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(54) Benævnelse: **KANALSEKTION TIL EN LUFTBEVÆGELSESKANAL**

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US-A- 3 981 326
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US-A1- 2012 292 407

DESCRIPTION

[0001] The present invention relates to a duct section for an air movement duct for apparatus for ventilating, heating, air-conditioning and/or cooling a space.

[0002] The invention seeks to provide improvements in the efficiency of the air movement, particularly, but not exclusively when it is required to deflect the path of the air movement.

[0003] US Patent No.4255176 discloses an arrangement in which to flows of air are combined into one duct and at the outlet of the duct provides a plurality of curved louvreswhich are pivotally mounted at the outlet ends of the air duct to direct the mixed air in any desired direction but no indication is provided of how the louvres are pivoted and whether they are connected together or not. They are designed essentially to dissipate the outlet air from the duct system. The present invention seeks to provide a ducted flow system in which the flow of the air is guided in a controlled manner.

[0004] According to the present invention there is provided a duct section for an air movement duct, comprising a duct inlet section for a fan driven primary air flow, the duct section further having a peripheral air inlet through which a secondary air flow is drawn into the duct section by entrainment by the passing primary air flow to form a combined air flow of both the primary and the secondary air flows, a nozzle comprising a guide vane arrangement being located downstream of the peripheral air inlet so as to be impinged by and to direct the combined air flows, wherein the guide vane arrangement of the nozzle comprises a plurality of guide vanes in spaced parallel relationship and extending transversely across the duct section, wherein the guide vanes are elongate and arranged to be pivotable about their longitudinal dimension transverse to the direction of the air movement whilst remaining in the parallel relationship, the nozzle being pivotable about an axis substantially aligned with the periphery of the duct section to incline the vanes at an angle to the flow direction of the combined air flows to deflect and guide the airflows.

[0005] Preferably, the nozzle comprises a further part of the duct section spaced from the duct inlet section to form the peripheral air inlet therebetween.

[0006] Alternatively, the peripheral air inlet comprises a slot or plurality of slots extending around substantially the entire periphery of the duct section in a plane normal to the direction of the primary air flow.

[0007] In a preferred arrangement the nozzle is pivotable by up to 20° from the axis of the duct section, and preferably up to 10°.

[0008] In a preferred embodiment, the periphery of the inlet side of the nozzle is profiled, in cross-section, to provide a curved inlet edge to provide a smooth transition of the internal surface of the duct section for the air flow from the primary duct section through the guide

vanes irrespective of the angular displacement of the nozzle.

[0009] A preferred embodiment of the present invention is shown in the accompanying drawings in which:-

Figure 1 shows a schematic cross-sectional view of a duct section with a guide nozzle inclined at an angle to the axis of a primary part of the duct section and hence the air flow passing through, to deflect the air flow,

Figure 2 illustrates the duct section of figure 1 in which the nozzle axis is correctional with that of the primary duct section,

Figure 3 shows a schematic part sectional perspective view of the duct section in which the guide vanes of the nozzle have been omitted in the interests of clarity, and

Figure 4 is a schematic illustration using bubbles indicative of the air flow to indicate the air flow through the duct section and the nozzle.

[0010] Referring now to Figure 1 there is shown a schematic cross-sectional view of a duct section 1 which consists of an duct inlet section 2 for a fan driven primary air flow moving in the direction indicated by the arrow 3 and, downstream of the duct inlet section 2 a nozzle 4 which is spaced from the inlet duct section 2 to provide a peripheral air inlet 5 through which, in operation, the primary air flowing past the peripheral air inlet 5 entrains air from outside the duct section 1 to provide a secondary flow 8 into the nozzle so that a combination of the primary air flow and the secondary air flow passes through the nozzle 4. In another embodiment, the peripheral air inlet 5 comprises a slot or plurality of slots extending around substantially the entire periphery of the duct inlet section 2 in a plane normal to the direction of the primary air flow.

[0011] The greater flow of air formed by the combination of the two flows generates a venturi effect through the nozzle 4 which speeds up the flow of air through the nozzle.

