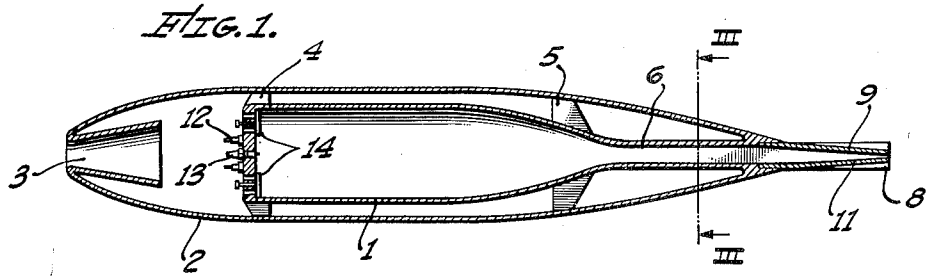
Oct. 14, 1952 P. KOLLSMAN 2,613,496

INTERMITTENT DUCT ENGINE

Filed Aug. 20, 1945

FIG. 1.



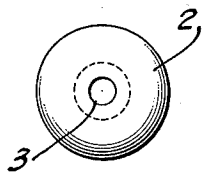


FIG. 2.

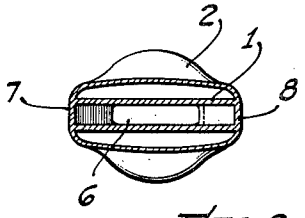


FIG. 3.

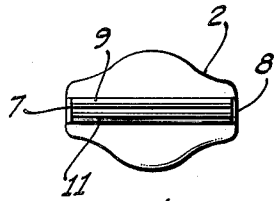


FIG. 4.

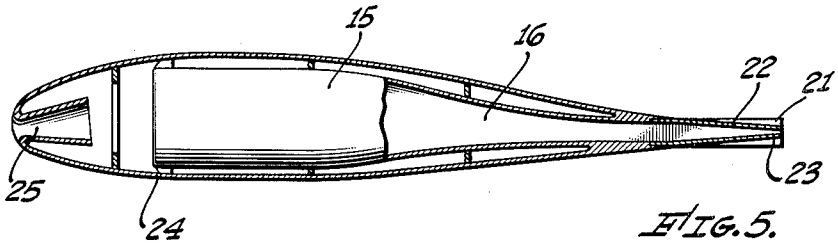


FIG. 5.

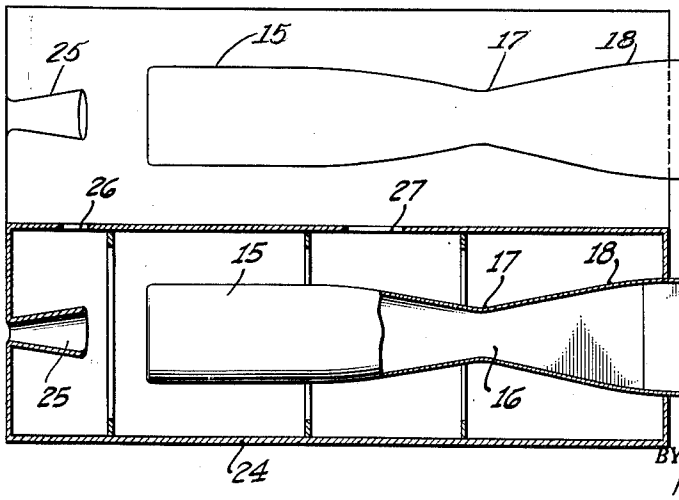


FIG. 6.

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INTERMITTENT DUCT ENGINE

Paul Kollsman, New York, N. Y.

Application August 20, 1945, Serial No. 611,630

3 Claims. (Cl. 60—35.6)

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This invention relates to an impulse engine moving through a fluid medium by the reactive thrust of a fluid jet and more particularly to an intermittent duct engine moving through the air from the reactive thrust of impulse jets.

One object of the invention is the provision of an intermittent duct engine having an air supply chamber containing air at super-atmospheric pressure supplied by a moving orifice in which the volume of the fluid chamber is many times greater than the volume of gas intermittently fed to the engine so that air is introduced into the engine without substantial change in the pressure within the air chamber and/or with a substantially constant rate flow of air through the entrance orifice.

Another object of the invention is an intermediate duct engine in accordance with the preceding object in which the orifice area is appreciatively smaller than the area of the air entrance to the engine and with the mass of air in the air chamber substantially without directional flow.

In Figure 1 is a sectional view through an intermittent duct engine according to the present invention.

Figure 2 is a front end view of the engine of Figure 1.

Figure 3 is a sectional view on a line III—III of Figure 1.

Figure 4 is an end view of the engine of Figure 1.

Figure 5 is a sectional view through a modified form of engine.

Figure 6 is a sectional plan view of the engine of Figure 5 with a second engine shown in juxtaposed relation.

