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AEROPLANE ENGINE EXHAUST

Filed Feb. 1, 1929

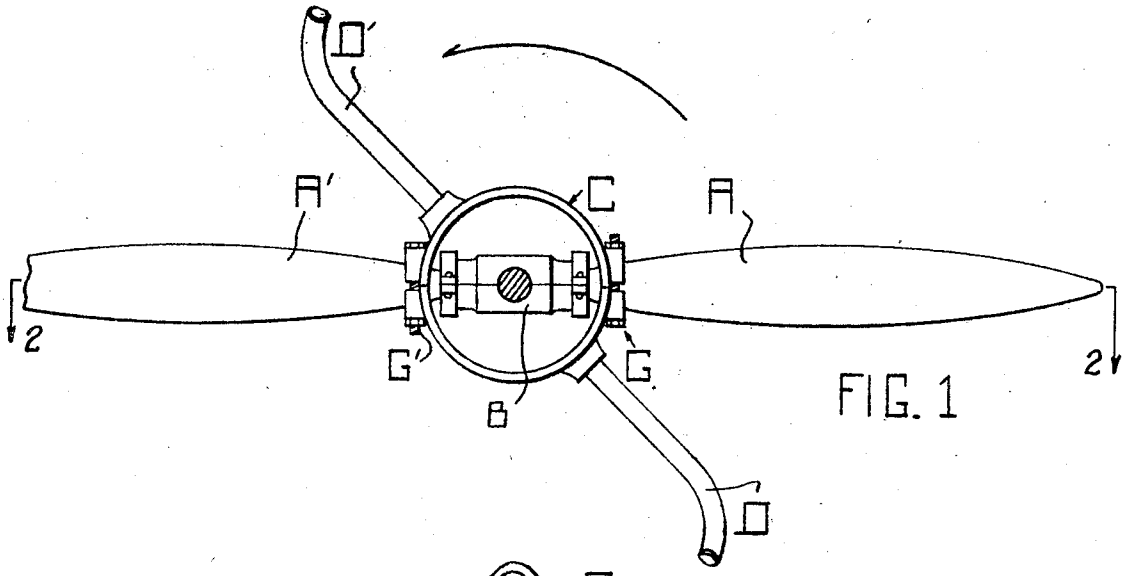

FIG. 1

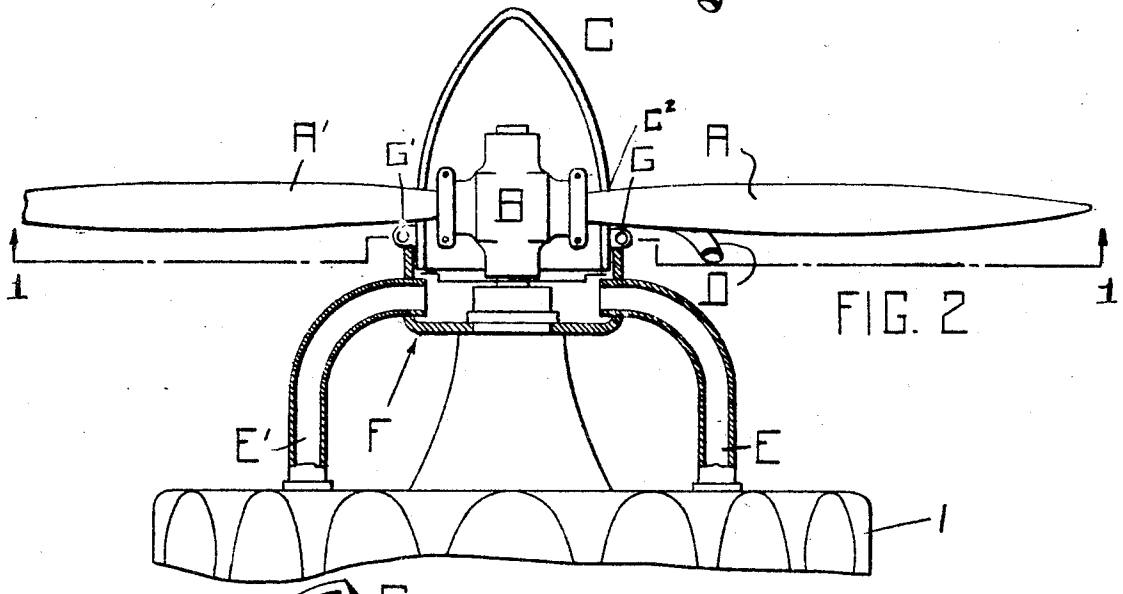

FIG. 2

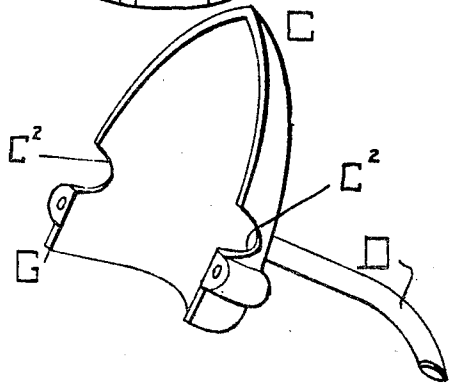

FIG. 3

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UNITED STATES PATENT OFFICE

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AEROPLANE ENGINE EXHAUST

Application filed February 1, 1929. Serial No. 336,855.

This invention relates to devices and methods for reducing the exhaust noise of aeroplane engines; and its principal object is to provide means for exhausting into the slip-stream to reduce the air pressure at the exhaust valve, and also to break up the propeller noise.

The noise of an engine exhaust is caused by the collapse on itself of the air split by the outrush of burned gases, from the cylinder, like clapping one's hands. If this air pressure against the exiting gases is materially reduced then the violence of the recovery after the air displacement by the exhaust is very much less and the sound of the exhaust is correspondingly reduced.

This is the method of the present invention for silencing the aeroplane engine exhaust, and incidentally it increases the engine power by increasing the cylinder charge due to better scavenging, and a lower residual cylinder pressure when the intake valve opens.

The device employed in effecting these results consists of a hollow nose-cap for the engine enveloping the base of the propeller blades, and has exhaust manifold exit-pipes extending radially from the cap between the blades.

With this object in view, the invention consists of the novel combination of means shown in the illustrations, described in the specifications, and particularly pointed out in the claims.

