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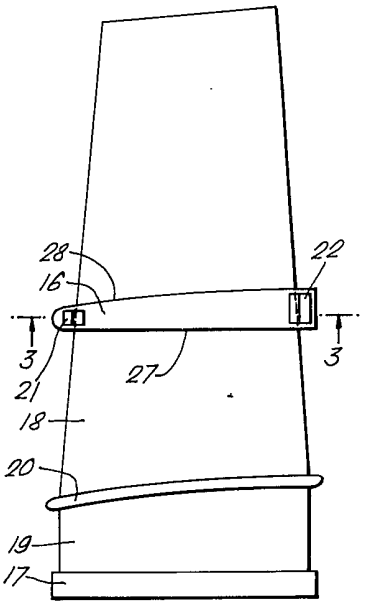
(54) **Bladed fan rotor assembly for a gas turbine engine**

(57) The fan rotor comprises a fan disc (13) which supports at its periphery a plurality of angularly spaced apart fan rotor blades (18). To provide support for the blades against torsional vibration each blade is engaged part way up its radial extent by a pair of rings (21, 22) which engage with the leading and trailing edges respectively of the blade. The rings are enclosed within inner and outer shells (27), (28) which define an aerodynamic shape splitter (16).

Fig. 2.



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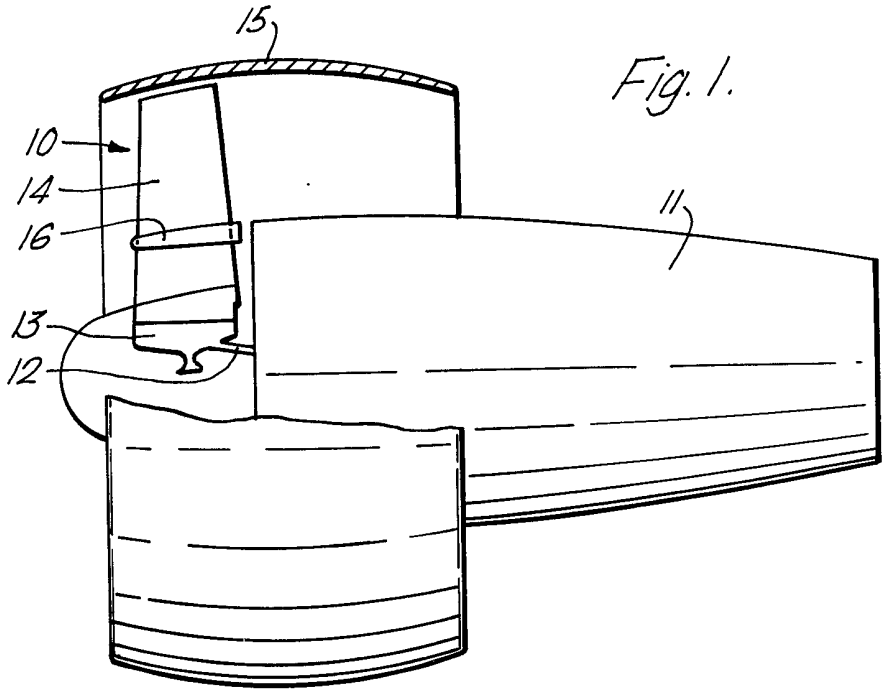


Fig. 1.

Fig. 2.

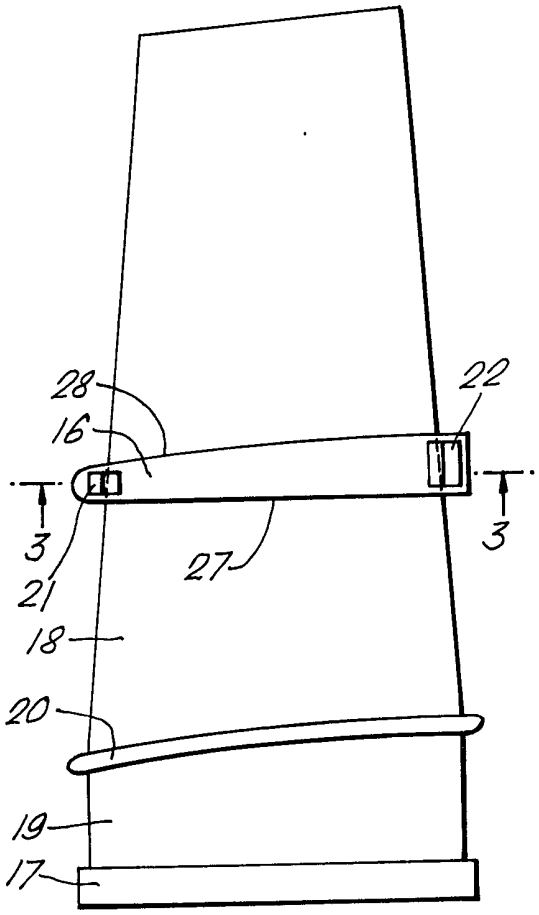
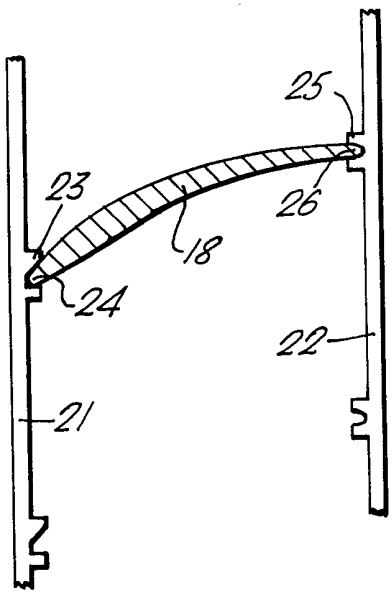


Fig. 3.