[0012] As shown in cross-section in Figures 1 and 2 the nozzle 4 has three guide vanes 6 arranged in spaced parallel relationship and extending transversely across the duct section 1 to guide the air flow. In cross-section, the vanes 6 have an aerodynamic profile to minimise turbulence as the air passes through the nozzle 4. In the embodiment of the invention shown in Figure 1, the nozzle 4 is arranged to pivot about a point 7 adjacent the periphery of the duct inlet section 2 to deflect the flow of air at an angle to the inlet flow of primary air as indicated by the arrows 3 in the duct inlet section. This arrangement has the effect that secondary air entering adjacent the pivot point 7 travels at a different speed than the secondary air drawn in at other points on the periphery, particularly at a point 180° spaced from this pivot point 7, where the peripheral gap is wider. This speed difference can be used to bring about change in the flow direction. This has advantages in directing the flow leaving the nozzle 4.

[0013] The periphery of the nozzle 4 has a profile in cross section which has the same or slightly smaller internal diameter than that of the duct inlet section 2 and on the upstream edge 9 of the nozzle the profile is curved outwardly radially as shown to provide a smooth transition for both the primary and the secondary air flows into the nozzle 4.

[0014] The referring now also to Figure 3, there is shown a part sectional view of the duct section in which the vanes in the nozzle have been removed from the nozzle in the interests of clarity. The arrows 8 indicate the secondary air flow passing into the interior of the duct section 1 to combine with the primary air flow as both the air flows pass through the nozzle 4.

[0015] Figure 4 illustrates schematically, by means of bubbles, the general disposition of the air flows. The primary air flow 3 enters the duct section 1 in the direction of the arrow 3and the secondary air flow 8 passes through the secondary air gap 5 to combine with the primary air flow so a much greater volume of air passes through the nozzle 4 as indicated by the density of the bubbles. Thus, a venturi effect through the nozzle is generated.

[0016] It will be understood that different embodiments of the nozzle 4 may arrange for the guide vanes to be pivoted in a different manner. For example, the nozzle could be pivoted about a transverse axis located on the axial axis of the duct section 1 so that the peripheral air inlet 5 has a reduced gap at one edge and an increased gap at the edges located 180° apart when it is tilted. It is also possible for the vanes to be connected via a linkage arrangement movable to tilt the vanes simultaneously whilst retaining them in spaced parallel relationship. Although three vanes are shown it will be understood that the number of vanes provided would depend upon the requirements of the particular installation and could therefore be one or more. Although shown as circular in cross-section, it will be understood that the duct could have a square, rectangular or other cross section.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US4255176A [0003]

PATENTKRAV

1. Kanalsektion til en luftbevægelseskanal der omfatter en kanalindløbssektion (2), som har et primært luftindløb til en ventilatordrevet primær luftstrøm, hvilken kanalsektion (1) yderligere omfatter et perifert luftindløb (5) nedstrøms for det primære luftindløb, gennem hvilket en sekundær luftstrøm (8) trækkes ind i kanalsektionen (1) ved medrivning af den passerende primære luftstrøm (3) for at danne en kombineret luftstrøm af både den primære og den sekundære luftstrøm, en dyse (4) der omfatter et styreskovlarrangement, som er anbragt nedstrøms for det perifere luftindløb (5) for således at blive påvirket af og for at dirigere de kombinerede luftstrømme, hvilket styreskovlarrangement for dysen (4) omfatter et antal styreskovle (6), der er i et adskilt parallelt forhold og som strækker sig på tværs af kanalsektionen (1), **kendetegnet ved, at**:
styreskovlene (6) er aflange og indrettet til at være drejelige omkring deres længdedimension på tværs af retningen af luftbevægelsen, mens de forbliver i det parallelle forhold, hvilken dyse (4) er drejelig omkring en akse (7), der i det væsentlige er på linje med periferien af kanalsektionen (2) for at hælde skovlene i en vinkel med strømningsretningen for de kombinerede luftstrømme for at afbøje og styre luftstrømmene.

2. Kanalsektionen til en luftbevægelseskanal ifølge krav 1, hvor dysen (4) omfatter en yderligere del af kanalsektionen (1), der er adskilt fra kanalindløbssektionen (2) for at danne det perifere luftindløb (5) derimellem.

