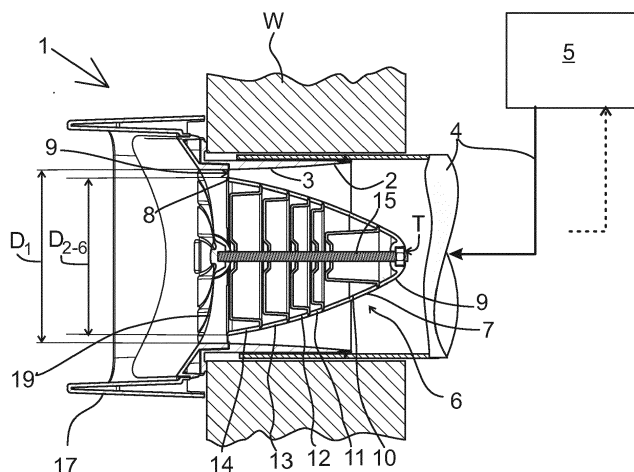


Fig. 2

Description

FIELD OF THE INVENTION

[0001] The present invention relates to an exhaust air blow-out device adapted for mounting to the outer wall of a building.

BACKGROUND OF THE INVENTION

[0002] In prior art is known an exhaust air blow-out device. The exhaust air blow-out device comprises a connector collar. The connector collar has a circular cross-section and an inner surface having an inner first diameter. The connector collar is connectable to an exhaust air channel of a mechanical house ventilation system to form a part of the exhaust air channel. A throttling device is arranged inside the connector collar for increasing blow-out rate of the exhaust air. The current building regulations require that the blow-out rate should be at least 5 m/s so that the exhaust air does not mix with the fresh intake air, the intake opening being often located near to the exhaust air blow-out device. However, exhaust air rate coming via the exhaust air channel from the mechanical house ventilation system to the blow-out device may be less than the required 5 m/s. Therefore, a throttling device is needed to increase the blow-out rate of the exhaust air. The problem with the prior art exhaust air blow-out devices is that the throttling rate of the throttling device is fixed and not variable depending on the prevailing exhaust air rate coming from the mechanical house ventilation system. A further problem is that the throttling device causes noise.

OBJECTIVE OF THE INVENTION

[0003] The objective of the invention is to alleviate the disadvantages mentioned above.

[0004] In particular, it is an objective of the present invention to provide an exhaust air blow-out device providing means for adjusting the blow-out rate of the exhaust air.

[0005] Further, it is an objective of the present invention to provide an exhaust air blow-out device which is optimized to reduce noise caused by blow-out of the exhaust air.

SUMMARY OF THE INVENTION

[0006] According to a first aspect, the present invention provides an exhaust air blow-out device adapted for mounting to the outer wall of a building. The exhaust air blow-out device comprises a connector collar. The connector collar has a circular cross-section and an inner surface having an inner first diameter. The connector collar is connectable to an exhaust air channel of a mechanical house ventilation system to form a part of the exhaust air channel. The exhaust air blow-out device comprises

a throttling device. The throttling device is arranged inside the connector collar for increasing blow-out rate of the exhaust air. According to the invention the throttling device comprises a nose cone element having an outer contour with aerodynamic shape of a nose cone. The nose cone element is arranged concentrically inside the connector collar. The nose cone element comprises a tip directed towards the exhaust air flow and a circular trailing edge having a second diameter smaller than the first diameter defining a circular blow-out gap between the inner surface of the connector collar and the trailing edge of the nose cone element the exhaust air being blown out via said circular gap forming a throttling means the second diameter defining the throttling rate. The nose cone element comprises a tip section and a set of adjusting sections connectable successively with the tip section to form an assembly forming the nose cone element having a desired second diameter of the trailing edge. Each of the adjusting sections have an outer contour being a part of said nose cone shape and gradually increasing second diameters of the trailing edges, so that the number of adjusting sections can be varied for adjusting the exhaust air blow-out rate by adjusting the face area of the blow-out gap.

[0007] The advantage of the invention is that due to the aerodynamic nose cone shape the throttling device has a small resistance of flow while being able to increase the blow-out rate of the exhaust air. Further, the aerodynamic nose cone shape reduces noise of the blow-out exhaust air flow. The set of adjusting elements enables adjusting the throttling rate to optimal for the exhaust air blow so that exhaust air blow-out rate can always be adjusted to be at least 5 m/s although the exhaust air volume flow rate can vary in the range e.g. 20 - 120 l/s depending on the output of the mechanical house ventilation system used. Same exhaust air blow-out device can be used for different the mechanical house ventilation systems.

