

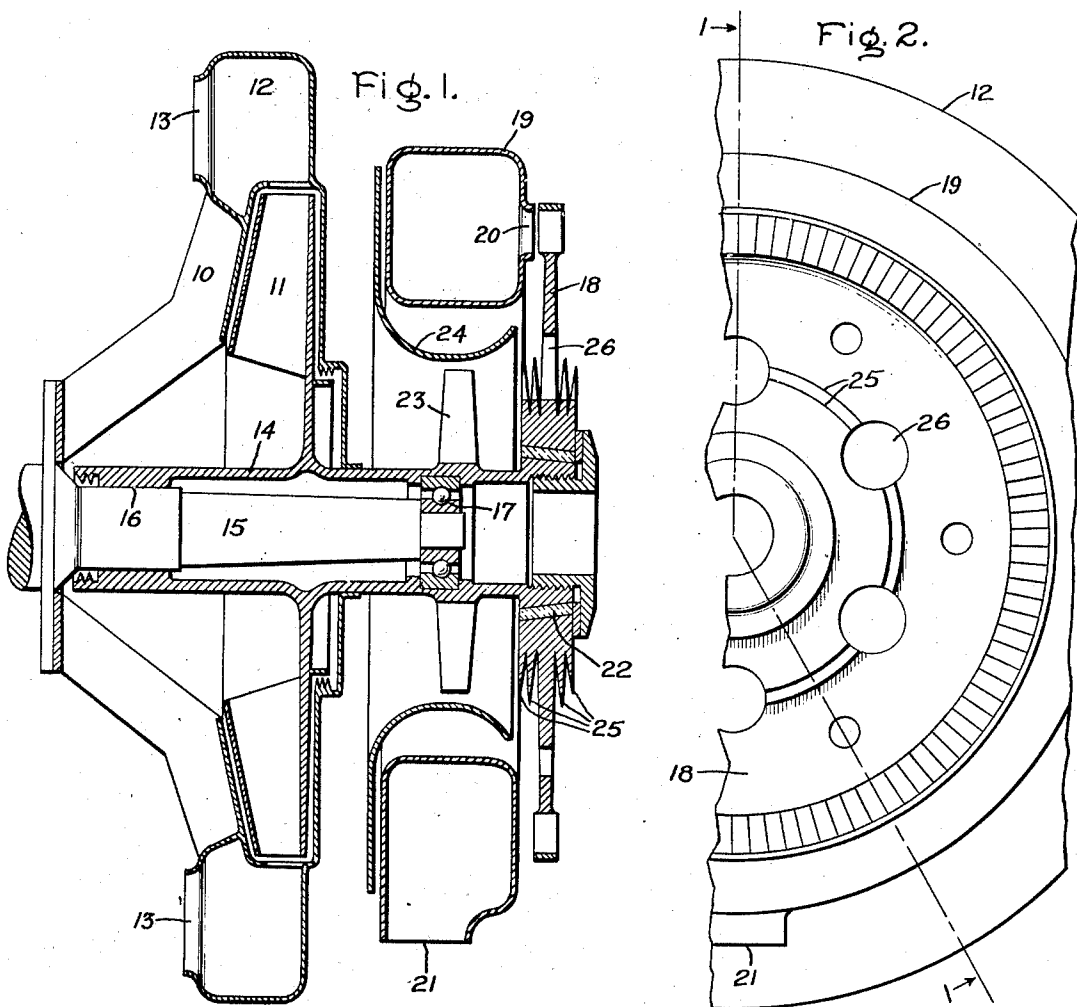
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GAS TURBINE DRIVEN SUPERCHARGER

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GAS TURBINE DRIVEN SUPERCHARGER

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The present invention relates to gas turbine driven superchargers such as are used in aircraft for supercharging internal combustion engines. The gas turbine or turbines for driving the superchargers in such arrangements receive their operating medium in the form of gases discharged or exhausted from an internal combustion engine. These gases have high temperature and cause considerable heating of the gas turbine wheel. Precaution has to be taken therefore to avoid excessive heating of the turbine shaft and the transmission of such heat to other parts of the plant.

