March 2, 1971 J. O. MORTLOCK 3,566,606

GAS TURBINE DUCTED FAN ENGINE

Filed May 16, 1969

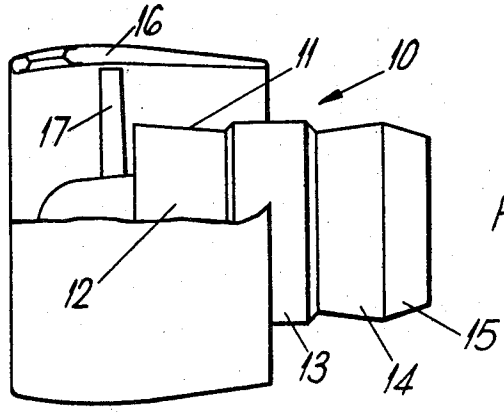


FIG. 1

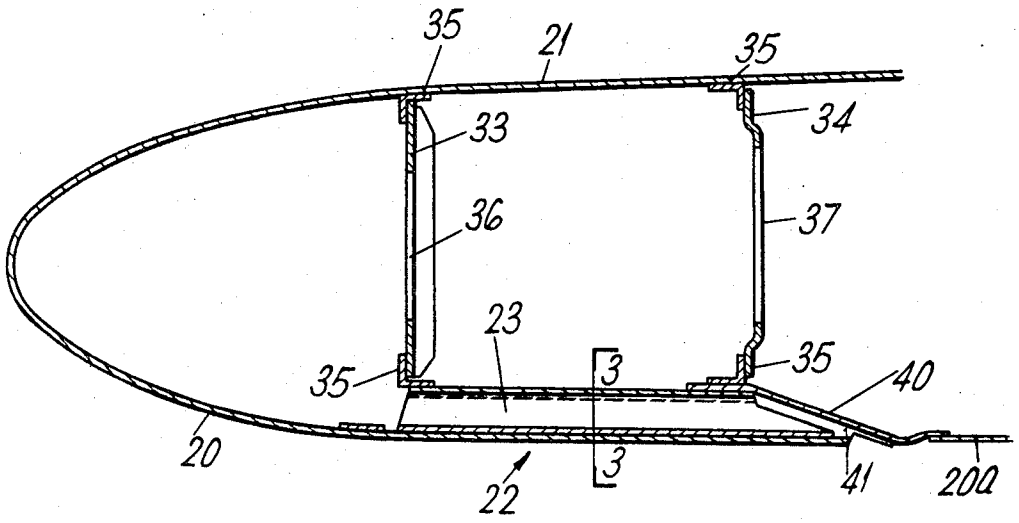


FIG. 2

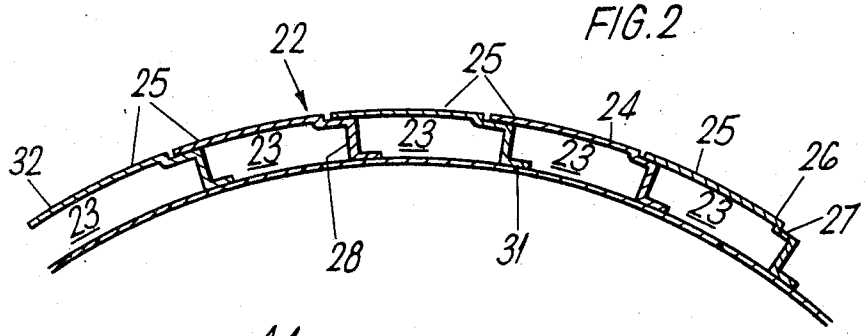


FIG. 3

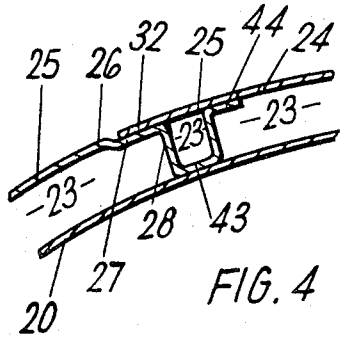


FIG. 4

Inventor

JAMES OSWALD MORTLOCK

By

Cushman, Darby & Cushman Attorneys

United States Patent Office 3,566,606 Patented Mar. 2, 1971

3,566,606

GAS TURBINE DUCTED FAN ENGINE

James Oswald Mortlock, Derby, England, assignor to Rolls-Royce Limited, Derby, England

Filed May 16, 1969, Ser. No. 825,308
Claims priority, application Great Britain, May 28, 1968, 25,484/68
Int. Cl. F02k 3/04; F04d 29/58
U.S. Cl. 60—226 10 Claims

ABSTRACT OF THE DISCLOSURE

A gas turbine ducted fan engine has a fan housed in a fan duct. A portion of the fan duct is constituted by two spaced apart walls, one wall consisting of members each of which has a flange which extends to the other wall and is attached thereto.

This invention relates to gas turbine ducted fan engines.

According to the present invention there is provided a gas turbine ducted fan engine having an annular duct, a fan housed in the annular duct, two spaced apart walls constituting at least a portion of the annular duct, one of said spaced apart walls consisting of a plurality of members, each of which has at least one integral flange extending to at least the other wall and is secured thereto, a step being formed in each of said members, said step being adapted to receive a part of the next adjacent member.

A foot may be provided adjacent the end of each flange, said foot being secured to the other wall.

Alternatively, said flange may be U-shaped having a foot adjacent the end thereof, said foot being attached to the next adjacent member.

Said walls may be made of metal, said flanges being secured to said other wall by welding.

The spaces between the two walls may be adapted to receive hot air.

Preferably said portion of the annular duct is upstream of the fan.

