TECHNICAL MEMORANDUMS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 385

COOLING OF AIR-COOLED ENGINES BY FORCED CIRCULATION OF AIR

From "Les Ailes," September 9, 1926

Washington
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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

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COOLING OF AIR-COOLED ENGINES BY FORCED CIRCULATION OF AIR.*

The cooling of aviation engines has long been practically solved. At present, however, there seems to be an endeavor to effect it in some less crude way than, for example, by means of a radiator placed in the full air stream or by the direct cooling of the cylinder heads.

Such methods create, in fact, well outside the apparent master section of the fuselage, disturbed zones, where the flow is poor, which help to make the maneuvering of the airplane more difficult.

Moreover, the head resistance of a radiator is far from being negligible and it is for this reason that for several years investigators have been endeavoring to improve the cooling devices.

Tests have been made with a system consisting of an interior radiator, in which the air circulation was obtained by means of the negative pressure produced by the engine exhaust, which was effected with the aid of an exhaust pipe. A strong current of air was thus obtained in the radiator, without disturbing the flow outside the fuselage.

Other devices, utilizing ejector pipes connected with the

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exhaust for producing a suction about the cylinders of air-cooled engines will, when perfected, render it possible to house radial air-cooled engines almost completely.

Piero Magni, whose various tests have been recently described in "Les Ailes," succeeded in the practical operation of a 50 HP. engine, completely enclosed in a fuselage (Figs. 1, 2, and 3). He called his invention an "aerodynamic fuselage," because it presents no obstacle to the air current.

In order to obtain this result, an air current is forced into the nose of the fuselage by the action of several fans revolving with the propeller. The air is then guided by special deflectors which cause it to flow along the exhaust pipes and cylinders and then, after having been utilized, pass out through annular ports. This system of cooling worked perfectly at all speeds.

The engine frame is mounted on two vertical axes and can pivot so as to enable easy access to the rear side of the engine.

The propeller was difficult to proportion, by reason of the considerable part of the disk area covered by the spinner. Thus the Piero Magni propeller 5 has very tapering blades with a diameter of 2 meters (6.56 feet) and a pitch of 1.884 meters (6.18 feet). It holds the engine to 1525 R.P.M., corresponding to 50 HP.

These results are very interesting. They indicate a way which will soon be adopted, as conceded by all technical experts, if we wish to improve the efficiency of aircraft.

Translation by Dwight M. Miner,
National Advisory Committee
for Aeronautics.

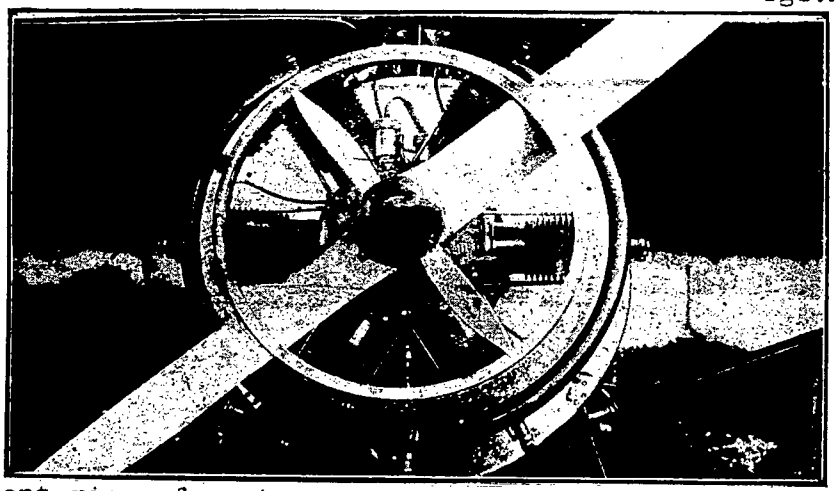

Fig.1 Front view of engine-propeller group, after removing spinner. Note the parabolic deflecting cone which covers the propeller hub. The propeller is wooden and the two-bladed fan is incorporated in the drum integrally with the propeller (Piero Magni device).

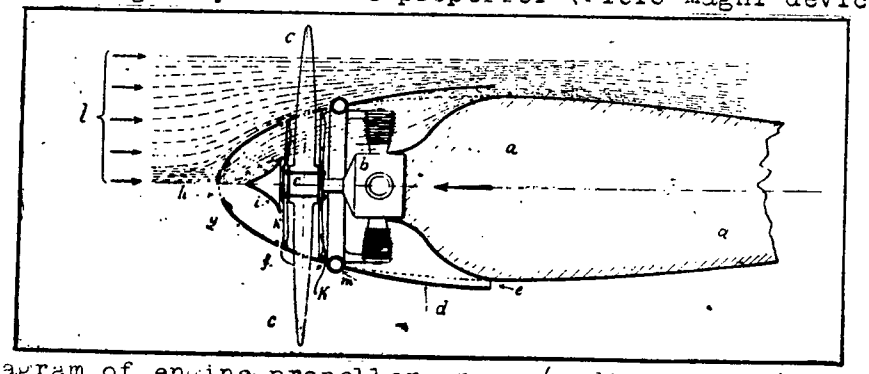

Fig.2 Diagram of engine-propeller group (radial engine) entirely inclosed in the "aerodynamic fuselage"and cooled by the forced circulation of air.

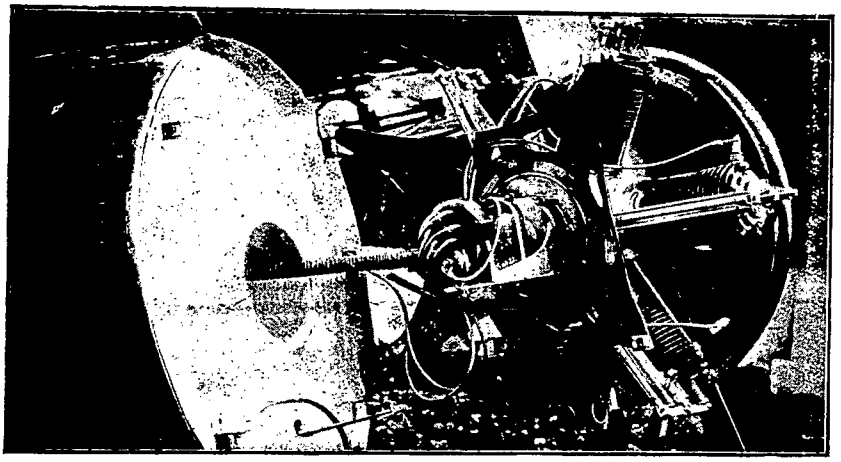

Fig.3 Engine-propeller group open for inspection. Note, from left to right: the wooden shell of the fuselage closed by an incombustible triplex cap ; the four removable steel pivots; and, lastly, the Anzani engine.