3. Kanalsektionen til en luftbevægelseskanal ifølge krav 1, hvor det perifere luftindløb (5) omfatter en slids eller et antal slidser, der strækker sig omkring i det væsentlige hele periferien af kanalindløbssektionen (2) i et plan, der er normalt i forhold til retningen af den primære luftstrøm.

4. Kanalsektion til en luftbevægelseskanal ifølge et hvilket som helst af kravene 1 til 3, hvor dysen (4) kan drejes op til 20° fra aksen for indløbssektionen af den primære luftstrømskanal (2).

5. Kanalsektion til en luftbevægelseskanal ifølge et hvilket som helst af de foregående krav, hvor periferien af indløbssiden af dysen (4) er profileret i tværsnit for at tilvejebringe en buet indløbskant, der danner en jævn overgang af den indre overflade af kanalsektionen (2) til luftstrømmen fra den primære kanalsektion gennem styreskovlene (6) uanset vinkelforskydningen af dysen.

DRAWINGS

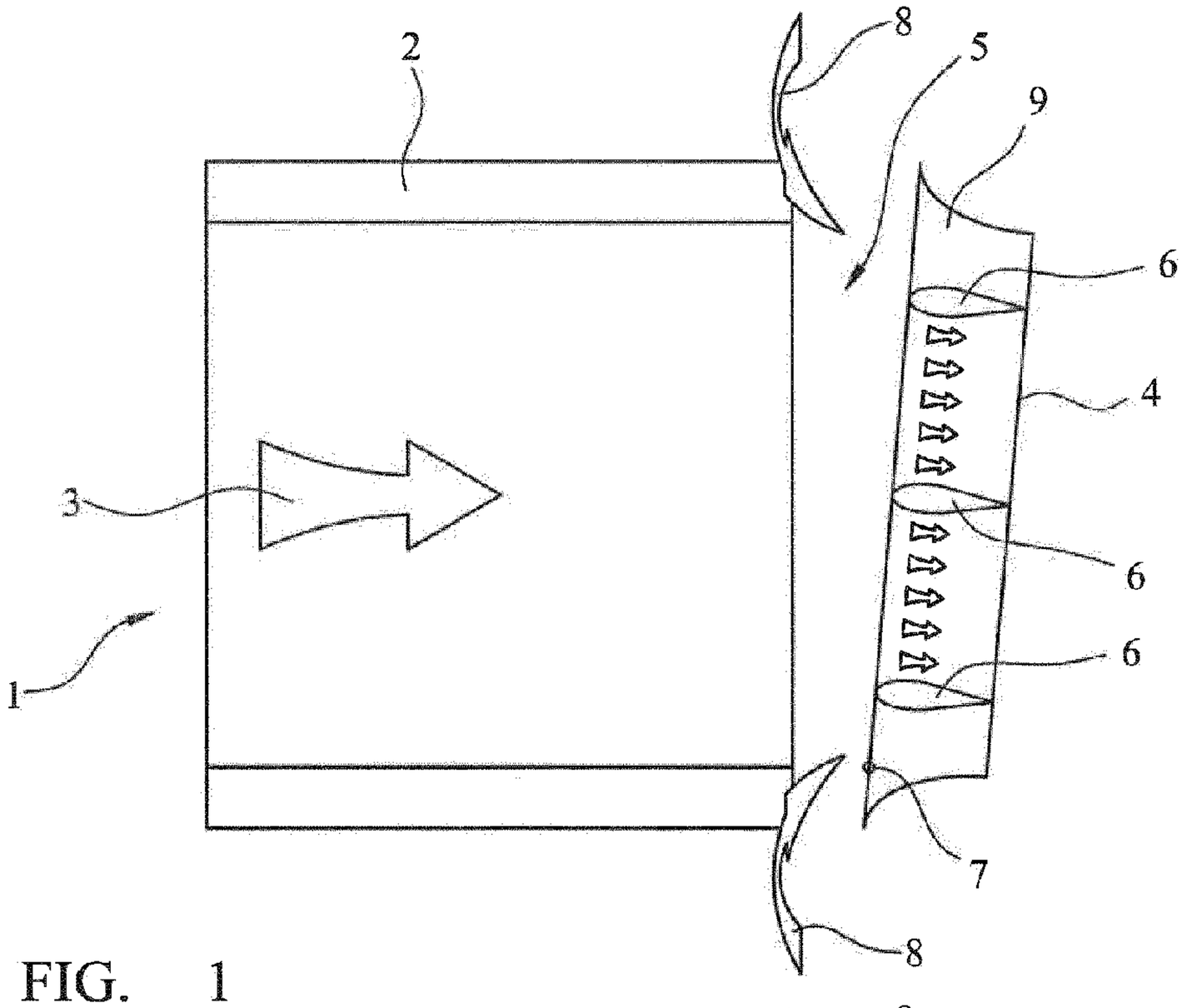


FIG. 1

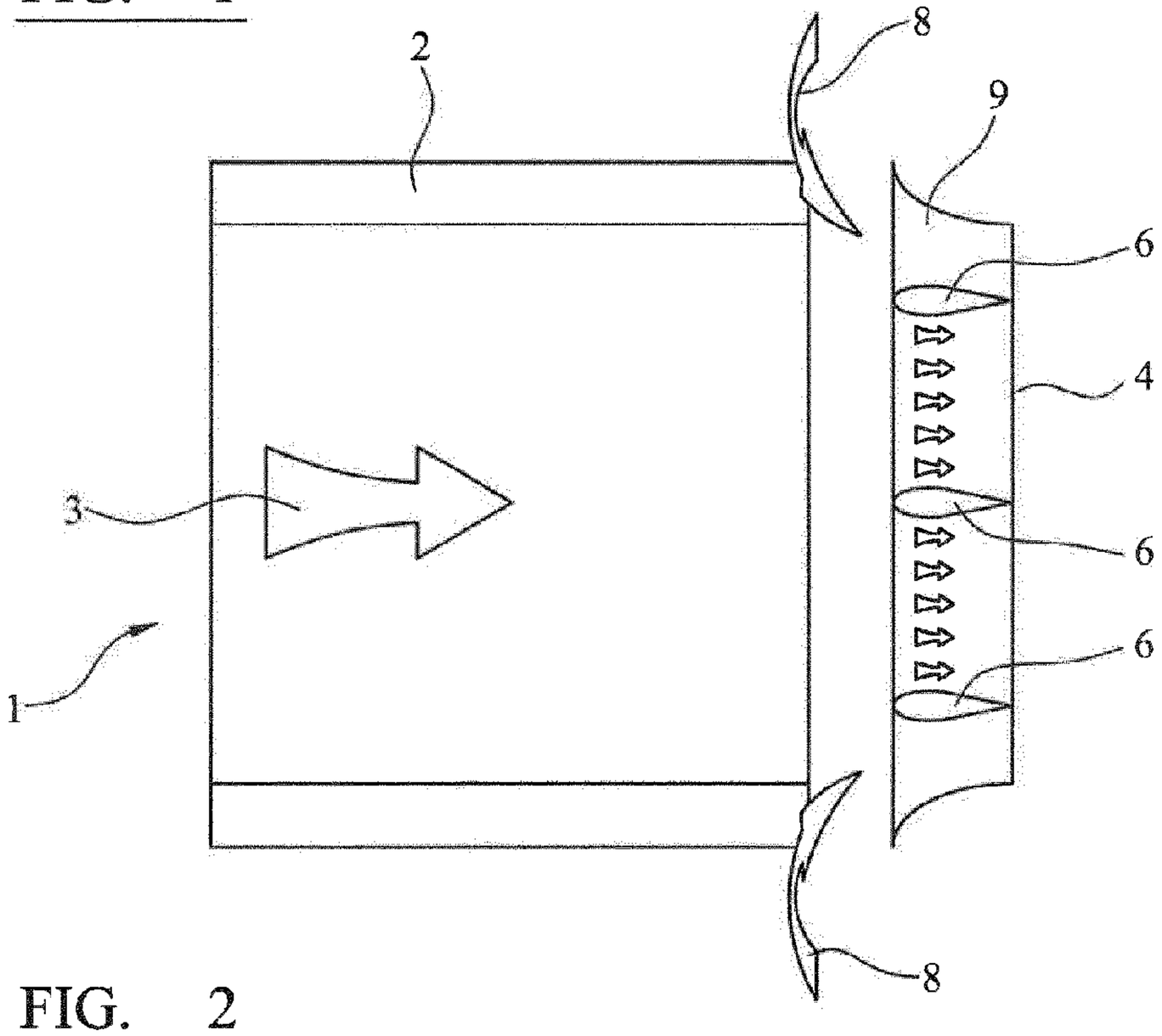
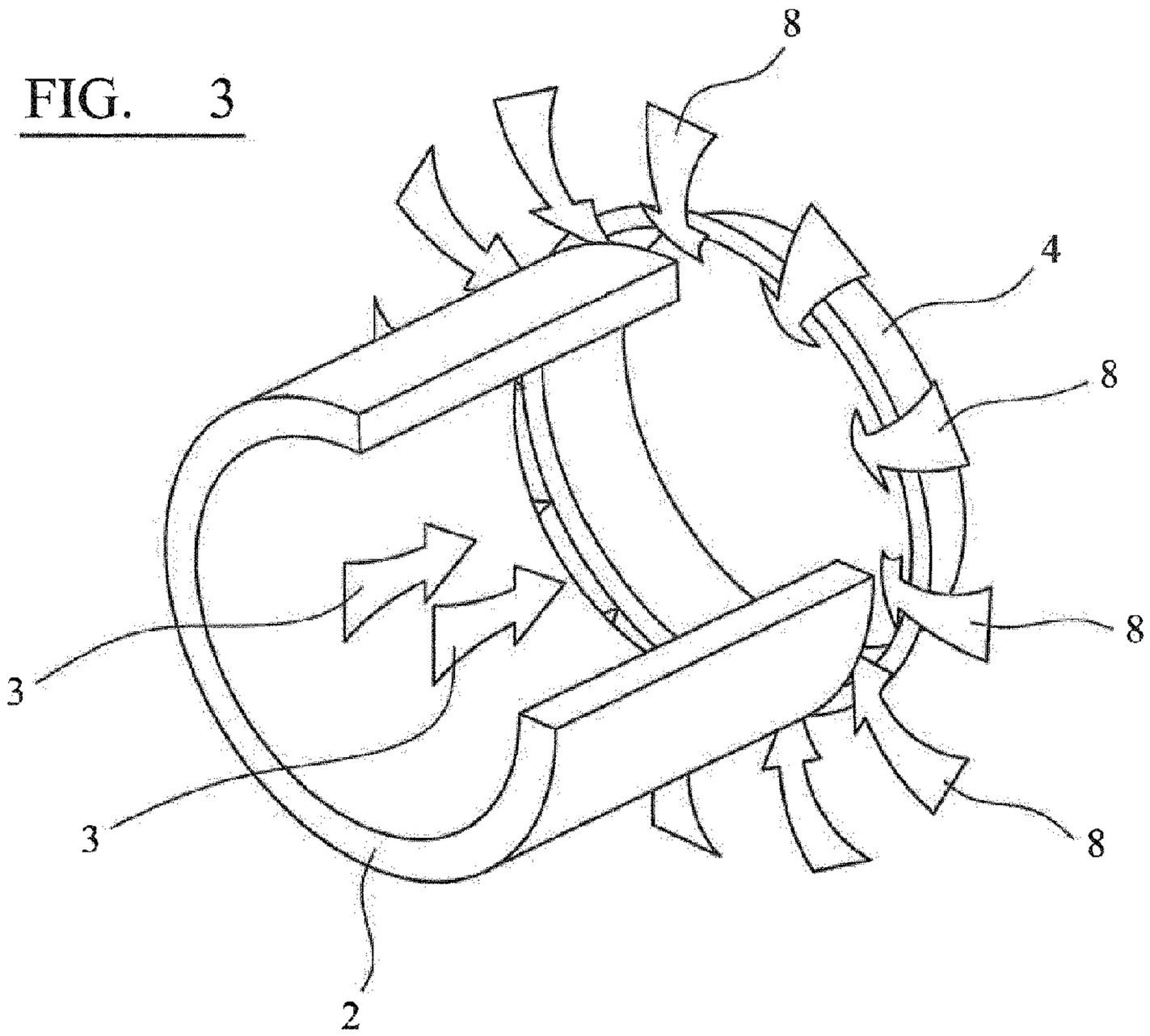