[0008] In an embodiment of the exhaust air blow-out device, the number of the adjusting sections in the nose cone element is selected in order to obtain the exhaust air blow-out rate of at least 5 m/s.

[0009] In an embodiment of the exhaust air blow-out device, the nose cone element comprises an elongated fixing bolt, and that the tip section and the adjusting sections each comprises a central hole through which the fixing bolt can extend to connect the tip section and a selected number of adjusting sections together.

[0010] In an embodiment of the exhaust air blow-out device, the exhaust air blow-out device comprises a weather guard housing connectable to the outer wall of the building, the weather guard housing comprising a blow-out opening, and a grate connected to the weather-guard housing at the blow-out opening.

[0011] In an embodiment of the exhaust air blow-out device, grate comprises a central hub having a central hole through which the fixing bolt can extend to connect the grate, the tip section and the selected adjusting sections together.

[0012] In an embodiment of the exhaust air blow-out device, the tip section and/or at least one of the adjusting sections comprises a snap-fit joint for mutual interconnection.

[0013] In an embodiment of the exhaust air blow-out device, the nose cone shape of the nose cone element is elliptical.

[0014] In an embodiment of the exhaust air blow-out device, the nose cone shape of the nose cone element is parabolic.

[0015] It is to be understood that the aspects and embodiments of the invention described above may be used in any combination with each other. Several of the aspects and embodiments may be combined together to form a further embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The accompanying drawings, which are included to provide a further understanding of the invention and constitute a part of this specification, illustrate embodiments of the invention and together with the description help to explain the principles of the invention. In the drawings:

Figure 1 shows an exploded view of the exhaust air blow-out device according to an embodiment of the invention,

Figure 2 is a cross-section of the exhaust air blow-out device Figure 1 installed to an outer wall of a building.

Figure 3 shows separately a tip section and a set of adjusting sections of the device of Figure 1, and

Figures 4a-4f show six different configurations of the assemblies of the tip section and adjusting sections assembled together.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Figures 1 and 2 show an exhaust air blow-out device 1 adapted for mounting to the outer wall W of a building. The exhaust air blow-out device 1 comprises a connector collar 2. The connector collar 2 has a circular cross-section and an inner surface 3 having an inner first diameter D_1 . As can be seen in Figure 2, the connector collar 2 is connectable to an exhaust air channel 4 of a mechanical house ventilation system 5 to form a part of the exhaust air channel 4. Further, the exhaust air blow-out device 1 comprises a throttling device 6. The throttling device 6 is arranged inside the connector collar 3 for increasing the blow-out rate of the exhaust air,

[0018] The throttling device 6 comprises a nose cone element 7. The nose cone element 7 has a curved outer contour with aerodynamic shape of a nose cone. The nose cone element 7 is arranged concentrically inside

the connector collar 3. The nose cone element 7 comprises a tip T directed towards the exhaust air flow and a circular trailing edge 8; 8₁, 8₂, 8₃, 8₄, 8₅. The circular trailing edge 8; 8₁, 8₂, 8₃, 8₄, 8₅ has a second diameter $D_{2-1} - D_{2-6}$ which is smaller than the inner first diameter D_1 of the connector collar 3, so that a circular blow-out gap 9 is defined between the inner surface 3 of the connector collar 2 and the trailing edge 8; 8₁, 8₂, 8₃, 8₄, 8₅ of the nose cone element 7. Thereby, the exhaust air is blown out via said circular gap 9 forming a throttling means the second diameter $D_{2-1} - D_{2-6}$ defining the throttling rate.

[0019] Also referring to Figures 3 and 4a-4f, the nose cone element 7 comprises a tip section 9 and a set S of adjusting sections 10, 11, 12, 13, 14 connectable successively with the tip section 9 to form an assembly forming the nose cone element 7 which has a desired second diameter $D_{2-1} - D_{2-6}$ of the trailing edge 8. Each of the adjusting sections 10, 11, 12, 13, 14 have an outer contour being a part of the nose cone shape and have gradually increasing second diameters $D_{2-1} - D_{2-6}$ of the trailing edges. As seen in Figures 4a-4f, the number of adjusting sections in the nose cone assembly can be varied for adjusting the exhaust air blow-out rate by adjusting the face area of the blow-out gap 9.

