

March 5, 1946.

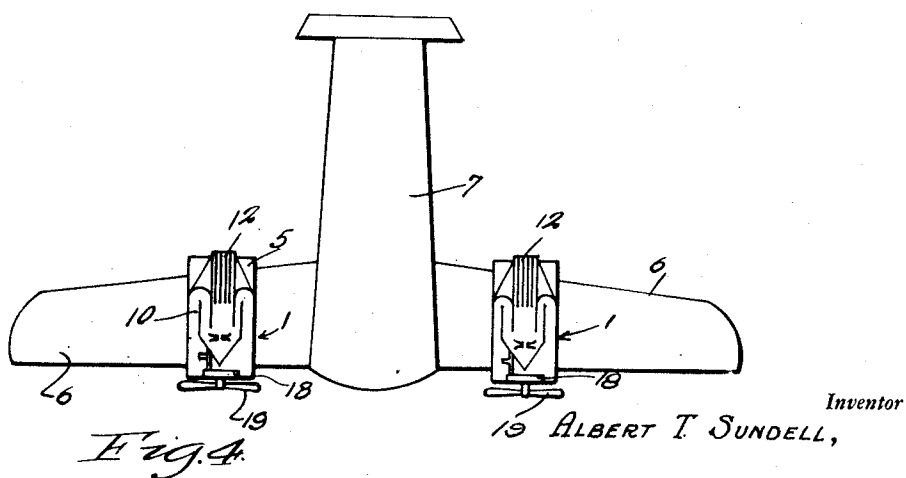
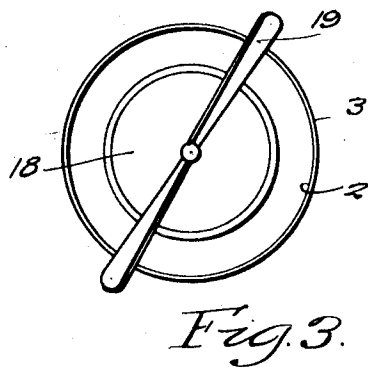
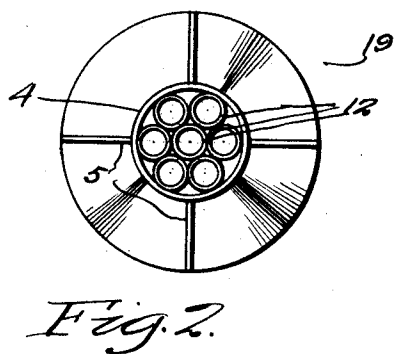
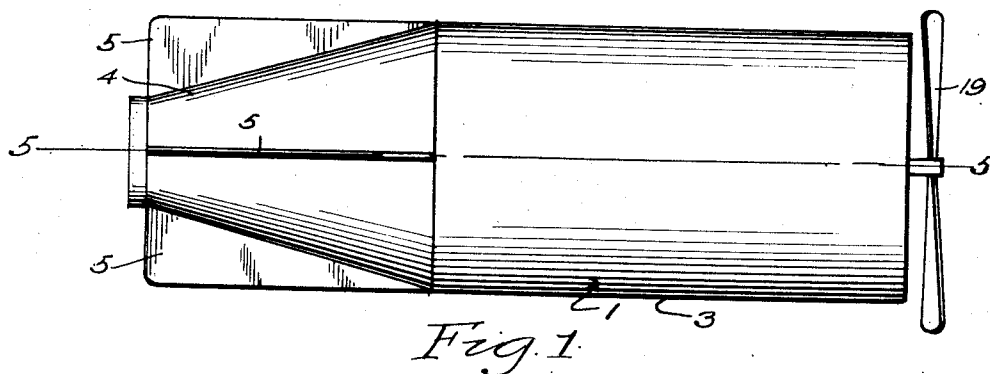
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2,395,919

AUXILIARY POWER PLANT FOR AIRPLANES

Filed Sept. 14, 1944

2 Sheets-Sheet 1



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AUXILIARY POWER PLANT FOR AIRPLANES

