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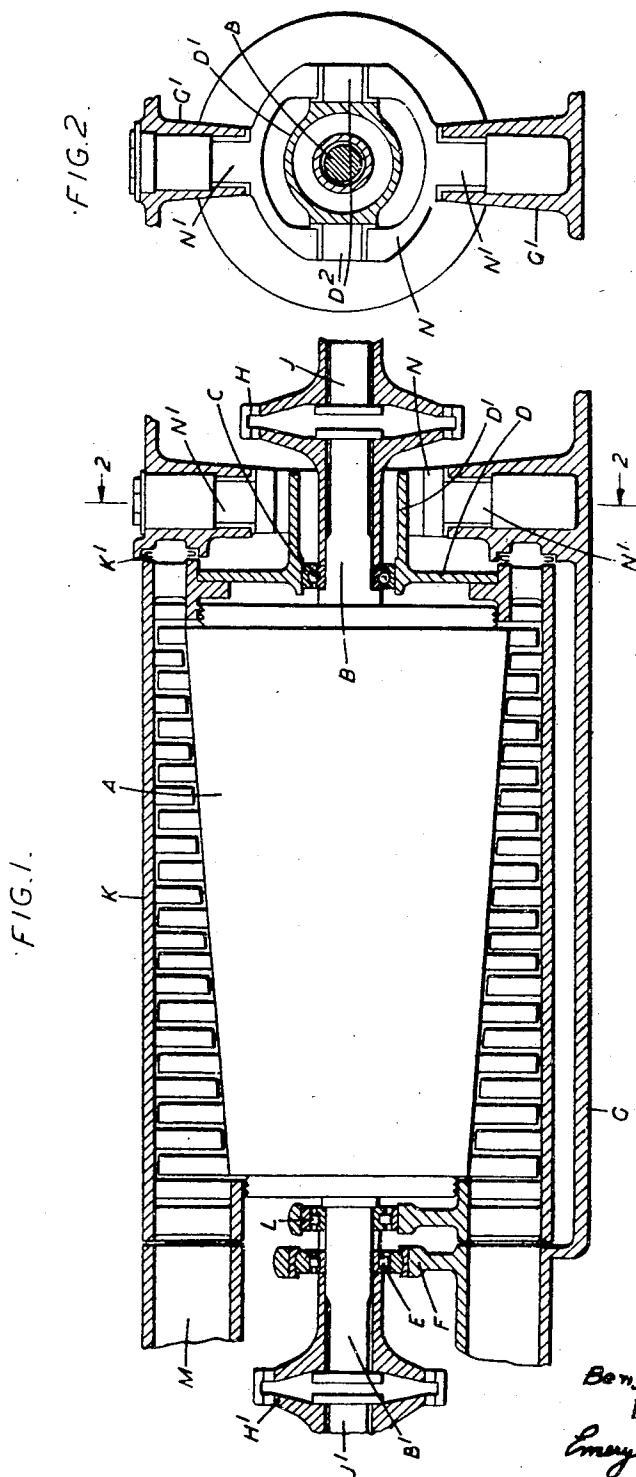
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2,435,528

