

[54] AIR INTAKES

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[56]

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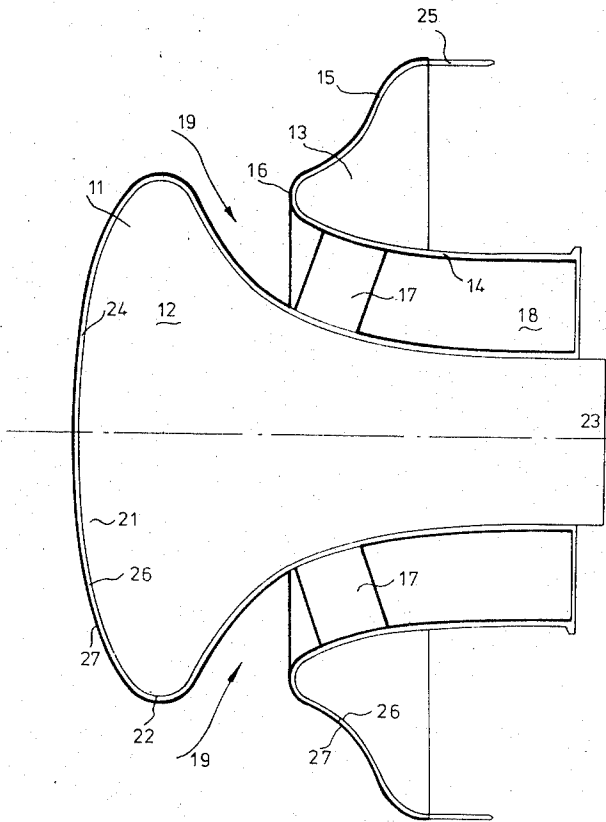
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[57]

ABSTRACT

A gas turbine engine air intake designed to prevent ingestion into the engine of a substantial proportion of any ice or slush present in the incoming air. The air intake comprises a central bullet and an outer casing defining an annular passage therebetween through which air flows to the engine compressor. The central bullet is enlarged at its upstream end to a mushroom shape whose outer periphery lies upstream of and is at a greater radius than the leading edge of the outer casing. In operation the ice and slush is deflected by reason of its greater momentum around the outside of the engine cowl and out of the path of the air drawn into the annular passage.