In the form of the invention shown in Figures 1, 2, and 4, the intermittent duct engine comprises a combustion chamber 1 surrounded by an outer shell 2 forming an air chamber having an inlet orifice 3 disposed in the air stream of the moving engine. The combustion chamber and the outer casing are joined in spaced relation by circumferentially spaced ribs 4 and 5. The combustion chamber 1 is shown as a cylinder which becomes progressively flattened to form a rectangular discharge duct 6 terminating in a variable area discharge passage comprised by stationary side walls 7 and 8 and resilient flexible upper and lower walls 9 and 11. The combustion chamber is provided with ordinary fuel injection nozzles 12, ignitor plug 13 and air inlet valves 14.

The volume of the air chamber formed within the casing 2 is many times greater than the

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volume of combustion air drawn into the combustion chamber 1 through the air valve 14 for each engine impulse. Accordingly, this intake of air is effected at substantially constant pressure. Air in the air chamber within casing 2 is at super-atmospheric pressure in view of the dynamic force of the exterior air on the orifice 3. The area of the inlet orifice 3 is substantially less than combined area of the air valves 14 and a continuous flow of air through inlet orifice 3 is effected at a substantially constant rate of flow.

The walls 9 and 11 are formed of resilient spring material supplying an inherent bias tending to bring the walls together to close the discharge passage. In view of this resilient bias a pressure differential will be maintained between the gas within the passage and the exterior atmosphere while gas flows through the passage and the walls will automatically assume positions to maintain this pressure differential. Should the pressure within the passage decrease sufficiently at cessation of gas flow, the walls 9 and 11 will come together to close the outlet passage and provide a streamlined tail for the duct to reduce air drag.

In the modification of the invention illustrated in Figures 5 and 6, there is provided a tubular combustion chamber 15 having fuel injection nozzles, igniter plug and valves as in Figure 1, not here illustrated. Connected with the combustion chamber 15 is a discharge duct 16 of converging tubular section to the point 17, as shown in Figure 6, and thereafter extending with generally rectangular section in the portion 18. The discharge duct terminates in a variable discharge passage having stationary side walls 19 and 21 between which are disposed the upper and lower resilient walls 22 and 23 conforming in form and function with the walls 9 and 11 of Figure 1. Exteriorly of the combustion chamber 15 is the shell 24 forming an air chamber similar to the air chamber in shell 2 and provided with an inlet orifice 25 disposed in the air stream. The casing 24 is of rectangular transverse section as shown in Figure 7 and its longitudinal section is substantially streamlined as illustrated in Figure 5 to facilitate its insertion within an aircraft wing. In Figure 6 a second engine is shown side by side with the one engine, with communicating openings 26 and 27 between the chambers within casings 24 to provide availability of the entire volume of air in the plurality of air chambers for each of the impulse engines.

While certain preferred embodiments of the invention have been specifically disclosed, it is un-

derstood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. An intermittent duct engine installation for aircraft comprising, in combination, an airfoil having a leading edge and a trailing portion, the leading edge having an aperture therein diverging inwardly and forming a dynamic air admission port; a combustion chamber enclosed in said airfoil; a discharge duct leading from said combustion chamber to said trailing portion; means for introducing fuel into said combustion chamber; means for igniting combustible mixture in said combustion chamber; means forming a rearwardly closed air chamber in the leading portion of said airfoil communicating with the atmosphere solely through said dynamic port in said leading edge causing superatmospheric pressure to be built up in said air chamber in flight; and an air admission valve between said air chamber and said combustion chamber, the volume of said air chamber being larger than individual charges of air admitted into the combustion chamber, whereby the dynamic pressure in the air chamber is maintained substantially constant.

2. An intermittent duct engine installation for aircraft comprising, in combination, an airfoil having a leading edge and a trailing portion, the leading edge having an aperture therein diverging inwardly and forming a dynamic air admission port; a combustion chamber enclosed in said airfoil; a discharge duct leading from said combustion chamber to said trailing portion; means for introducing fuel into said combustion chamber; means for igniting combustible mixture in said combustion chamber; means forming a rearwardly closed air chamber in the leading portion of said airfoil about said combustion chamber, said air chamber communicating with the atmosphere solely through said dynamic port in said leading edge causing superatmospheric pressure to be built up in said air chamber in flight; and an air admission valve between said air chamber and said combustion chamber, the volume of said air chamber being larger than individual charges of

air admitted into the combustion chamber, whereby the dynamic pressure in the air chamber is maintained substantially constant.

3. An intermittent multiple duct engine installation for aircraft comprising, in combination, an airfoil having a leading edge and a trailing portion, the leading edge having apertures therein forming dynamic air admission ports; a plurality of duct engines within said airfoil, each engine including, a combustion chamber enclosed in said airfoil, a discharge duct leading from said combustion chamber to said trailing portion, means for introducing fuel into said combustion chamber, means for igniting combustible mixture in said combustion chamber, means forming an individual rearwardly closed air chamber in the leading portion of said airfoil communicating with the atmosphere solely through said dynamic port in said leading edge causing superatmospheric pressure to be built up in said air chamber in flight, and an air admission valve between said air chamber and said combustion chamber, the volume of said air chamber being larger than individual charges of air admitted into said combustion chamber; and means providing a pressure equalizing passage between adjoining individual air chambers.

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