

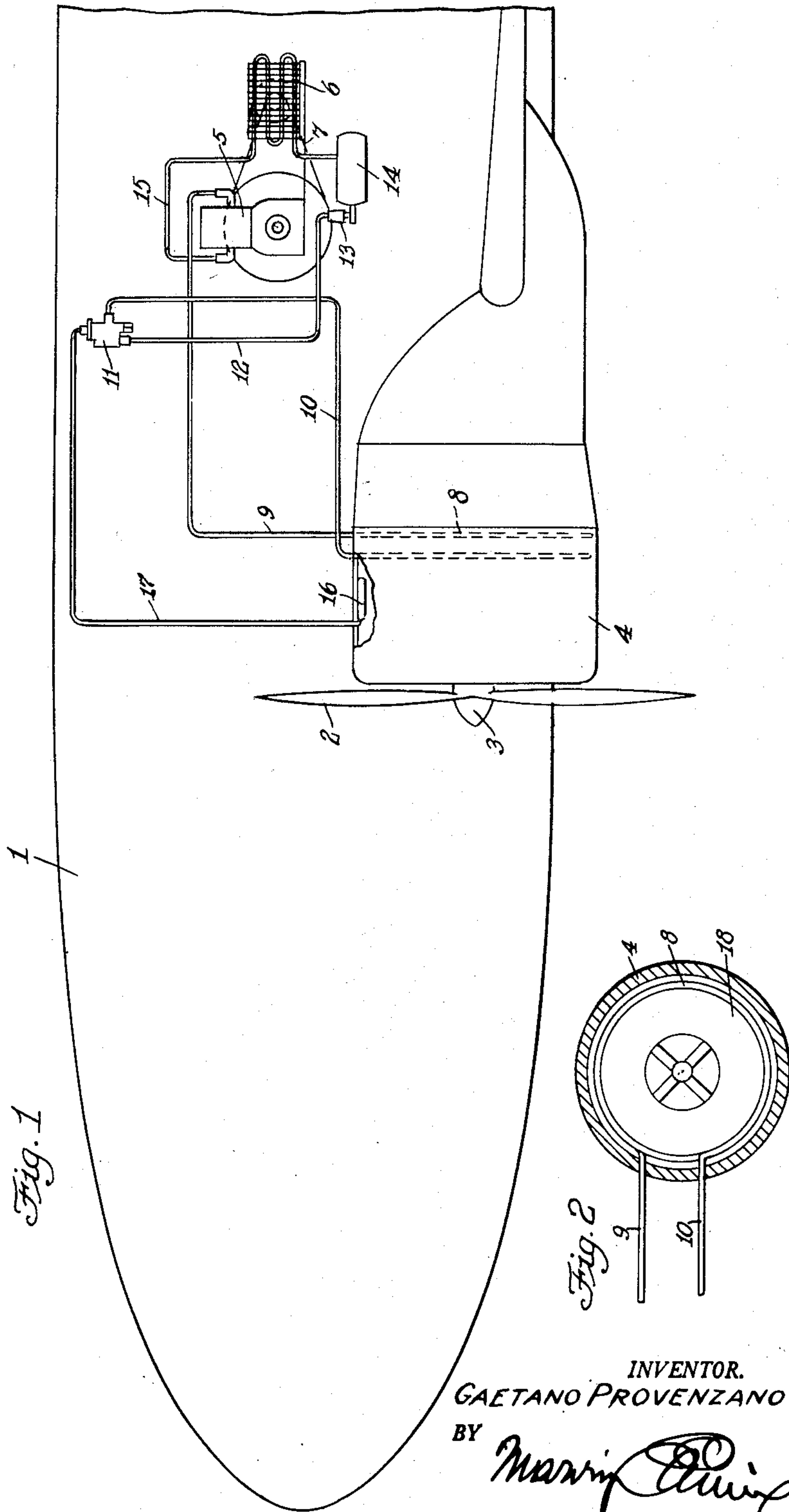
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COOLING SYSTEM FOR INTERNAL-COMBUSTION ENGINES

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## UNITED STATES PATENT OFFICE

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## COOLING SYSTEM FOR INTERNAL-COMBUSTION ENGINES

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1 Claim. (Cl. 123—41.19)

1

This invention relates to cooling systems for heat engines. More particularly the invention pertains to cooling systems for internal combustion motors. Further, the invention relates to cooling systems for the engines of automotive devices as well as to stationary installations. The system is specially adapted for controlling the operating temperature of aviation power plants whether they are air or liquid cooled.