FIG. 2

FIG. 3



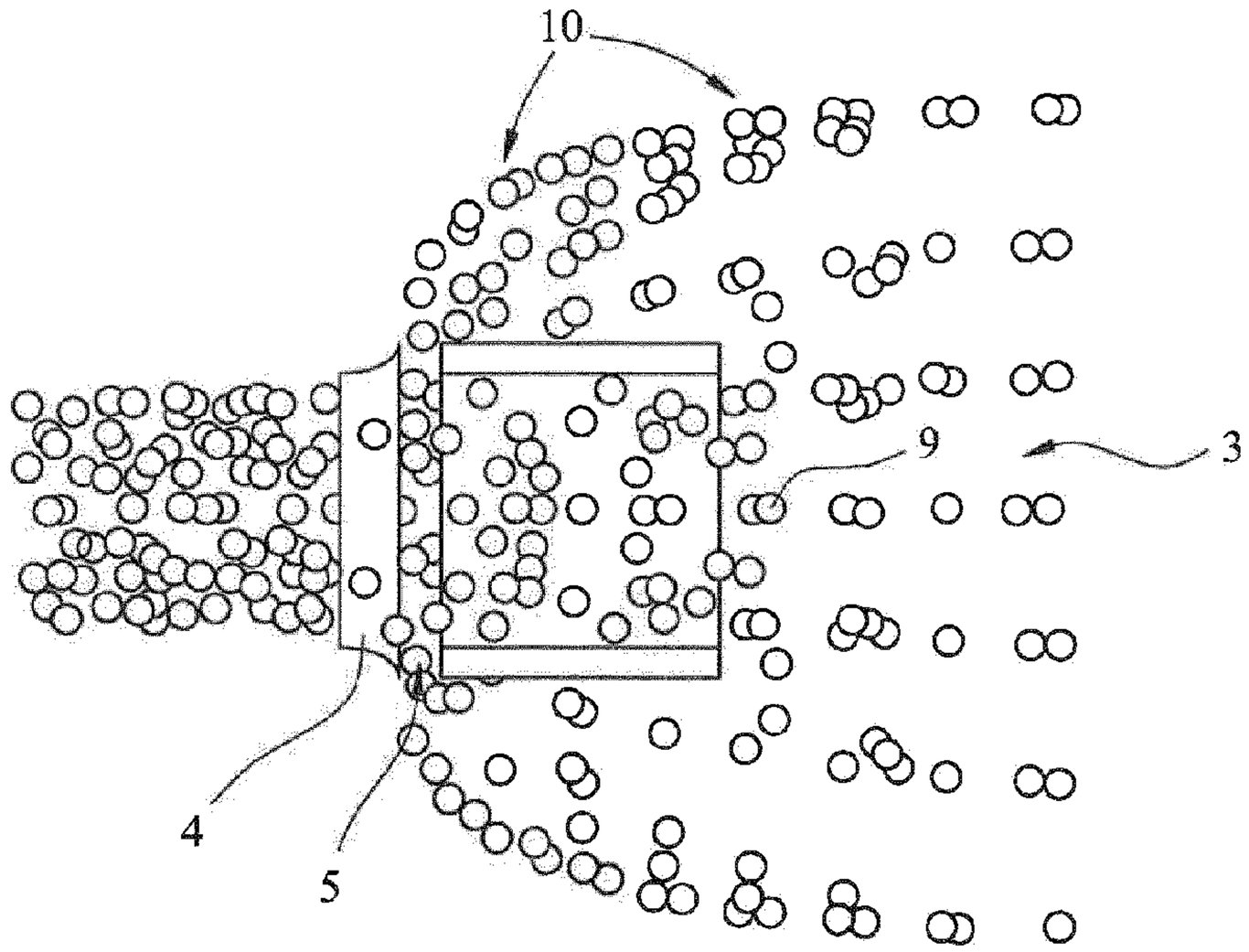


FIG. 4