[0020] The number of the adjusting sections 10, 11, 12, 13, 14 in the nose cone element 7 is selected in order to obtain the exhaust air blow-out rate of at least 5 m/s.

[0021] In Figure 4a the nose cone element 7 comprises only the tip section 9 having the diameter D_{2-1} of the trailing edge 8₁ defining the throttling rate. The throttling rate is at its smallest.

[0022] In Figure 4b the nose cone element 7 comprises the tip section 9 and first adjusting section 10. The trailing edge 8₂ of the first adjusting section 10 has a diameter D_{2-2} , larger than diameter D_{2-1} , for defining the throttling rate.

[0023] In Figure 4c the nose cone element 7 comprises the tip section 9, the first adjusting section 10 and second adjusting section 11. The trailing edge 8₃ of the second adjusting section 11 has a diameter D_{2-3} , larger than diameter D_{2-2} , for defining the throttling rate.

[0024] In Figure 4d the nose cone element 7 comprises the tip section 9, the first adjusting section 10, the second adjusting section 11 and third adjusting section 12. The trailing edge 8₄ of the third adjusting section 12 has a diameter D_{2-4} , larger than diameter D_{2-3} , for defining the throttling rate.

[0025] In Figure 4e the nose cone element 7 comprises the tip section 9, the first adjusting section 10, the second adjusting section 11, the third adjusting section 12 and fourth adjusting section 13. The trailing edge 8₅ of the fourth adjusting section 13 has a diameter D_{2-5} , larger than diameter D_{2-4} , for defining the throttling rate.

[0026] In Figure 4f the nose cone element 7 comprises the tip section 9, the first adjusting section 10, the second adjusting section 11, the third adjusting section 12, the fourth adjusting section 13 and the fifth adjusting section

14. The trailing edge 8₆ of the fifth adjusting section 14 has a diameter D₂₋₆, larger than diameter D₂₋₄, for defining the throttling rate. Referring to Figures 1 and 2, the nose cone element 7 comprises an elongated fixing bolt 15. The tip section 9 and the adjusting sections 10, 11, 12, 13, 14 each comprises a central hole 16 through which the fixing bolt 15 can be inserted to connect the tip section and a selected number of adjusting sections together.

[0027] As seen in Figures 1 and 2, the exhaust air blow-out device 1 comprises a weather guard housing 17 which is connectable to the outer wall W of the building. The weather guard housing 17 comprising a blow-out opening 18, and a grate 19 connected to the weather guard housing 17 at the blow-out opening 18. The grate 19 comprises a central hub 20 having a central hole 21 through which the fixing bolt 15 can extend to connect the grate 19, the tip section 9 and the selected number of adjusting sections 10, 11, 12, 13, 14 together.

[0028] The tip section 9 and/or at least one of the adjusting sections 10, 11, 12, 13, 14 may be interconnected by snap-fit joints.

[0029] The nose cone element 7 may have elliptical, parabolic or any other suitable nose cone shape.

[0030] Although the invention has been described in conjunction with a certain type of exhaust air blow-out device, it should be understood that the invention is not limited to any certain type of exhaust air blow-out device. While the present inventions have been described in connection with a number of exemplary embodiments, and implementations, the present inventions are not so limited, but rather cover various modifications, and equivalent arrangements, which fall within the purview of prospective claims.

Claims

1. An exhaust air blow-out device (1) adapted for mounting to the outer wall (W) of a building, the exhaust air blow-out device (1) comprising

- a connector collar (2), the connector collar (2) having a circular cross-section and an inner surface (3) having an inner first diameter (D₁), the connector collar being connectable to an exhaust air channel (4) of a mechanical house ventilation system (5) to form a part of the exhaust air channel, and
- a throttling device (6), the throttling device being arranged inside the connector collar (3) for increasing blow-out rate of the exhaust air, **characterized in that** the throttling device (6) comprises a nose cone element (7) having an outer contour with aerodynamic shape of a nose cone, the nose cone element (7) being arranged concentrically inside the connector collar (3), the nose cone element (7) comprising a tip (T) directed

