March 9, 1943. P. M. LEMOIGNE 2,313,491

MOTOR PROPELLING UNIT

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Fig. 1.

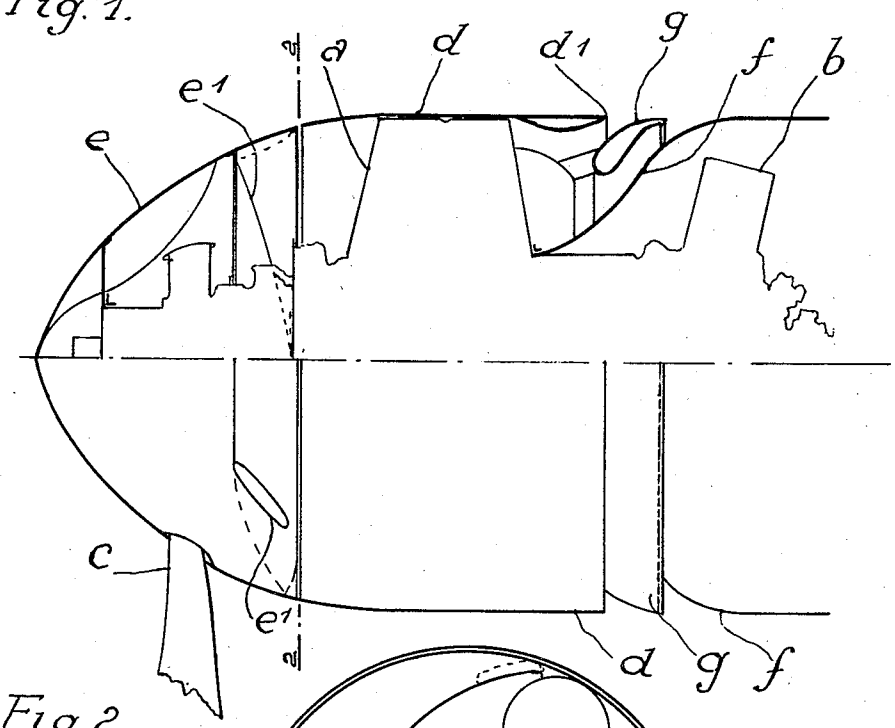
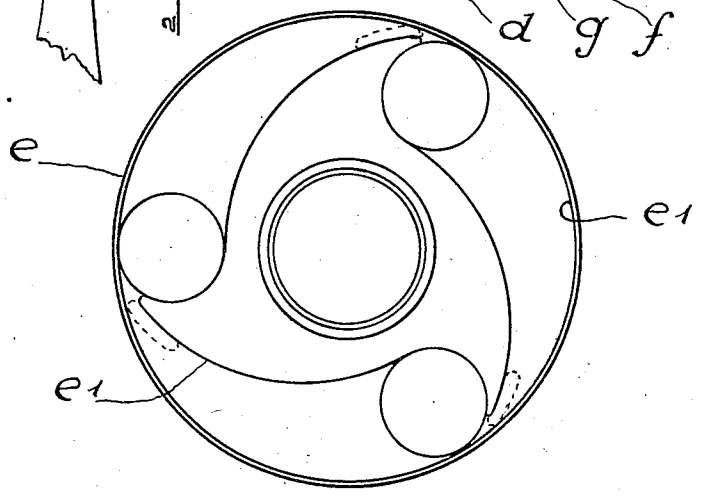


Fig. 2.



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Fig. 3.