4 Claims, 2 Drawing Figures



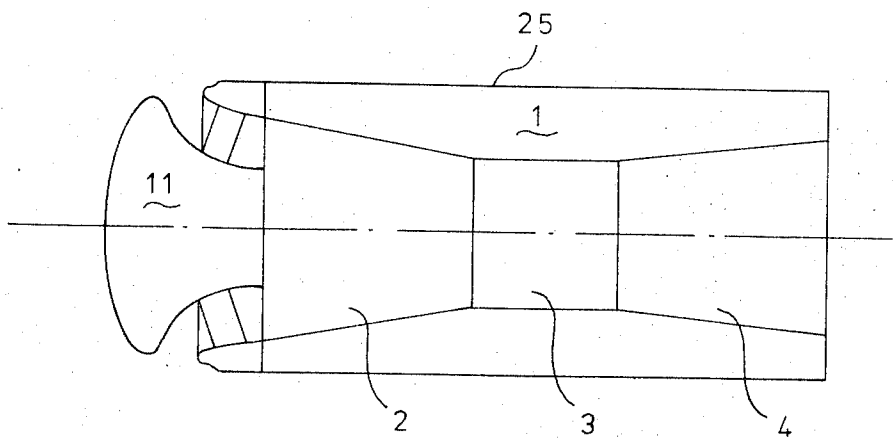


FIG. 1

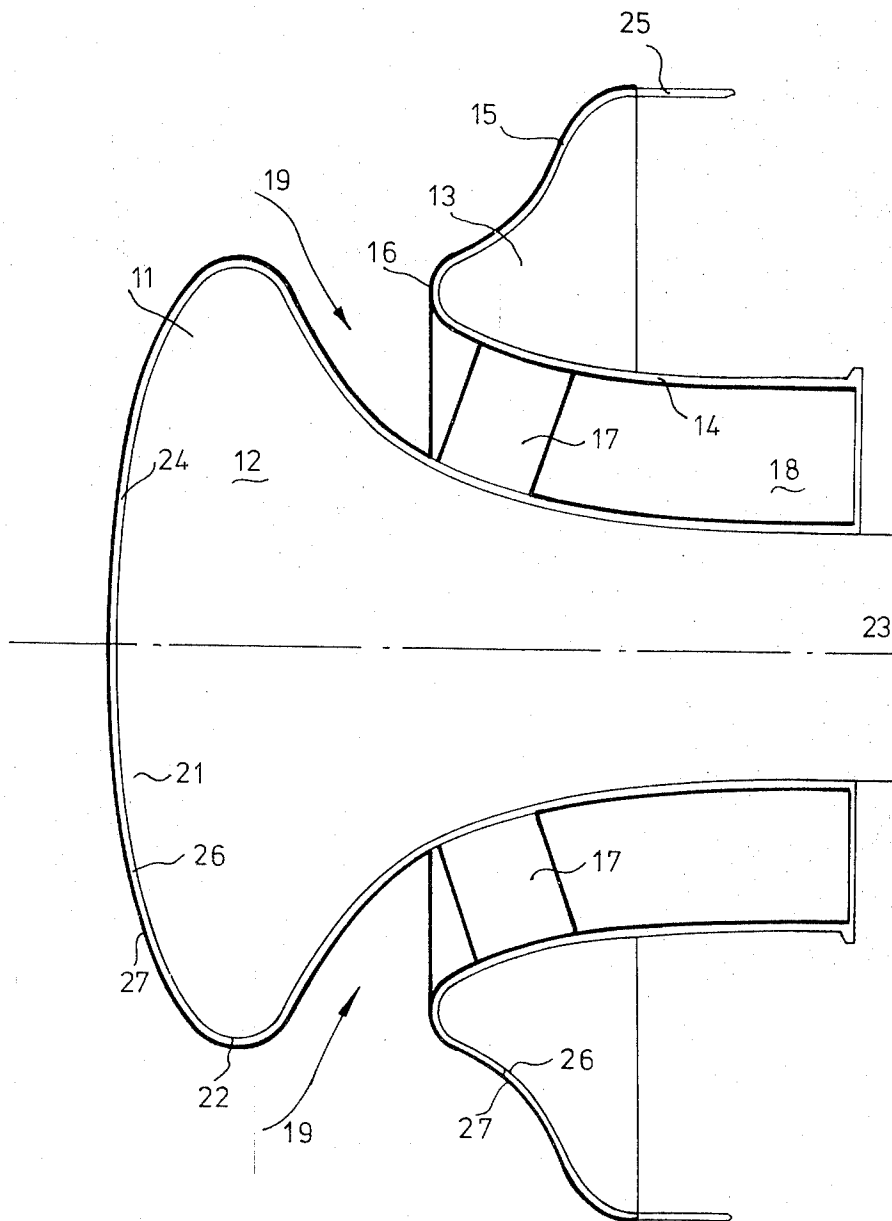


FIG. 2

AIR INTAKES

In operation of gas turbine powerplants problems arise due to the ingestion into the engine of ice and slush with the incoming air. Ice and slush can cause a flame out of the combustion system of the engine.

The present invention relates to an improved construction of air intake for a gas turbine powerplant wherein a substantial proportion of any ice or slush present in the air is not ingested.

According to the invention there is provided an air intake for a gas turbine engine comprising an outer casing having a leading edge, a central bullet having an upstream end portion which is enlarged, an annular passage defined between said central bullet and said outer casing and adapted to receive a flow therethrough of air in a determined direction, said enlarged portion having an outer periphery which is forward of the leading edge of the outer casing and every point on which lies a greater distance from the central axis of the intake than its corresponding point in the same axial plane on the leading edge of the outer casing.

In a preferred form the enlarged portion of the nose bullet is of circular cross-section and its upstream surface is convex so as to form a dome. The words upstream and downstream in this context refer to the direction in which the air flows through the intake.

Means are preferably provided for heating the surfaces of the intake which are exposed to the air flow.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in which:

FIG. 1 is a part sectional side elevation of a gas turbine engine fitted with an air intake designed according to the invention.

FIG. 2 is a longitudinal section of an air intake according to the invention.

The gas turbine engine 1 in FIG. 1 includes compressor system 2, a combustion system 3 and a turbine system 4 all in flow series as shown and surrounded by an engine cowl 25. An air intake is attached to the compressor system and profiled to blend with the engine cowl.

Referring now to FIG. 2, the air intake 11 comprises a central bullet 12 and an outer casing 13 having inner and outer walls, 14 and 15 respectively, meeting at the leading edge of the outer casing which throughout the specification should be taken as the most upstream point 16 of the casing. The outer casing is supported from the central bullet by struts 17 to define an annular passage 18 therebetween. The direction of air entering the air intake is indicated by arrows 19.

The central bullet 12 is enlarged at its upstream end into a shape, which will hereinafter be referred to as the mushroom 21, which is of circular cross-section and of which the upstream surface is convex to form a dome. The outer periphery 22 of the mushroom 21 lies up-

stream of the leading edge 16 of the outer casing 13 and every point on the outer periphery 22 lies at a greater distance from the central axis 23 of the air intake than its corresponding point in the same axial plane on the leading edge 16 of the outer casing.

In operation the incoming air strikes the dome 24 of the mushroom and flows outwards towards the outer periphery 22, the air is then turned through a large angle to be drawn into the annular passage 18. Ice and slush mixed with the air deflected by the mushroom is by reason of its greater momentum carried out of the path of the air drawn into the annular passage. This ice and slush passes round the outside of the engine cowl 25 or strikes the outer wall 15 of the outer casing and slides off around the engine cowl.

To prevent ice forming on the surfaces of the air intake the surfaces are heated by electric resistance coils 26 placed on the surfaces and held in position by a matting 27. The matting 27 which may be of rubber or plastics material is bonded to the air intake surfaces.

The air intake shown in this example is for a gas turbine powerplant mounted on top of the fuselage of a helicopter and is of particular advantage where ice and slush formed on top of the fuselage forward of the powerplant breaks away and is urged towards the air intake. If two powerplants each fitted with this air intake are mounted side by side a gutter could be formed between the powerplants to facilitate the easy removal of ice and slush deflected by the mushrooms to the space between them.

It will be appreciated that an air intake constructed according to the invention would in operation also remove a substantial proportion of other particulate matter, for example sand, from the incoming air.

We claim:

1. An air intake for a gas turbine engine comprising an outer casing having a leading edge, a central bullet having an upstream end portion which is enlarged, an annular passage defined between said central bullet and said outer casing and adapted to receive a flow therethrough of air in a determined direction, said enlarged portion having an upstream surface which is convex forming a dome and having an outer periphery which is forward of the leading edge of the outer casing and every point on said periphery lies at a greater distance from the central axis of the intake than its corresponding point in the same axial plane on the leading edge of the outer casing.

2. An air intake according to claim 1, in which the enlarged portion of the central bullet is of circular cross-section.

3. An air intake according to claim 1, additionally comprising means for heating surfaces of the air intake which are exposed to a flow of air.

4. An air intake according to claim 3 in which said heating means comprise electrical resistance coils which are held in position on said surfaces by a matting material which is bonded to said surfaces.

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