COMPRESSOR

Filed Aug. 16, 1946

2 Sheets-Sheet 1



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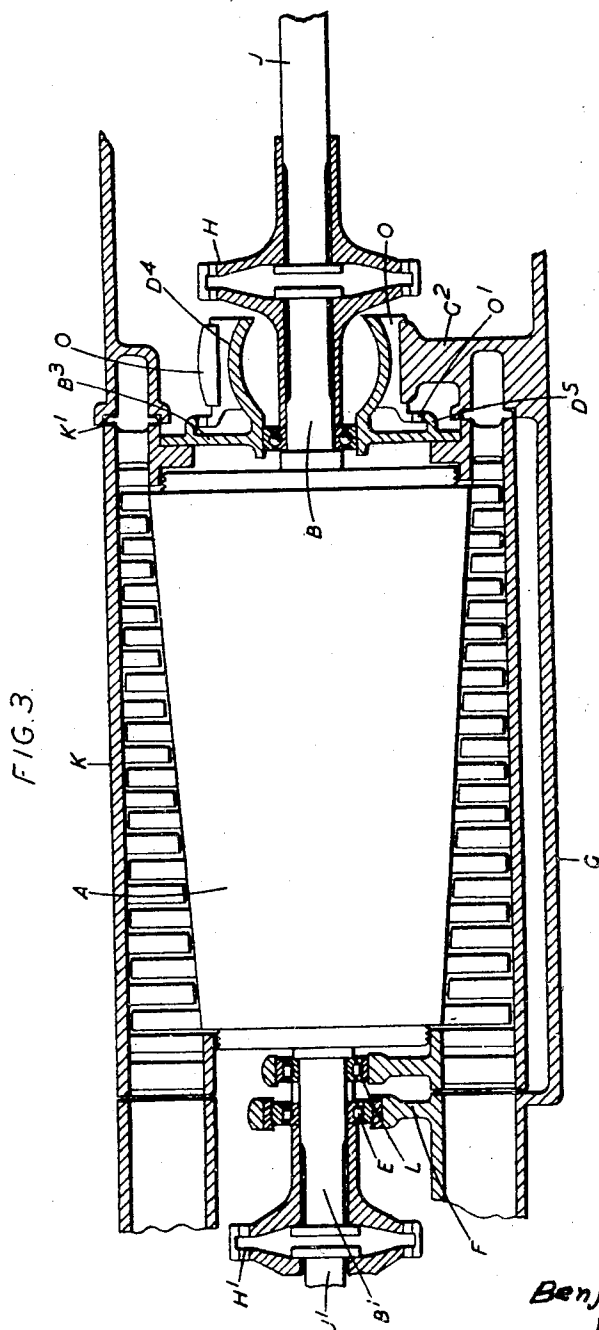
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UNITED STATES PATENT OFFICE

2,435,528

COMPRESSOR

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Section 1, Public Law 690, August 8, 1946

3 Claims. (Cl. 230—122)

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This invention relates to internal combustion engine power plants and has for its object to provide an improved mounting for an axial flow turbine driven compressor forming a part of such a plant when the compressor is placed above and supported on the engine. The invention applies more especially to a power plant of the general type comprising an engine which drives the propeller of an aircraft and also a compressor, the exhaust gases from the engine acting on a turbine which drives an axial flow compressor and also a second propeller.

According to this invention the shaft of the rotor of the axial flow compressor is carried in a bearing at one end by the casing enclosing the rotor and this casing at that end is carried on the part which supports the whole compressor and in a manner which permits the casing to float without rotation on that supporting part, while at its other end the casing is carried through a bearing, which may be of the self-aligning type, by the adjacent end of the shaft of the rotor which in turn is carried through a bearing which may be of the self-aligning type, by the said part which supports the compressor, this arrangement tending to prevent any distortion of the supporting part from being transmitted to the casing and the rotor within it. That end of the non-rotating casing within which the one end of the rotor shaft is carried in a bearing is supported by the part on which it is mounted in a manner which permits movement between the casing and that supporting part while actual rotation of the casing is prevented by interengaging members respectively disposed on the casing and on the part on which it is mounted. In one arrangement a spherical joint serves as the connecting support between the one end of the compressor casing and the part on which it is mounted. In another arrangement a universal joint is interposed between the one end of the casing and the part on which it is mounted this joint serving as the support for that end of the casing.

In the engine of an aircraft some degree of distortion is liable to occur and if this is transmitted to a multi-stage axial flow compressor mounted on the engine may cause the blading to suffer damage of a serious nature. However, with the compressor mounted in the manner now proposed distortions of the part or parts which support the casing of the compressor will not tend to be communicated to that casing owing to the way in which it can yield or float as a whole in relation to the engine below it. No tendency for the rotor shaft to be distorted will occur

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since it is partly carried in bearings by the casing and at least one of the bearings for the shaft is as mentioned of the self-aligning type.

The accompanying drawings illustrate by way of example two alternative arrangements that may be employed in carrying the invention into practice.

In these drawings,

Figure 1 is a longitudinal sectional elevation illustrating one way in which the compressor and the rotor within it may be mounted on some part of an internal combustion engine.

Figure 2 is a transverse section on the line 2—2 in Figure 1.

Figure 3 is a longitudinal sectional elevation illustrating an alternative arrangement of the mounting.

Referring to Figures 1 and 2, the rotor A has one end portion B of its shaft carried in a bearing C of normal type in an end plate D of the casing of the compressor. At the other end of the rotor which is the intake end, that end portion B¹ of its shaft is carried in a self-aligning bearing E supported by a pedestal F forming part of or otherwise carried by the part G on which the whole compressor is mounted. This may be the internal combustion engine or some part of a structure which is itself rigidly connected to the engine. The end portion B of the rotor shaft is connected preferably through a flexible coupling H to the shaft J of a turbine, not shown in the drawing, which drives the compressor. The other end portion B¹ of the rotor shaft is similarly connected through a flexible coupling H¹ to a shaft J¹ through which, and preferably through gearing, a propeller can be driven.