In the drawings, Fig. 1 is a view of the nose-cap assembled on the propeller hub looking from the rear; Fig. 2 a horizontal sectional view of the cap and enclosing exhaust pan overlapping the open end of the cap taken substantially on the line 2—2 of Fig. 1; and Fig. 3 is a detail perspective view of one-half section of the cap.

In the drawings like symbols refer to like parts, A and A′ being the blades of a propeller, shown as of typical steel structure; B the hub holding the blades; C a nose-cap; D and D′ exhaust exit-pipes in the nose-cap. E and E′ are exhaust manifolds ending by a bend inside the exhaust pan F. The two halves of the nose-cap are held together by lugs at G and G′. The hollow nose-cap C envelopes the hub of the propeller and forms an exhaust gas collector. The nose cap C, which is split longitudinally to form two sections, is arranged in spaced relation with the hub of the propeller and each section of the nose cap is provided at opposite sides with recesses C^2 formed in the longitudinal meeting edges of the sections and adapted to fit the propeller blades to enable the sections of the nose cap to be firmly clamped on the propeller blades by the bolts G and G′. The nose-cap is circular in cross sectich and the exhaust pan is circular and is arranged concentric with the nose-cap.

The exhaust manifolds E and E′ and exhaust pan F are fixed to the frame of the engine or motor, and the open end of the pan envelopes the open end of the nose-cap C with a clearance at least great enough to prevent contact as the nose-cap rotates with the rotation of the propeller. Only the front end of the motor 1 and the front portion of the exhaust manifolds E and E′ are illustrated in Fig. 2 of the drawings, but as the particular construction of the motor and its parts does not constitute a part of the present invention, further illustration thereof is unnecessary.