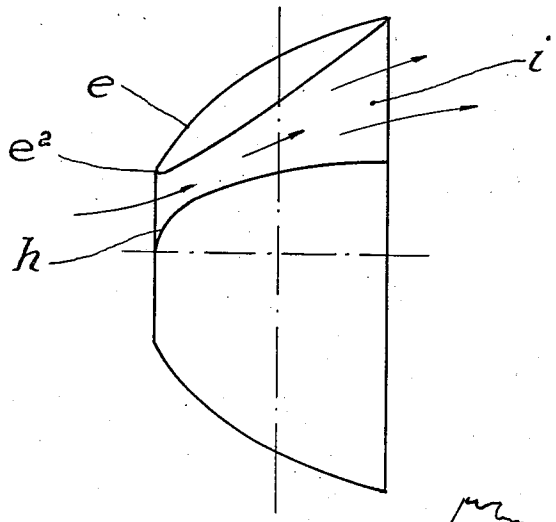
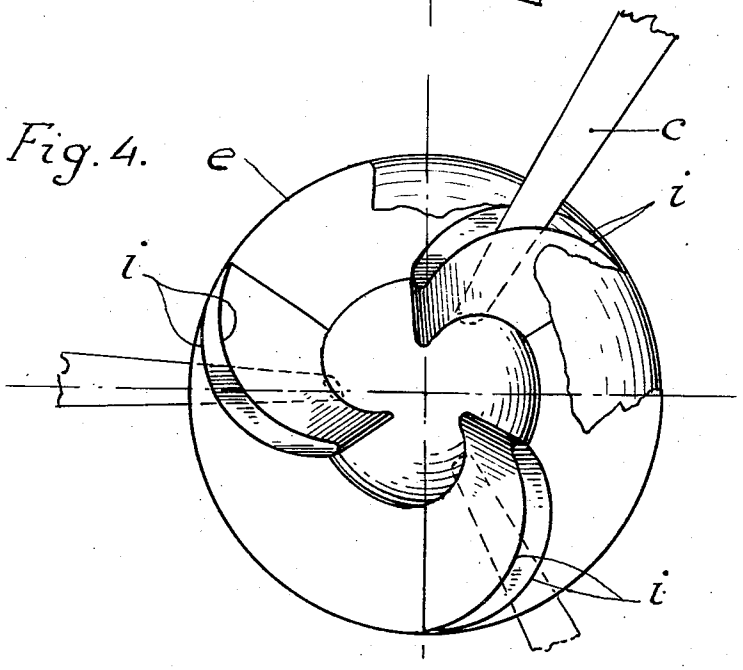


Fig. 4.



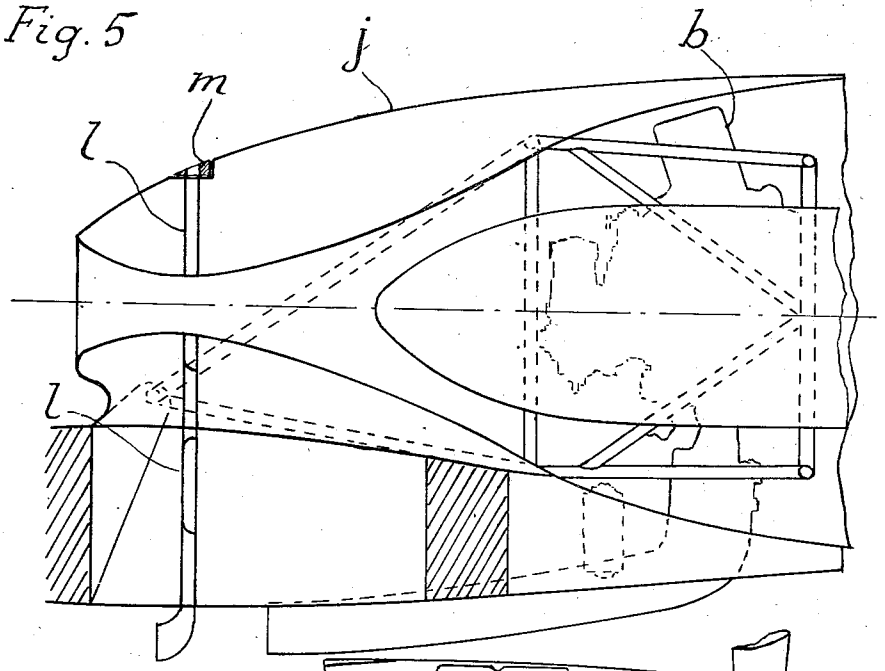
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Fig. 5



