The present invention relates to improvements in the construction of protective screens and more particularly to an improved construction of an air inlet screen masking the air inlet passage of a gas turbine engine.

As is well known, it is necessary to provide a screen, protective baffle or other similar protective device in the air inlet of a gas turbine engine in order to prevent entry of any foreign matter which could damage the engine while it is in operation. Such a screen must be strong and rigid enough to withstand the impact of any foreign objects which under the influence of the intake air may strike the screen at high velocity and also the vibrational effects of the engine in operation. The mesh or air admitting openings of the screen must also be selected to be large enough to avoid creating an excessive pressure drop with effect the operation of the engine and at the same time the openings must be kept small enough to block any appreciable sized foreign object.

With these factors in mind, the present invention aims to provide an improved air inlet screen construction which is designed particularly for use in a turbo-prop engine having a circular plenum chamber formed by an air inlet case. Accordingly in the preferred construction the air inlet screen is of a cylindrical form and is designed so that it can be made in segments or as a complete cylinder.

In order to provide the desired structural rigidity and to avoid supplementary reinforcing members which would add additional weight, the present screen construction is made from a sheet or sheets of perforated sheet metal which is corrugated lengthwise to make it self-supporting. This corrugated construction permits flexibility in the manner of assembly while providing excellent impact resistance. In addition, increased structural integrity may be obtained by introducing solid boundaries at specified locations.

The diameter of the perforations in the sheet are selected to provide maximum air flow while preventing passage of any foreign particles of a dimension liable to cause damage to the engine. As will be appreciated the nature and extent of both corrugations and perforations may be varied dependant on application and environment. There is another advantage in the present construction in that intake noise suppression is added by the defraction of sound waves due to the perforations and some noise scattering caused by the convolutions of the screen material.

Specifically, the screen sections are provided with integral outwardly extending flanges along their free edges and these are overlapped by supplementary flange sections so that the necessary joint or joints are made by butting the adjacent flanges together with a rubber gasket therebetween. The ends of the resultant cylindrical screen are provided with overlapping annular gaskets, preferably of rubber, which provide a seal about the engine air intake when the screen is installed and also provide additional vibration damping as well as allowing for more tolerance in manufacturing and assembly of screen elements. A feature of the present construction resides in the provision of offset or non-located dowel-pins which extend outwardly from one or both of the ends of the air inlet screen and engage with corresponding openings provided in the air inlet casing to ensure proper alignment and prevention of rotation.

Having thus generally described the nature of the invention, particular reference will be made to the accompanying drawings showing a preferred embodiment thereof, and in which;

FIGURE 1 is a side view of the air inlet screen according to the invention as it would appear in operative position surrounding a circular plenum chamber formed by the air inlet core of an in-line free turbine engine.

FIGURE 2 is a sectional view of FIGURE 1 along the line 2—2 showing the construction and assembly of the top interconnecting flanges of the screen sections.

FIGURE 3 is a sectional view of FIGURE 1 along the line 3—3 showing the construction and assembly of the lower interconnecting flanges of the screen sections.

FIGURE 4 is a sectional view, broken for convenience, of the construction of FIGURE 1 along the line 4—4 to show in more detail the attachment of the locating dowel-pin and construction and attachment of the end gasket flanges.

FIGURE 5 is an enlarged detail view of a section of one end of a screen section to illustrate a preferred perforation pattern and means of attachment of the gasket flange.

FIGURE 6 is a sectional view of FIGURE 5 along the line 6—6 to show the preferred relationship of corrugations and perforations and gasket flange.

With particular reference to FIGURES 1 and 2 of the drawings an air inlet screen assembly 10 according to the invention is shown in operative position surrounding a circular plenum formed in an air inlet case A of an in-line gas turbine engine.

The air inlet screen assembly 10 as shown is made up of two equal sections 12, 12a of perforated metal sheet which are corrugated longitudinally as indicated at 14 and formed to the desired semi-circular contour to form the main body of the cylindrical screen assembly 10. It will be appreciated that the present screen construction can be made in two segments as shown, for the two sections, or as a single cylindrical section, depending on requirements and conditions of assembly, without departing from the design of the invention.

In the construction illustrated, and this will be typical of alternative constructions, the free longitudinal edges of each perforated corrugated section 12, 12a is bent upwards to form an integral flange 16 and this flange 16 is overlapped and reinforced by an angular reinforcing flange 18. In the preferred construction the flange 18 is placed over the integral flange 16 and the two joined together for example, by spotwelding.

In order to obtain a close seal between the screen sections and to aid in the general flexibility of the structure with respect to assembly, each flange 18 is provided with a sealing strip 20 of rubber or the like, which is secured to the flange 18 by suitable means. The flanges 18 of the respective sections are connected in face to face relationship on assembly by suitable bolts and nuts 22 as shown. To provide additional flexibility on assembly and to provide a seal between the ends of the present air inlet screen and the engine air inlet case A, each screen section 12, 12a is provided along the opposite trans-axial ends with a flexible gasket strip 24, as shown in FIGURE 4. These gaskets 24 are preferably made of rubber with an internal slot or groove 26 which accommodates the thickness of the perforated screen plate and they are attached to the plate edges by heat and pressure or a suitable adhesive so that they are firmly bonded in place. As will be understood from the preceding description and the accompanying drawings, each air inlet screen section is a complete unit, which can be
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3. An air inlet screen as claimed in claim 1 wherein the perforations in each section are from about .040" to about .050" in diameter.

4. An air inlet screen as claimed in claim 2 wherein each of said supplementary flanges consists of a strip of metal folded over on itself and formed to an angular shape, said perforated metal section integral flange fitting between the opposed sides of said folded over supplementary flange.

5. A self supporting air inlet screen as claimed in claim 1 wherein said flexible sealing means each comprise a longitudinally slotted strip of resilient material and each of said section end marginal portions are fitted within said slot and secured thereto.

6. In a gas turbine powerplant including means defining an annular air inlet passageway having bordering walls, a self-supporting air inlet screen of cylindrical formation extending between said bordering walls and masking said annular air inlet passage, said air inlet screen made up of at least one fomed section of perforated metal strip corrugated at regularly spaced intervals about its circumference and in the axial direction of said cylindrical screen, means for sealing the connection between said bordering walls and screen, and locating means on said screen whereby it is located relative to said air inlet passageway in the longitudinal and circumferential directions and also to prevent rotational movement of said screen relative to said passageway bordering walls.

7. In a gas turbine powerplant as claimed in claim 6 wherein said cylindrical air inlet screen is made up of two equal sections interconnected at diametrically opposed points.

8. In a gas turbine powerplant as claimed in claim 6 wherein said locating means comprise at least one locating pin extending from an inner surface of said screen adapted to overlap said passageway bordering walls.

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