The casing K of the rotor A with the blading fixed therein is supported at one end through a bearing L on the end portion B¹ of the shaft of the rotor. At this end of the casing, which is the intake end, a suitable passage M carried by the structure G leads into the compressor. At the other end of the casing is a suitably formed delivery passage and sealing K¹ is there arranged between the casing K and the adjacent part G¹ of the fixed structure so as to avoid leakage in the delivery from the casing. At this end the casing, which through its end plate D carries the end portion B of a rotor shaft, is itself supported through a universal joint by the part G¹ of the structure on which the compressor is mounted. This universal joint comprises a sleeve D¹ projecting from the end plate D and forming an inner member having oppositely projecting gudgeon pins D². These are carried in an outer

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annulus N which in turn has oppositely directed gudgeon pins N¹ rotatably carried in the part G¹ of the fixed structure.

This arrangement constitutes a universal joint resembling a gimbal mounting and serves to prevent distortions of the engine or of the part on which the compressor is mounted from being communicated to the compressor casing, thus avoiding the risk of damage to the compressor which through its casing K floats on the part on which it is mounted.

To prevent the casing K from rotating various means may be employed, but a convenient arrangement for example at the delivery end is to form or attach to the end plate D an annulus with inwardly directed teeth or projections adapted to engage a ring of corresponding outwardly directed teeth or similar projections on a part of the fixed structure. This arrangement is shown by way of example in Figure 3 with reference to which it will be described hereunder. It will thus be seen that at one end the rotor A is wholly carried by its casing K which at one end is itself supported through a universal joint while at the other end the casing is carried through a bearing L by a part B¹ of the rotor shaft which in turn is carried through a bearing E which may be of the self-aligning type on the part G on which the compressor is mounted.

Referring to the alternative arrangement shown in Figure 3, in this case while at the intake end the casing K is supported as in the previously described arrangement in a bearing L on the end portion B¹ of the shaft of the rotor A, which itself is carried in a self-aligning or other bearing E by the part F on the supporting structure G, at the delivery end the end plate D³ of the casing is formed with a curved part D⁴ constituting the inner part of a spherical joint which rests in a suitably curved bearing O mounted on a pedestal G² forming part of the structure G on which the compressor is mounted. This arrangement provides a floating mounting for the delivery end of the casing. The rotation of the latter is prevented by providing the end plate D³ of the casing with an annulus having inwardly projecting teeth D⁵ which engage a corresponding annulus with outwardly directed teeth O¹ carried by the fixed part of the spherical bearing O.

What I claim as my invention and desire to secure by Letters Patent is:

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1. An axial flow compressor comprising in combination a part on which the compressor is mounted, a rotor, a casing enclosing the rotor, a bearing at the first end of the casing in which is carried one end of the shaft of the rotor, a support for the said first end of the casing between it and the said part on which the compressor is mounted, such support permitting the casing to float without rotation with respect to the said part on which the compressor is mounted, a bearing at the second end of the casing and by which it is carried on the second and adjacent end of the shaft of the rotor, and a bearing in which the second end of the shaft of the rotor is carried by the said part on which the compressor is mounted.

2. An axial flow compressor comprising in combination a part on which the compressor is mounted, a rotor, a casing enclosing the rotor, a bearing at the first end of the casing in which is carried one end of the shaft of the rotor, a support for the said first end of the casing including a universal joint between it and the said part on which the compressor is mounted such support with the universal joint permitting the casing to float without rotation with respect to the said part on which the compressor is mounted, a bearing at the second end of the casing and by which it is carried on the second and adjacent end of the shaft of the rotor, and a bearing in which the second end of the shaft of the rotor is carried by the said part on which the compressor is mounted.

3. An axial flow compressor comprising in combination a part on which the compressor is mounted, a rotor, a casing enclosing the rotor, a bearing at the first end of the casing in which is carried one end of the shaft of the rotor, gimbals forming a connection between the said first end of the casing and the part on which the compressor is mounted, the gimbals serving to support the end of the casing on the said part in a manner which permits the casing to float without rotation with respect to the said part, a bearing at the second end of the casing and by which it is carried on the second and adjacent end of the shaft of the rotor, and a bearing in which the second end of the shaft of the rotor is carried by the said part on which the compressor is mounted.

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