towards the exhaust air flow and a circular trailing edge (8; 8₁, 8₂, 8₃, 8₄, 8₅) having a second diameter (D₂₋₁ - D₂₋₆) smaller than the first diameter (D₁) defining a circular blow-out gap (9) between the inner surface (3) of the connector collar (2) and the trailing edge (8) of the nose cone element (7) the exhaust air being blown out via said circular gap (9) forming a throttling means the second diameter (D₂₋₁ - D₂₋₆) defining the throttling rate; and that the nose cone element (7) comprises a tip section (9) and a set (S) of adjusting sections (10, 11, 12, 13, 14) connectable successively with the tip section (9) to form an assembly forming the nose cone element (7) having a desired second diameter (D₂₋₁ - D₂₋₆) of the trailing edge (8), each of the adjusting sections (10, 11, 12, 13, 14) having an outer contour being a part of said nose cone shape and having gradually increasing second diameters (D₂₋₁ - D₂₋₆) of the trailing edges, so that the number of adjusting sections can be varied for adjusting the exhaust air blow-out rate by adjusting the face area of the blow-out gap (9).

2. The exhaust air blow-out device according to claim 1, **characterized in that** the number of the adjusting sections (10, 11, 12, 13, 14) in the nose cone element (7) is selected in order to obtain the exhaust air blow-out rate of at least 5 m/s.

3. The exhaust air blow-out device according to claim 1 or 2, **characterized in that** the nose cone element (7) comprises an elongated fixing bolt (15), and that the tip section (9) and the adjusting sections (10, 11, 12, 13, 14) each comprises a central hole (16) through which the fixing bolt (15) can extend to connect the tip section and a selected number of adjusting sections together.

4. The exhaust air blow-out device according to any one of the claims 1 to 3, **characterized in that** the exhaust air blow-out device (1) comprises a weather guard housing (17) connectable to the outer wall (W) of the building, the weather guard housing comprising a blow-out opening (18), and a grate (19) connected to the weather guard housing (17) at the blow-out opening (18).

5. The exhaust air blow-out device according to claim 4, **characterized in that** the grate (19) comprises a central hub (20) having a central hole (21) through which the fixing bolt (15) can extend to connect the grate (19), the tip section (9) and the selected adjusting sections (10, 11, 12, 13, 14) together.

6. The exhaust air blow-out device according to any one of the claims 1 to 5, **characterized in that** the tip section (9) and/or at least one of the adjusting

sections (10, 11, 12, 13, 14) comprises a snap-fit joint for mutual interconnection.

7. The exhaust air blow-out device according to any one of the claims 1 to 6, **characterized in that** the nose cone shape of the nose cone element (7) is elliptical. 5
8. The exhaust air blow-out device according to any one of the claims 1 to 6, **characterized in that** the nose cone shape of the nose cone element (7) is parabolic. 10

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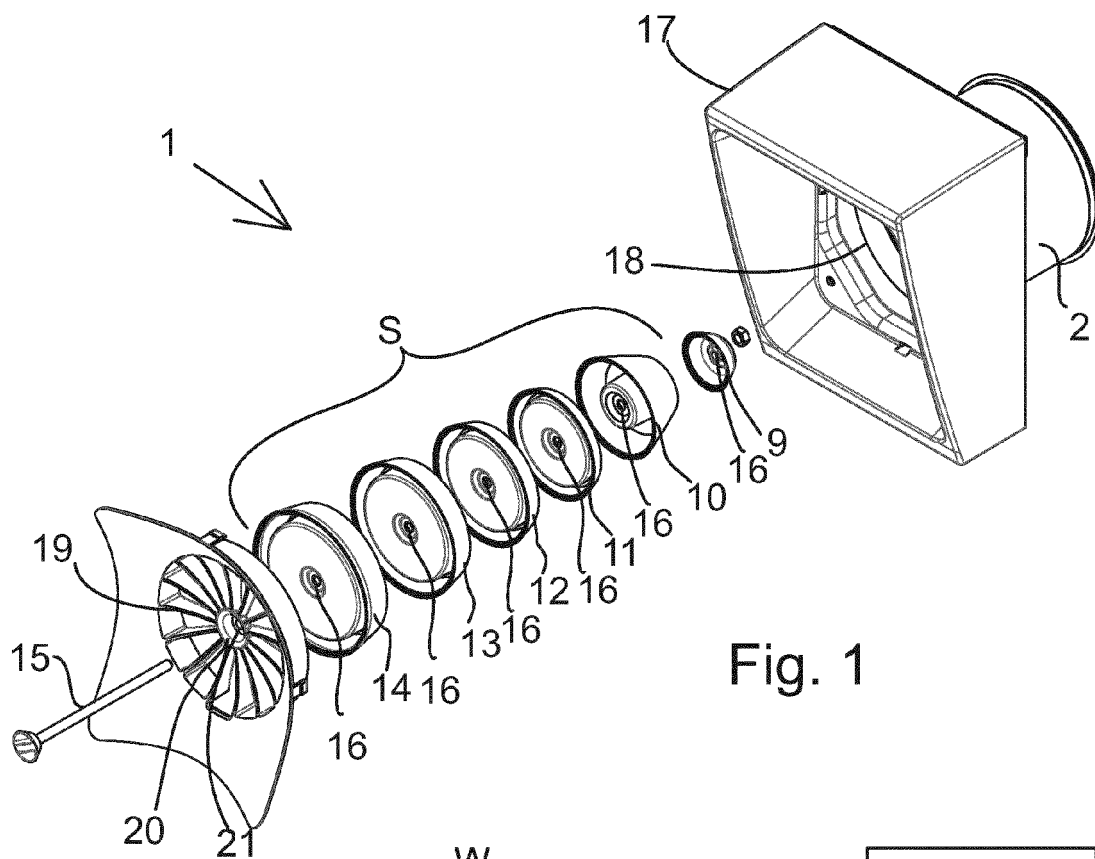