SPECIFICATION

A fan rotor for a gas turbine engine

This invention relates to a fan rotor for a gas turbine engine.

The fan rotors of gas turbine engines normally comprise a plurality of relatively large blades held in root fixings from the periphery of a blade carrying disc. Because of their large size it is frequently desirable to provide the blades with some kind of restraint against vibration. In the past this restraint has been provided by clappers or similar devices. However, in the case of blades having wide chord such restraints may not provide sufficient damping for torsional vibration of the blade.

The present invention provides a fan rotor in which considerable torsional restraint may be exercised on the fan blades.

According to the present invention a fan rotor for a gas turbine engine comprises a fan disc which supports at its periphery a plurality of angularly spaced apart fan rotor blades, each fan rotor blade being engaged part way up its radial extent by a pair of rings which engage with the leading and trailing edges respectively of each of the blades.

Preferably the rings are provided with indentations adapted to engage the respective edge of each of the fan blades. Thus the blades may be attached to the rings at these indentations.

Conveniently the rings form part of an annular splitter adapted to divide the flow of air through the fan into an inner and an outer flow.

The invention also comprises a gas turbine engine having a fan rotor as set out above.

The invention will now be particularly described, merely by way of example, with reference to the accompanying drawings in which;

Figure 1 is a partly cut-away view of a gas turbine engine having a fan rotor in accordance with the invention,

Figure 2 is an enlarged view of one of the fan blades of Figure 1 and,

Figure 3 is a section on the line 3-3 of Figure 2.

In Figure 1 there is shown a gas turbine engine comprising a fan generally indicated at 10 driven by a core engine 11. The engine 11 is not described in detail since it comprises a conventional gas turbine engine having an additional turbine which drives the fan through a shaft 12. The shaft 12 drives a fan disc 13 from which extends an angularly spaced apart array of fan blades 14, the blades being carried from the disc 13 by a conventional groove and root arrangement. Extending round the tips of the array of blades 14 there is a fan cowl 15.

Operation of the engine described thus far is conventional in that the fan 10 takes in air which is compressed and part of which enters the core engine 11. The remaining air passes between the cowl 15 and the casing of the core engine 11 to provide propulsive thrust. In this embodiment the fan blades 14 are of comparatively wide chord and they are provided with an annular splitter ring 16 which divides the airflow through the fan into an outer flow which bypasses the core engine and an inner flow which provides the air supply to the core engine. To this end the splitter 16 is arranged to line up with the forward end of the casing of the core engine 11.

In order to provide torsional damping of the blades 14, the splitter 16 incorporates a damping structure in accordance with the invention. This structure is best seen in Figures 2 and 3. In Figure 2 may be seen the root 17 of the blade which carries the aerofoil 18 through a shank 19. Platforms 20 extend circumferentially at the inner extremity of the aerofoil 18 to make up the inner boundary of the airflow through the fan. The splitter 16 which extends circumferentially from part way up the aerofoil 18 is externally an aerodynamic shell but it will also be seen that it incoporates a forward ring 21 and a rearward ring 22. As can best be seen from Figure 3, the forward ring 21 is provided with a rearward projection 23 in which is formed an indentation 24. Similarly the ring 22 has a forward projection 25 in which is formed an indentation 26.

These indentations are sized and positioned so that they engage with the forward and rearward edges respectively of the aerofoil 18 of the fan blade, and in this particular instance they are metallurgically bonded to the blades by brazing. Extending between these rings there are the inner and outer shells 27 and 28 which make up the aerodynamic shape of the splitter 16.

It will be appreciated that the effect of the two rings 21 and 22 is to tie each fan blade to its next adjcent blades at the leading and trailing edges of its aerofoil section. Clearly this restrains this part of the blade from torsional movement, and the leading and trailing edges form the best positions for such restraint since they are the positions where the unrestrained torsional movement will be greatest. The rings also form a convenient structure on which to build the remainder of the splitter 16.

It will be understood that there are a number of possible variations of this embodiment. Thus it would be possible to fasten the rings 21 and 22 to the aerofoil without the use of indentations in the ring itself; the aerofoil could be cut-away or the ring could simply be bonded to the blade edges. Additionally although it is obviously convenient to position the rings inside the splitter, the rings could be mounted as a separate entity.

CLAIMS

1. A fan rotor for a gas turbine engine comprising a fan disc which supports at its periphery a plurality of angularly spaced apart fan rotor blades, each fan rotor blade being engaged part way up its radial extent by a pair of rings which engage with the leading and trailing edges respectively of each of the blades.

2. A fan rotor as claimed in claim 1 and in which each said ring is provided with indentations each of which engages the respective edge of one of the fan blades.

3. A fan rotor as claimed in claim 2 and in which the blades are attached to the rings at the indentations.

4. A fan rotor as claimed in any of the preceding claims and in which the rings are enclosed within an annular aerodynamic casing.

5. A fan rotor as claimed in claim 4 and in which the casing forms an annular splitter adapted to divide the flow of air through the rotor into an inner and an outer flow.

6. A fan rotor substantially as hereinbefore particularly described with reference to the accompanying drawings.

7. A gas turbine engine having a fan rotor as claimed in any one of the preceding claims.

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