Dec. 16, 1924. 1,519,444

E. N. FALES

AIRCRAFT PROPULSION

Filed Jan. 17, 1921

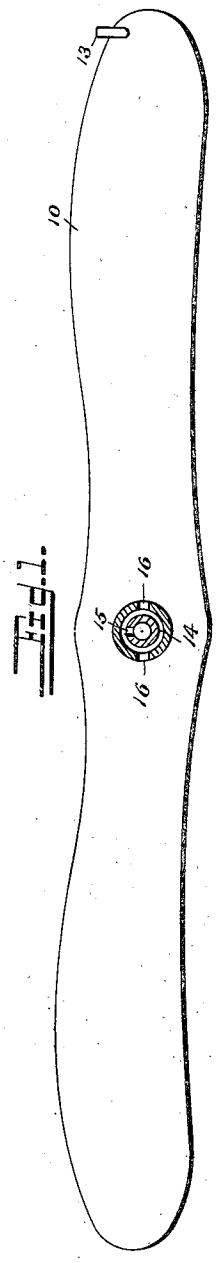


Fig. 1.

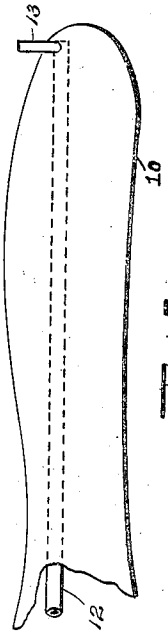


Fig. 2.

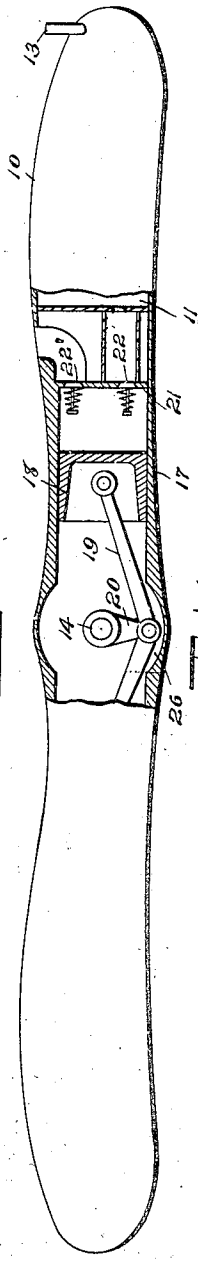


Fig. 3.

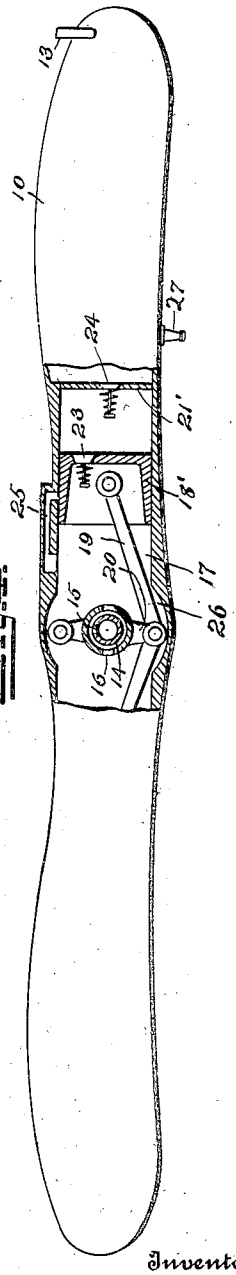


Fig. 4.

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UNITED STATES PATENT OFFICE.

ELISHA N. FALES, OF DAYTON, OHIO.

AIRCRAFT PROPULSION.

Application filed January 17, 1921. Serial No. 438,045.

To all whom it may concern:

Be it known that I, ELISHA N. FALES, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Aircraft Propulsion, of which the following is a specification.

This invention relates to aircraft propulsion, the object of the invention being to eliminate the ordinary internal combustion or explosion engine now in common use, and also to eliminate the conventional propeller now in common use in aircraft. By means of the present invention, an engine and propeller may be said to be combined in such a way that the hot exhaust gases of the engine cylinders are used for actuating or driving the propeller, thereby recovering some of the heat and energy now wasted.

The device embodies propeller blades which may be hollow or have passageways or pipes leading from the hub to the tips thereof for the purpose of conducting gas or vapor from a hollow propeller shaft to the propeller tips, the gas under pressure issuing as jets at the propeller tips in a direction more or less opposite to the direction of movement of the propeller blades. The reaction of such jets furnishes the rotational force for the propeller.

One advantage of such a device is that the torque is applied at a maximum leverage, eliminating strain in the propeller due to application of torque at the hub. The apparatus herein fully described furnishes means for rotating a propeller or other machine.

With the above and other objects in view, the invention consists in the novel construction, combination and arrangement herein fully described, illustrated and claimed.

In the accompanying drawings:

Fig. 1 is a view, partly in elevation and partly in section, of the improved device,

Fig. 2 is a fragmentary sectional view of one of the propeller blades, showing a modified form of passageway for the exhaust gases;

Fig. 3 is a longitudinal section thru a special form of the device wherein the blade is combined with the cylinder of a reciprocating engine.

Fig. 4 is a similar section showing certain modifications.

In the embodiment of the invention illustrated in the drawings and referring particularly to Figs. 3 and 4, I have shown a combined engine and propeller comprising two combustion cylinders and two propeller blades, having passageways therein to carry off the products of combustion.