Fig. 1

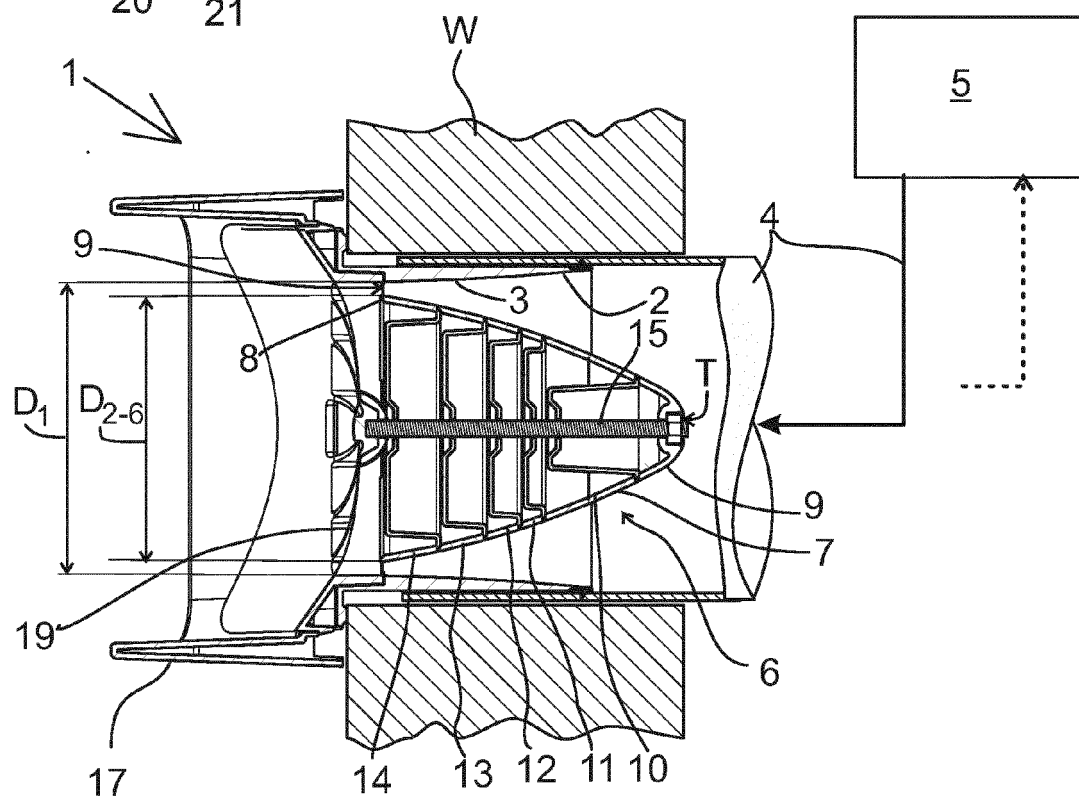


Fig. 2

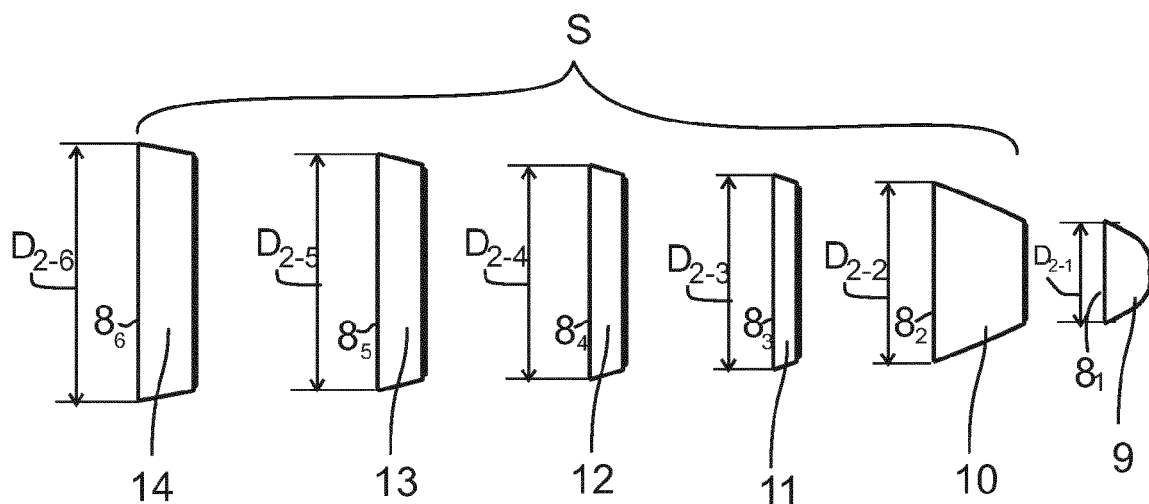


Fig. 3

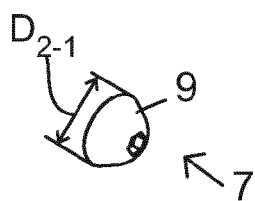


Fig. 4a

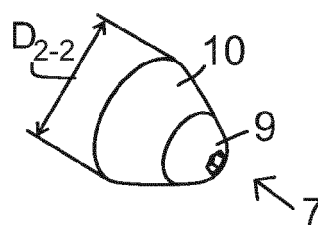


Fig. 4b

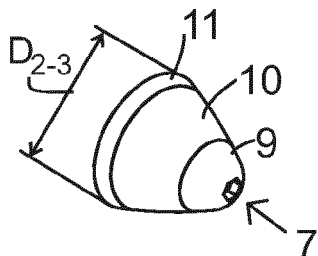


