

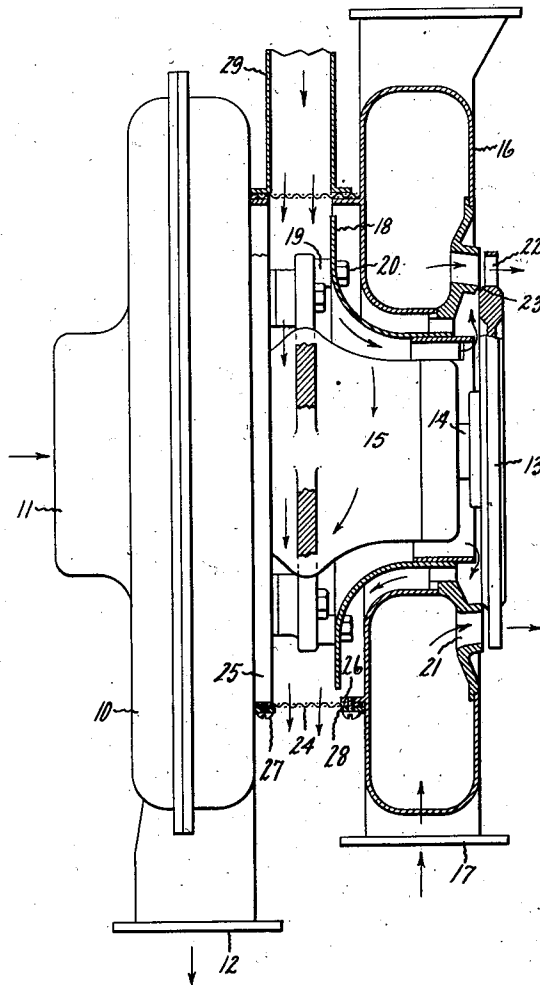
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GAS TURBINE DRIVEN SUPERCHARGER

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UNITED STATES PATENT OFFICE

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GAS TURBINE DRIVEN SUPERCHARGER

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1 Claim. (Cl. 230—116)

The present invention relates to gas turbine driven superchargers comprising a compressor and a gas turbine having a bucket wheel secured to an overhung shaft of the supercharger and exhausting directly into the atmosphere. Gas turbine driven superchargers are often used for supercharging combustion engines, especially in aircraft power plants. In arrangements of this kind it may occur that solid objects such as washers, nuts, bolts and the like may become loose during operation and drop into pockets formed by the turbine bucket wheel and adjacent parts. Also, during assembly of such plants it may occur that solid objects are inadvertently dropped into such pockets and left there. This endangers the operation of such power plants, particularly when such solid objects are forcefully thrown against the highly stressed bucket wheel during operation.

The object of my invention is to provide an improved gas turbine driven supercharger arrangement whereby the bucket wheel is effectively protected against contact with loose solid objects.

For a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claim appended thereto in connection with the accompanying drawing.

The single figure of the drawing illustrates an arrangement embodying my invention, the compressor being shown in elevation and the turbine in section.

The arrangement comprises a centrifugal compressor 10 with an inlet 11 and a discharge conduit 12. The compressor is driven by a gas turbine including a bucket wheel 13 secured to an overhung portion of the supercharger shaft 14. The shaft 14 is supported by a bearing 15 arranged between the bucket wheel 13 and the compressor 10, the impeller of the compressor being carried by the shaft. Operating gases are conducted to the bucket wheel 13 by means including an annular nozzle box 16 with an inlet 17 and concentrically spaced from the bearing 15. A partition 18 is provided between the nozzle box 16 and adjacent portions of the bearing 15 and the compressor 10 to reduce heat transfer from the nozzle box to the bearing and the compressor.

The protecting wall 18 is supported on the supercharger by means including studs 19 and bolts 20.

The nozzle box 16 has a row of nozzles 21 for properly directing operating gases towards a row of buckets 22 of the bucket wheel 13. The row of nozzles 21 and the adjacent row of buckets 22 form a small clearance 23. It is important that any solid objects be prevented from contacting the bucket wheel during operation, especially in proximity to the clearance 23, because the bucket wheel is normally rotated at high speed and contact of loose, solid objects with it might prove fatal to the arrangement. This is accomplished by the provision of an annular screen 24 between the compressor and the nozzle box. The screen 24 has edges secured to annular flanges 25 and 26 of the compressor and the nozzle box respectively by means including screws 27 and washers 28. During operation, cooling air may pass through the screen 24 in the direction of the arrows to cool the bearing 15 and the bucket wheel 13. Access of solid matter is prevented by the screen 24. In the present instance cooling air from a suitable source, such as the slip stream of an airplane, is conducted to the outer surface of the bearing 15 by means of a flanged conduit 29 secured to the nozzle box and the casing of the compressor 10.

What I claim as new and desire to secure by Letters Patent of the United States is:

Gas turbine driven supercharger arrangement comprising a compressor having a shaft, a bearing supporting an intermediate portion of the shaft, a gas turbine having a bucket wheel secured to the shaft and an annular nozzle box for conducting gas to the wheel concentrically spaced from the bearing, cylindrical flanges being formed on adjacent portions of the compressor and the nozzle box, means comprising a conduit secured to the flanges for conducting cooling air to the bearing and the bucket wheel, and means including a cylindrical screen with edges secured to the flanges of the compressor and the nozzle box and having a portion extending across said conduit to prevent solid objects from entering the space between the nozzle box and the bearing.

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