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2 Sheets-Sheet 2

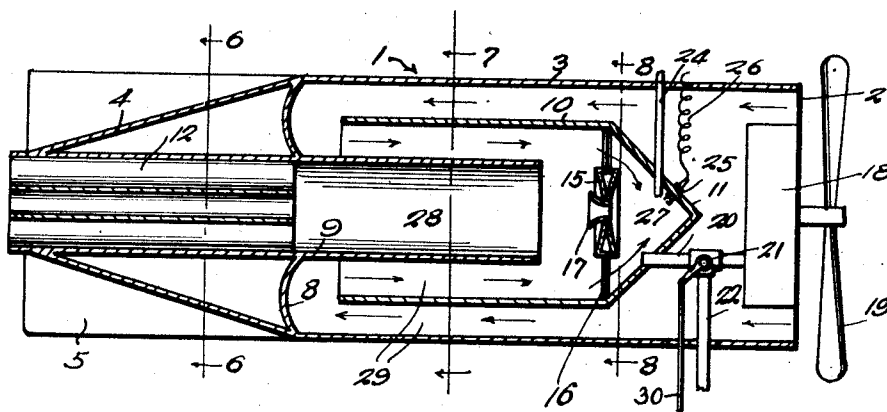


Fig. 5.

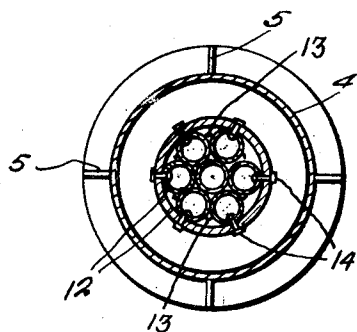


Fig. 6.

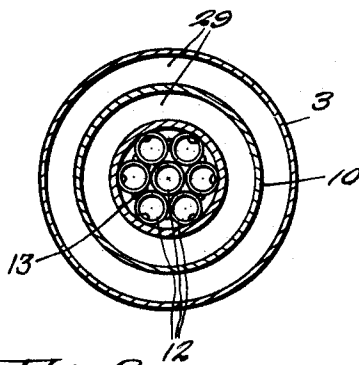


Fig. 7.

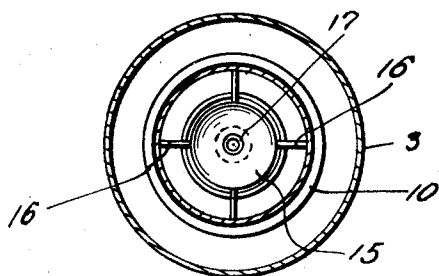


Fig. 8.

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UNITED STATES PATENT OFFICE

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AUXILIARY POWER PLANT FOR AIRPLANES

Albert T. Sundell, Chicago, Ill.

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4 Claims. (Cl. 170—135.5)

My invention relates to improvements in auxiliary power plants for airplanes powered primarily by internal combustion motors.

The primary object of my invention is to provide means for utilizing the potential power in the exhaust gases of such motors, the air pressure resulting from operation of the motor propellers, and from forward travel of the airplane, and the vacuum resulting from such forward travel, to create auxiliary power for attaining higher speed of operation of airplanes than can be attained with present day powering plants, all without adding appreciably to weight of the airplane, or resorting to expensive complicated structure.

Other and subordinate objects are also comprehended by my invention, all of which, together with the precise nature of my improvements, will be readily understood when the succeeding description and claims are read with reference to the drawings accompanying and forming part of this specification.

In said drawings:

Figure 1 is a view in side elevation of my invention, in a preferred embodiment thereof,

Figure 2 is a view in rear end elevation,

Figure 3 is a view in front end elevation,

Figure 4 is a diagrammatic view in plan illustrating generally the manner in which the invention is applied to an airplane,

Figure 5 is a view in longitudinal section taken on the line 5—5 of Figure 1,

Figure 6 is a view in transverse section taken on the line 6—6 of Figure 5,

Figure 7 is a similar view taken on the line 1—1 of Figure 5,

Figure 8 is another similar view taken on the line 8—8 of Figure 5.