Fig. 4c

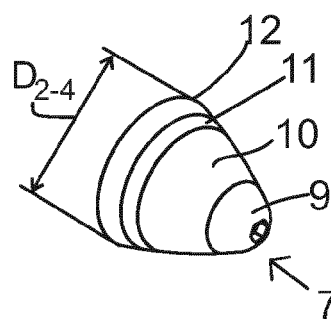


Fig. 4d

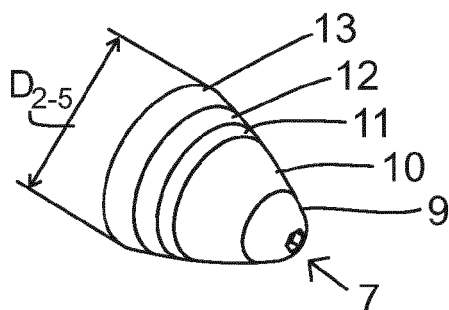


Fig. 4e

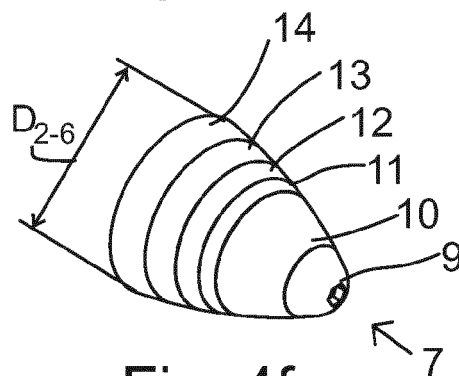


Fig. 4f



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