The propeller blades 10 may be of hollow formation, as indicated at 11; or instead of making each propeller blade hollow, a passageway or pipe 12 may lead thru each blade longitudinally thereof, as indicated in Fig. 2. In each case there is a jet nozzle 13 at the discharge end of the passageway leading thru the propeller blade, which jet nozzle faces approximately in a rearward direction, or in a direction contrary to normal direction of rotation of the propeller or movement of the propeller blade. The escaping gases under pressure thereby react to apply a rotational force to the propeller.

The combined engine and propeller are mounted upon a tubular shaft 14, having one or more ports 15 to admit the gas continuously or intermittently, as desired, to the engine cylinders and propeller blades. The hub of the propeller is likewise formed with ports 16 for the same purpose.

Referring more particularly to the modification shown in Fig. 3, in which a fluid is conducted into the explosive chamber from a point remote from the rotational axis of the propeller, at the base of each propeller blade, there is an engine cylinder 17 containing a reciprocatory piston 18 from which a connecting rod 19 leads to a crank 20 on the engine shaft 14, said shaft being stationary and non-rotary. The cylinder 17 forms in effect the shank of the respective propeller blade 10, which is clearly shown in Figures 3 and 4. Under the arrangement shown in Fig. 3, there is a cylinder head 21 between the cylinder proper and the propeller blade, the same being fitted with one or more exhaust and inlet valves 22 and 22′ respectively, which may be opened by any suitable mechanism for that purpose. The mixture is exploded against the piston 18 and passes by the exhaust valve 22, and through the propeller blade, issuing from the jet 13 where it reacts upon the atmosphere to drive the propeller.

Under the arrangement shown in Fig. 4, the piston 18′ contains an automatic inlet valve 23 in the head thereof while the cylin-

der head 21′ is formed with a port controlled by an automatic inlet valve 24, both of these valves permitting the fluid to flow from the center of the propeller outwardly but preventing a flow in the reverse direction. In place of the automatic inlet valve 23 or in conjunction therewith a by-pass 25 may be provided to permit the fluid to be drawn into the compression chamber between the head of the piston 18′ and the cylinder head 21′ when the piston is in its innermost position. Under this arrangement the gasoline or other explosive mixture used is received from the hollow shaft 16, drawn into the compression chamber, between the cylinder head in the piston when the piston is moved inwardly. The fluid is then compressed on the reverse motion of the piston and when a sufficient pressure has been obtained in the compression chamber the automatic inlet valve 24 is opened and the fluid is permitted to flow into the expansion chamber where it is then ignited by means of a spark plug 27 which may be fired continuously or intermittently as may be desired. The combustion of the fluid in this expansion chamber produces a considerable pressure therein and the exhaust and burnt gases are forced out of the outlet nozzle 13 to thereby rotate the propeller by means of the jet action produced, and the consequent reaction on the atmosphere.

Where the pipe 12 is employed, it may be formed so as to constitute a re-enforcement for the blade, in which case said pipe may have its walls of greater cross-sectional area adjacent to the hub than at the tip of the propeller thereby providing for centrifugal strains. The valves may be operated by any suitable mechanical means as by a cam or crank or other suitable device, or they may be electrically operated or automatically operated by pressure differences on opposite sides thereof. The spark plugs may be located in the explosion chamber or directly adjacent to or in the jet nozzle. Electrical connections for the plugs or valves may embody the usual means, such as ring and brush controls.

I do not desire to be limited to the exact arrangement herein shown and described, as it will be apparent that the device is susceptible of many changes in the form, preparation and minor details of construction which may accordingly be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

I claim:

1. In aircraft propulsion, an internal combustion engine embodying an engine shaft, and a plurality of cylinders which radiate from and revolve around said shaft, pistons for compressing the gases mounted to reciprocate in said cylinders and connected with said crankshaft, and propeller blades extending from said cylinders and having passageways for the gases from the cylinders and means for igniting said gases in said passageways.

2. In aircraft propulsion, an internal combustion engine embodying an engine shaft, and a plurality of cylinders which radiate from and revolve around said shaft, pistons for compressing the gases mounted to reciprocate in said cylinders and connected with said crankshaft and propeller blades extending from said cylinders and having passageways for the gases from the cylinders, said passageways terminating in outlets which discharge in a direction contrary to the direction of movement of the propeller blades and means for igniting said gases in said passageways so that the propeller is rotated by the reaction of said gases on the atmosphere.

3. In aircraft propulsion, an internal combustion engine embodying an engine shaft, and a plurality of cylinders which radiate from and revolve around said shaft, pistons for compressing gases mounted to reciprocate in said cylinders and connected with said crankshaft, and propeller blades extending from said cylinders, and having expansion chambers with outlets adjacent to the propeller blade tips discharging contrary to the movement of said blades and means for igniting said compressed gases in said passageways, so that the propeller is rotated by the reaction of said compressed gases on the atmosphere.

4. In aircraft propulsion, an internal combustion engine embodying an engine shaft, and a plurality of cylinders which radiate from and revolve around said shaft, pistons mounted to reciprocate in said cylinders and connected with said crankshaft, and propeller blades extending from said cylinders, and having valve-controlled expansion chambers with outlets adjacent to the propeller tips which discharge in a direction contrary to the direction of movement of the propeller blades, said pistons operating to compress the gases so that the propeller is rotated by the reaction of said compressed gases on the atmosphere.

In testimony whereof I have affixed my signature.

ELISHA N. FALES.