The object of my invention is to provide an improved construction and arrangement whereby the bucket wheel of the gas turbine is effectively cooled and the transmission of heat from the bucket wheel to other parts associated therewith is considerably reduced.

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

In the drawing, Fig. 1 is a sectional view along lines 1—1 of Fig. 2 of an exhaust gas turbine driven blower or supercharger embodying my invention, and Fig. 2 is a front view of Fig. 1.

The arrangement comprises a blower 10 with an impeller 11 and a discharge scroll 12. The scroll has a plurality of openings 13 for connection to the various cylinders of a combustion engine. The impeller is secured, in the present instance integrally formed, with a hollow shaft 14. The shaft is supported on an overhung shaft portion 15 which may form a part of the crank shaft of the engine to be supercharged. The support is accomplished in the present instance by means of a friction bearing 16 for the left-hand end of the hollow shaft 14 and a ball-bearing 17 for an intermediate portion of the shaft 14. The right-hand end portion of the shaft 14 is overhung with regard to the bearing 17. The supercharger, that is the shaft 14, with the impeller 11 is driven by a gas turbine which comprises a bucket wheel 18 secured to the overhung portion of the shaft 14. A nozzle box 19 having a plurality of nozzles 20 and an inlet opening 21 is associated with the bucket wheel and disposed intermediate the wheel and the supercharger. To reduce the transfer of heat from the disk of the bucket wheel 18 the latter is heat-insulated from the overhung portion of the shaft 14 by a member 22 made of a material of poor heat-conductivity.

In accordance with my invention the bucket

wheel 18 is cooled and thereby the transmission of heat therefrom to the shaft 14 and other parts associated therewith is considerably reduced by the provision of an auxiliary blower or fan having a plurality of vanes or blades 23, in the present instance integrally united with the shaft 14 and disposed intermediate the bucket wheel and the supercharger casing and inside the annular space defined by the nozzle box 19 of the gas turbine. The auxiliary fan or blower 23 also includes a casing 24 for properly conducting air from the atmosphere to the inlet side of the blades 23 and discharging it therefrom toward the bucket wheel 18. To improve the cooling effect on the wheel and to facilitate the discharge of the air, the hub of the bucket wheel is provided with a plurality of annular projections 25 on both sides of the bucket wheel disks and these annular projections on the bucket wheel 18 are provided with a plurality of circumferentially spaced openings 26 which also extend through the bucket wheel disk. The outer side of the bucket wheel 18 is completely exposed to the atmosphere.

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

1. Exhaust gas turbine driven supercharger for aircraft including the combination of a supercharger, an axial flow gas turbine having a bucket wheel secured to the shaft of the supercharger with one side of the bucket wheel directly exposed to atmosphere, means for conducting gas to the bucket wheel comprising a nozzle box arranged intermediate the wheel and the supercharger, and auxiliary blower means for cooling the side of the bucket wheel adjacent the supercharger.

2. Exhaust gas turbine driven supercharger for aircraft including the combination of a supercharger having a shaft and an impeller integrally formed on the shaft, a gas turbine having a bucket wheel secured to said shaft, an annular nozzle box for supplying gases to the bucket wheel being disposed intermediate the wheel and the supercharger, and means for cooling the bucket wheel including an auxiliary blower having an impeller secured to the shaft intermediate the bucket wheel and the impeller and within an annular space defined by the nozzle box.

3. Exhaust gas turbine driven supercharger for aircraft including the combination of a supercharger having a shaft and an impeller secured thereto, a gas turbine having a bucket wheel secured to an overhung portion of said shaft and a nozzle box disposed intermediate the bucket wheel and the impeller, means for cooling the bucket wheel and reducing transmission of heat

therefrom to the shaft, said means including a member made of a material with low heat-conductivity interposed between the bucket wheel and the overhung portion of the shaft, the bucket wheel having a hub with a plurality of annular projections formed on the hub on both sides of the disk, a plurality of circumferentially spaced

openings through said projections, and an auxiliary blower having an element secured to the shaft intermediate the impeller and the bucket wheel for forcing cooling air from the atmosphere towards the bucket wheel.

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