According to another aspect of the present invention, there is provided a gas turbine ducted fan engine having an annular duct, a fan housed in the annular duct, two spaced apart walls constituting a portion of the annular duct, one of said spaced apart walls consisting of a plurality of members, each of which has at least one integral U-shaped flange extending to at least the other wall and is secured thereto, a foot being provided adjacent the end of each flange, said foot being attached to the next adjacent member.

A step preferably is formed in each of said members, said step being adapted to receive a part of the next adjacent member.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:

FIG. 1 is a diagrammatic view of a gas turbine front fan engine provided with a fan shroud, partly shown in section, according to the present invention,

FIG. 2 is a broken-away view on a larger scale of part of the structure shown in FIG. 1,

FIG. 3 is a section taken on the line 3—3 of FIG. 2, and

FIG. 4 is a sectional view of an alternative embodiment of the present invention.

In FIG. 1 there is shown a front fan gas turbine engine **10** having an engine casing **11** within which there are mounted, in flow series, low and high pressure compressors **12**, combustion equipment **13** and high and low pressure turbines **14**, the turbine exhaust gases being directed to atmosphere through an exhaust duct **15**.

Mounted concentrically about the engine casing **11**, and arranged at the upstream end of the latter, is an outer casing **16** which is double-walled and forms the fan shroud of a front fan **17**. The downstream end of the casing **16** is supported from the engine casing **11** by means of a plurality of angularly spaced apart struts (not shown).

The casing **16** comprises an inner metal wall **20** and an outer metal wall **21**. The two walls may be integral with each other as shown or seam-welded together at the leading edge of the casing **16**. The inner wall **20** has a portion **22** which is double-walled and has axially extending cavities **23** therethrough.

The portion **22** is shown in FIG. 3 and it will be seen that there is a wall **24** which consists of a plurality of overlapping members or sections **25**. Each section **25** has at its downstream end **26** a step **27** and a radially inwardly extending flange **28** provided with a foot **31**. The upstream end **32** of each section **25** engages the step **27** of the adjacent section, and the two may be attached together by welding or the like. The feet **31** are also welded to the inner wall **20**, thus making a strong double-walled structure having the axially extending cavities **23** therethrough.

FIG. 4 shows an alternative embodiment of the present invention which is similar to that shown in FIG. 3 and so will not be described in detail, like parts having been given like reference numerals. The flange **28** is U-shaped and is welded to the inner wall **20** at **43**. The flange **28** is provided with a foot **44** which is secured by welding or the like to the next adjacent section **25**. Thus the flange forms a further axially extending cavity between the inner wall **20** and each section **25**.

The portion **22** of the inner wall is positioned upstream of the tip of the fan **17**. The walls **20** and **21** are kept apart by two spaced apart radially extending annular members **33**, **34**. These annular members are welded to the outer wall **21** and portion **22** by means of L-shaped brackets **35**. Both annular members **33**, **34** have apertures **36**, **37** respectively provided therethrough. Sandwiched between the L-shaped bracket **35** and the downstream end of the portion **22** is provided a frusto-conical member **40** which is welded to a continuation **20***a* of the inner wall **20**.

In operation hot air is fed, by means not shown, to the downstream end of the casing **16**. The hot air passes through apertures **36**, **37** in annular members **33**, **34** and impinges on the leading edge of the fan shroud. The hot air then passes through the cavities **23** and back into the fan duct via a cavity **41** formed between the portion **22** and the frusto-conical member **40**. This passage of hot air is designed to perform a de-icing or de-frosting function of the casing **16**.

The casing **16** is shown in FIG. 1 to be cylindrical, however, it may be frusto-conical and it will be appreciated that to accommodate the increase in diameter of the downstream end of the casing the overlap between the ends **32** of the sections **25** and the grooves **27** may be decreased with increased diameter of the casing **16**.

I claim:

1. A gas turbine ducted fan engine having an annular duct, a fan housed in the annular duct, two spaced apart walls constituting at least a portion of the annular duct, one of said spaced apart walls consisting of a plurality of members each of which has at least one integral flange extending to at least the other wall and is secured thereto, a step being formed in each of said members, said step being adapted to receive a part of the next adjacent member.

2. A gas turbine ducted fan engine as claimed in claim **1** in which a foot is provided adjacent the end of each flange, said foot being secured to the other wall.

3. A gas turbine ducted fan engine as claimed in claim 1 in which said walls are made of metal, said flanges being secured to said other wall by welding.

4. A gas turbine ducted fan engine as claimed in claim 1 in which the spaces between the two walls are adapted to receive hot air.

5. A gas turbine ducted fan engine as claimed in claim 1 in which said portion of the annular duct is upstream of the fan.

6. A gas turbine ducted fan engine having an annular duct, a fan housed in the annular duct, two spaced apart walls constituting a portion of the annular duct, one of said spaced apart walls consisting of a plurality of members each of which has at least one integral U-shaped flange extending to at least the other wall and is secured thereto, a foot being provided adjacent the end of each flange, said foot being attached to the next adjacent member.

7. A gas turbine ducted fan engine as claimed in claim 6 in which a step is formed in each of said members, said step being adapted to receive a part of the next adjacent member.

8. A gas turbine ducted fan engine as claimed in claim 6 in which said walls are made of metal, said flanges being secured to said other wall by welding.

9. A gas turbine ducted fan engine as claimed in claim 6 in which the spaces between the two walls are adapted to receive hot air.

10. A gas turbine ducted fan engine as claimed in claim 6 in which said portion of the annular duct is upstream of the fan.

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DOUGLAS HART, Primary Examiner

U.S. Cl. X.R.

60—39.09; 415—178, 219