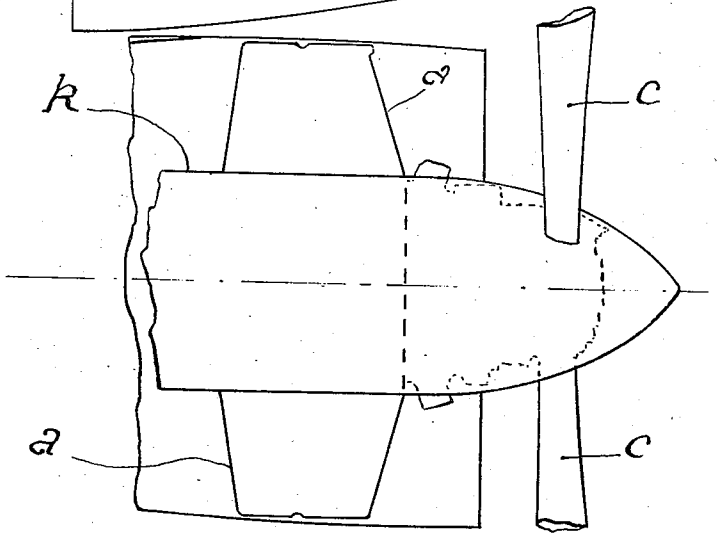


Fig. 5a.

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MOTOR PROPELLING UNIT

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Fig. 6.

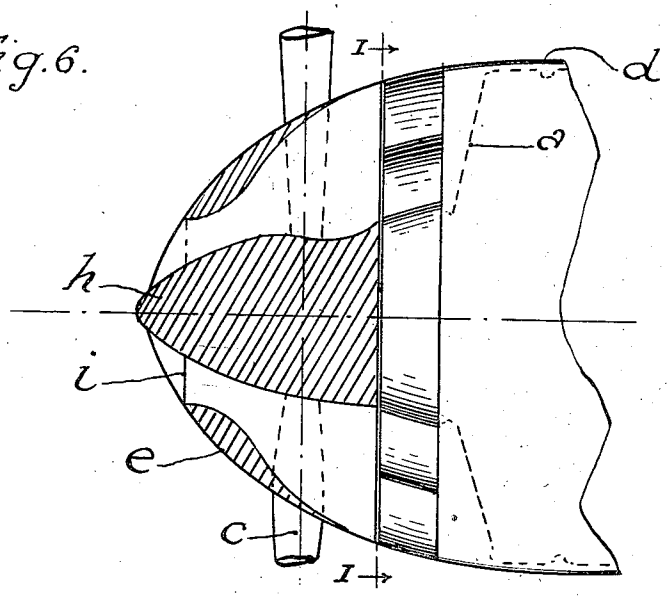
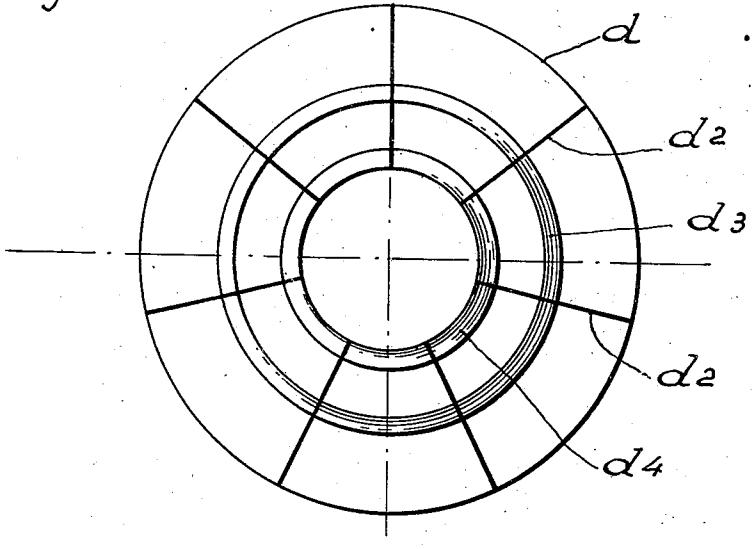


Fig. 7.



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UNITED STATES PATENT OFFICE

2,313,491

MOTOR PROPELLING UNIT

Pierre Marcel Lemoigne, Chatillon-sur-Bagneux, France; vested in the Alien Property Custodian

Application June 23, 1939, Serial No. 280,863
In France June 24, 1938

1 Claim. (Cl. 170—166)

The invention relates to motor propelling units, and more particularly to aircraft propelling units.

This invention has for its object to provide motor propelling units which offer less resistance to forward motion than those devised up to now and in which the engines of said units are subjected to a much better cooling action, particularly when the engines of said motor propelling units are idling or when the machines provided with the latter are in certain conditions for which the cooling is not normally ensured.

The invention is mainly characterized by the fact that the engine of said unit is arranged in a kind of nozzle and a rotor capable of imperatively ensuring a circulation of the surrounding fluid in the said nozzle is arranged at a suitable point on the latter. This rotor is arranged in such a manner that it is actuated by the propeller of the motor propelling unit.