It is an object of the invention to provide means for increasing the cooling effect available normally for controlling the temperature of a heat motor. It is also an object to provide an auxiliary cooling means which may be employed in conjunction with the cooling means usually used. Also it is an object to provide an economical and efficient cooling means which may be employed independently of the normally employed cooling means or which may be employed instead thereof. Further it is an object to provide a cooling system, for the purposes described, which is automatically operable to supply the degree of cooling selectively required during the operation of the engine to maintain optimum running conditions. Also it is an object to provide a cooling system which automatically guards the powerplant against overheating and the possibility of exploding the engine. Other and further objects and the advantages of the invention will be apparent as the following specification is read in conjunction with the drawing accompanying same, in which:

In the drawing forming part hereof, Figure 1 is a side elevation of an automotive apparatus embodying the invention, as applied to an airplane, for example, a part of which is shown. Figure 2 is a transverse section of the engine of Figure 1 with the cooling coil surrounding the cylinders thereof. In the drawing 1 is the body of an automotive device or the fuselage of an airplane, 2 is a propeller or other power translating means, carried on a suitable shaft of which 3 is the forward portion. A housing 4 may enclose a suitable motor or the engine 13. This motor may be cooled normally by air driven through the housing 4 and over the exposed surface of the motor or the motor may be cooled by a liquid circulated through the motor jacket in a well known manner.

A feature of the present invention is the employment with or independently of other cooling means, of a refrigerating cycle, in which 5 is a suitable compressor unit operated by an independent power source or by the main engine in the housing 4, an electric motor 6 connected

2

to the compressor by the belt 7 serving as an example. Associated with the engine in any appropriate manner is a tubular heat-transfer coil 8, mounted within the housing 4 and surrounding motor 13 through which, for the purpose of cooling the engine, a refrigerating fluid is adapted to be circulated, same being carried through pipe 9 connected to one side of the compressor, and through pipe 10 connected with the control valve 11, and from this valve through pipe 12, to the reducing valve 13 on the expansion tank 14 and then by pipe 15 back to the compressor, in a well known manner. The amount of the cooling effect applied to the engine may be regulated in any suitable manner as for example by the heat-responsive means 16 adjacent the engine within the housing 4 and which is adapted to govern the control valve 11, as by the expansion or contraction of a fluid in the pipe 17 leading from the means 16 to said valve 11, the variation in the volume of said fluid serving to increase or decrease the flow of coolant from the refrigerating system. The exact method of control employed will be governed by the conditions to be met and it is to be understood that a means such as 16, might be employed to start and stop the operation of the refrigerating unit by substituting for or associating with means 11, a suitable electric switch or other device for the purpose. By the system described it will be seen that a cooling effect far beyond that normally applied is made available. And that this effect may be independently applied or it may be applied in conjunction with the normal cooling means commonly used. As pointed out the embodiment illustrated and described is schematic and within the scope of the inventive idea modifications and changes may be made to effectively, economically and efficiently provide the means for selectively increasing the cooling effect applicable to a heat engine beyond that normally available by presently employed means.

I claim as my invention:

A dual cooling system for an internal combustion engine having a plurality of cylinders, a support for the latter, a housing, a conventional cooling system upon the support associated with the engine, the engine being located within said housing, a refrigerating system upon said support located externally upon said support, and having a fluid coolant, a cooling coil for said coolant surrounding the cylinders within the housing and connected to said refrigerating system externally of said housing, means for driv-



3

ing the refrigerating system, temperature responsive means located within said housing adjacent to said engine, and a control valve connected to the temperature responsive means and operable thereby in response to predetermined temperature conditions prevailing about said cylinders, said control valve being also connected to said cooling coil and to said refrigerating system to control flow of coolant from the latter system to said cooling coil.

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