As the outer ends of exhaust exit-pipes D and D′ sweep around with the propeller, the exhaust gases are "sucked" out of them, a result which is accelerated by curving the outer ends rearwardly relative to direction of rotation as shown, reducing the intermittent exhaust to a steady stream exhaust almost noiseless. The exhaust is intermittent in the chamber formed by the nose cap and the exhaust pan, but as there is a suction through the tubes which are of less cross-sectional area than the said chamber, there is a tendency to produce a steady stream of exhaust through the said tubes.

The partial vacuum thus created extends all the way back to the cylinders, very materially reducing the pressure against which the exhaust exits, thus creating an attenuated burnt gas residue in the cylinder. A greater volume, therefore, of good gas enters through

the intake valve in a given intake time, resulting in an increased power stroke.

As is well known, air passing the end of a pipe creates a partial vacuum in the pipe, and if the pipe is free to take in a fluid at its opposite end, a flow through the pipe is set up.

The whirling of the outer end of exhaust exit-pipes D and D′ creates just exactly this phenomenon, which accounts for the better power performance; and the movement of the gases through the system at an accelerated velocity causes the exhaust impulse to "string out" and lose its explosive character. The length of the exhaust exit-pipes is preferably such as to bring the exhaust into the most effective part of the slip-stream. The resultant length aids greatly by the high velocity of the air past the exit end of the pipes located as it is at a considerable radial distance from the hub.

What I claim is:

1. In a device of the character described, a motor, a propeller having a hub and blades rotated by the motor, exhaust manifolds, an exhaust gas collector consisting of an exhaust pan and a hollow nose-cap enveloping the hub of the propeller, said exhaust gas collector receiving the exhaust from the motor, means for clamping the nose cap to the blades of the propeller in spaced relation to the hub thereof, and exhaust pipes extending outwardly from the nose-cap and rotating with the propeller.

2. In a device of the character described, a motor, a propeller having a hub and blades rotated by the motor, exhaust manifolds, an exhaust gas collector consisting of an exhaust pan and a hollow nose-cap enveloping the hub of the propeller in spaced relation with the same and receiving the exhaust from the motor, means for clamping the nose cap to the blades of the propeller, and radially arranged exhaust pipes extending outwardly from the nose-cap between the blades of the propeller and rotating with the same.

3. In a device of the character described, a motor rotated propeller having a hub and blades, the combination therewith of an exhaust gas collector consisting of an exhaust pan and a hollow nose cap enveloping the hub of the propeller and arranged in spaced relation with the same, said nose cap being split longitudinally to form two sections having meeting edges and provided in their meeting edges at their rear portions with recesses receiving the blades of the propeller, means for clamping the sections of the nose cap to the blades of the propeller, and an exhaust pipe arranged between the blades of the propeller and connected at its inner end with the nose cap and having its outer end extending rearwardly with relation to the direction of rotation of the propeller to cause a suction through the exhaust pipe.

4. In a device of the character described having a shaft, a motor, a propeller having a hub and blades and mounted on said shaft, exhaust manifolds, a circular exhaust pan mounted on the motor, a hollow nose cap enveloping the hub of the propeller and disposed in spaced relation with the hub of the propeller and arranged concentric with the exhaust pan, said nose cap and exhaust pan forming a chamber which receives the exhaust of the motor, and exhaust pipes extending outwardly from the nose cap and rotating with the propeller.

5. In a device of the character described having a shaft, a motor, a propeller having a hub and blades and mounted on said shaft, exhaust manifolds, a circular exhaust pan mounted on the motor, a hollow nose cap enveloping the hub of the propeller and disposed in spaced relation with the hub of the propeller and arranged concentric with the exhaust pan, said nose cap and exhaust pan forming a chamber which receives the exhaust of the motor, and radially arranged exhaust pipes extending outwardly from the nose cap between the blades of the propeller and rotating with the latter.

6. In a device of the character described, a motor, a propeller having a hub and blades rotated by the motor, exhaust manifolds, an exhaust gas collector receiving the exhaust from the motor and including a hollow nose cap enveloping the hub of the propeller, means for clamping the nose cap to the blades of the propeller in spaced relation to the hub thereof, and an exhaust pipe extending outwardly from the nose cap and rotating with the propeller.

In testimony whereof I have affixed my signature.

CHARLES FRANCIS JENKINS.