The invention thus defined by its main feature can be carried out in various manners, in particular:

By dividing the cowl of said motor propelling units into four parts:

(1) Front cone;
(2) Central cowl;
(3) Silencer; and
(4) Rear cone.

The front cone is provided with at least one conduit in the shape of a horn the inlet of which is located at a suitable point on the periphery of the front cone and the outlet or exhaust of which is located on a plane passing through the base of said cone so that the air trapped by said horn scavenges the cylinders of the engine of said unit.

The central cowl is given according to the known manner the necessary enveloping shape and by giving to its trailing edge a profile suitable for allowing it to cooperate with the extrados of the cross section, given for that purpose to the silencer, in the formation of a slot creating a partial vacuum in the central cowl.

The rear cone is given such a shape that it serves as stream-lining and protection for the elements mounted at the rear of the engine and that it creates with the cooperation of the intrados of the cross section given to the silencer, a slot effect supplementary to that which has just been indicated.

The invention can also be carried out by providing the front cone with a central ear, an internal cone and partitions constituting vanes or blades and by stream-lining the parts of the blades of the propeller passing through the annular conduit of said front cone and by causing them to pass through said partitions or only some of said partitions which are made hollow for that purpose.

The invention can also be carried out by giving to the wall of the nozzle such a cross section that the latter is convergent-divergent and by arranging in the divergent part of the nozzle and co-axially with the latter a tapered body stream-lining the accessory elements of the engine proper.

Advantageously, the throttled portion of the nozzle is caused to communicate with the periphery of the latter by one or more channels or conduits the inlet or outlet of which is controlled by a suitable throttle-valve.

The invention will be clearly understood by means of the following complementary description and accompanying diagrammatic drawings, said complementary description and drawings being given simply by way of indication.

Figs. 1 and 2 of said drawings show, respectively, in longitudinal elevation and half-section, seen in vertical section according to line 2—2 of Fig. 1, a motor propelling unit devised according to one form of the invention.

Figs. 3 and 4 of said drawings show, respectively, in longitudinal elevation and half-section, parts broken away, and an end view, parts broken away, the front part of a motor propelling unit devised according to a second form of the invention.

Figs. 5 and 5*a* show in axial longitudinal vertical section, a motor propelling unit devised according to a third form of the invention.

Figs. 6 and 7 of said drawings show respectively in vertical longitudinal section and in cross section according to line I—I of Fig. 6, a motor propelling unit devised according to a fourth form of the invention.

According to the invention and in a motor propelling unit comprising an explosion engine *a* with its group of accessory parts *b*, such as carburettors, electric devices for the ignition of the combustible mixture, distributors, various pumps, etc., and a propeller *c*, mounted on the nose of the shaft of said engine, and in which the cooling of the engine (engine proper and oil radiator for instance) is perfectly ensured, the following or a similar method of procedure is adopted:

As is known, the engine is arranged in a cylindrical cowling *d*, care being taken, according to the invention, to give to the trailing edge of the intrados d^1 a profile, having a cross section such as that shown in the drawings.

A cone *e* (usually called saucepan) is devised and arranged so as to have a general ogivo-parabolic shape; said cone has been devised for covering, as is known, the front part of the engine *a* and the lower part of the blades of the propeller *c*, and so that its base should have a

surface corresponding to the front section of the cowling *d*.

The cowling *d* therefore forms an extension of the cone *e*. Of course, a gap exists between both of these elements, since the cone *e* rotates whereas the cowling *d* is fixed.

A deflector *f* is provided, to which is given the shape shown in the drawings so that it constitutes an outlet annular ear of the cowling *d* and protects the accessory devices *b* from the air which has become heated by passing through the cowling *d* by absorbing calories from the engine *a*.

The silencer *g* for the burnt gases of the engine is stream-lined in cross section as shown in the drawings, and said silencer is so arranged that its extrados and its intrados produce in cooperation with the corresponding parts of the trailing edge d^1 of the cowling *d* and of the front part of the deflector *f* a double slot effect increasing the partial vacuum in the cowling *d* and accelerating the escape of the air from said cowling *d*.

The cone *e* is constituted in such a manner that it comprises one or more conduits e^1 in the shape of a cone, three in this case, the inlet of which is at the periphery of the cone, near its base, and the outlet is in the plane of the base of the said cone *e*. These conduits are advantageously formed from suitable sheet metal plates partitioning the interior of the cone *e*.

It will be understood that the cooling of the engine *a* can be perfectly ensured since, on the one hand, the cone *e* acts as the rotor of a fan and on the other hand, the trailing edge d^1 of the cowling *d*, the silencer *g*, and the deflector *f* act as a filter-pump.

The circulation of the air is therefore compulsory in the cowling *d* and about the engine *a*, which is thus immersed in a draft constantly renewed upon the displacement of the machine on which the motor propelling unit just described is mounted.

Furthermore, said circulation is ensured also while the propelling unit is idling owing to the fact that the cone *e* acts as the rotor of a fan and owing to the suction created by the convection movement created by the silencer *g*. This possibility of cooling the engine *a* when it is idling is very important as it permits the operation of the engine in conditions practically identical to flying conditions.

The rotor which is in fact the cone *e* can also be constituted, as shown in Figs. 3 and 4, by opening said cone at its front part e^2, by arranging within it a cone *h* and by bracing both these cones *e* and *h* by means of partitions *i*, to which is advantageously given the shape of air-conducting blades, the curvature of which is a function, in particular, of the characteristics: speed of rotation of the engine, speed of translation of the motor propelling unit.

Advantageously these partitions *i* are so made that the blades of the propeller *c* can be caused to pass within them.

It will be easily understood that air, penetrating through the ear which is the opening formed at the part e^2 of cone *e*, is propelled by the partitions *i* toward the interior of the cowling *d* and compelled to circulate therein as long as the engine rotates, whether it be in flight or while idling.

In the form shown in Fig. 5 of the drawings, the invention comprises a nozzle the outer shape of which is that of a cylindrical ogival body *j* and the internal profile of which is convergent-divergent owing to the stream-lined shape given to the cross section of the wall of said cylindrical ogival body *j*.

In the axis of the said nozzle, and therefore within the body *j*, there is arranged a kind of cylindrical spindle *k* having an ogival shape at both its ends. The spindle *k* is located in such a manner that the flow of the cooling fluid (the surrounding air) in the body *j* is of null resistance.

One or more conduits *l* can be provided starting at the periphery of the front part of the body *j* or at another point outside the latter, and opening into the narrow part of said body *j*, in order to exert an action on the stream circulaitng in the nozzle, which action can be controlled by means of a throttle-valve *m*, which can be actuated by hand or by a thermostat.

It is to be understood that the elements of the engine *a* which must be cooled, i. e., the cylinders, project from the spindle *k* so as to be immersed in the fluid stream circulating in the diffusor of the nozzle and that the said driving spindle has its outlet point at the cone, stream-lining the hub of the propeller *c*.

In this form of the invention the circulation of the fluid can be enhanced by arranging near the propeller *c*, or on the latter, a device similar to the rotor of a fan.

According to Figs. 6 and 7 this rotor is constituted by the cone (or saucepan) *e* open at its front part e^2 and comprising within it a cone *h*, partitions *i* constituting the blades of the rotor *e*, and a stator constituted by the cowling *d* in which is housed the engine *a* to be cooled. In the front part of said cowling *d* is arranged a partitioning constituted, on the one hand by radial partitions d^2 and, on the other hand, by circular concentric partitions d^3, d^4.

As will be easily understood said partitions divide the vortical stream set in motion by the rotor *e*, into elementary streams which are thus directed, and distributed through the cowling *d* so as to better circulate between the elements of the engine; elements which are literally immersed in the fluid set in motion by the rotor *e*.

Experience has shown that the motor propelling units devised according to the invention ensure a perfect cooling of the engines, offer no resistance to the machines which are provided with them but cooperate in the lifting of the latter as is the same in particular with the form shown in Fig. 5 of the drawings, wherein the body *j* is arranged on the intrados of the wing of an aircraft.

The invention is not, of course, limited to the forms or applications of the same which have been more particularly described and illustrated, but includes in its scope all modifications thereof.

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

In a motor propelling unit including a driven propeller having blades, a rotor member actuated by said propeller, said rotor member including an outer cone provided with a central opening, an inner cone arranged concentrically within said outer cone, helically-shaped hollow partitions constituting the vanes of said rotor bracing said cones and the blades of the propeller passing within the hollow bracing partitions.

PIERRE MARCEL LEMOIGNE.