Referring to the drawings by numerals, a power plant, or motor, of the jet propulsion type is provided, according to my invention, and which comprises, as its basic elements, an elongated, outer casing 1 of suitable metal having an open front end 2, a cylindrical body section 3, and a tapered, frusto-conical, rear end section 4. A series of radial, longitudinally extending fins 5 extend along the rear end section 4 in equidistantly spaced relation for stabilizing purposes, as will presently more clearly be seen.

The casing 1 is designed to be of a length corresponding, substantially, to the distance between the leading and trailing edges of the wing 6 of an airplane 7, and to be suitably fixed, at least

one on each wing, to said wing to extend across the same, as shown in Figure 4.

An annular, diametrical baffle wall 8 is provided in the casing 1 at the juncture of the body and tail sections 3, 4 and which is fitted around a tubular section 9 relatively smaller in diameter than the body section 3 and disposed in the casing concentrically therewith to extend from the rear end of said casing forwardly into the same with its front end disposed substantially midway between the front end 2 of the casing 1 and said baffle wall 8, and with its rear end fitted in the rear end of the section 4 and projecting for a short distance out of the same. An inner shell 10, relatively smaller than the body section 3, and relatively larger in diameter than the section 9, and of generally cylindrical form, with a forwardly tapering, conical front end wall 11, is suitably secured in the body section 3 concentrically thereof with its front wall 11 disposed intermediate the front end of the tubular section 9 and the front end 2 of the casing 1, said shell 10 surrounding the greater portion of said section 9 forwardly of the baffle wall 8 and having its rear end spaced from said wall 8.

A series of parallel exhaust flue pipes 12 are provided in the section 9 to extend from substantially the plane of the wall 8, said pipes extending to and terminating in the plane of the rear end of the section 9 and thereby projecting similarly out of the casing.

The exhaust flue pipes 12 are arranged in engaging relation in a rosette assembly fitted into the section 9 and may be spot welded together as at 13 with the outside pipes of the assembly bolted at their ends as at 14 to the section 9.

A rearwardly flaring nozzle 17 is suitably fixed in the wall member 15 in the axis thereof.

The usual whirlwind-type airplane motor 18 is mounted, in any suitable manner, in the front end 2 of the casing 1 concentrically thereof and spaced from the circumferential wall of said casing 1 with the usual propeller 19 operating directly in front of said front end 2 and extending clear across the same. The exhaust pipe 20 of the motor 18 is extended from said motor into the front end of the shell 10 through the front wall 11 and provided with a control and by-pass valve 21 and a by-pass branch 22 for shunting the exhaust to atmosphere.

A fuel inlet line 24 is extended through the casing 1 into the front end of the shell 10, through the wall 11, for connection to a suitable mist spray device, not shown, for feeding raw gasoline, kero-

sene, or benzine, into said front end of the shell 10 in finely divided form.

A series of spark plugs, one of which is shown at 25, are suitably fixed in the front wall 11 and grouped around the apex thereof, with wires, as at 26, suitably attached to the plugs to extend from a source of electricity, not shown, in the usual manner.

The front wall 11 of the shell 10 forms, together with the wall member 15, a combustion chamber 27 in the front end of the shell 10, into which, as will be understood, the fuel inlet line 24, the exhaust 20, and the spark plugs 25 extend. The tubular section 9 forms therein, forwardly of the exhaust pipe 12 an expansion chamber 28. The body section 3, together with the cylindrical wall of the shell 10, and the baffle wall 8, forms an annular tunnel 29 through which air entering the front end 2 of the casing 1 may pass forwardly into the combustion chamber 27 and by way of the space between the wall member 15 and the shell 10.

Referring now to the operation of my invention, the airplane propeller 19 performs its usual function, and, in addition, forces atmospheric air into the front end 2 of the casing 1 and through the tunnel 29 into the combustion chamber 27. The velocity of the air passing through the tunnel 29 is increased by forward travel of the airplane and power plant at higher speeds. The air mixes with the raw fuels sprayed into said combustion chamber 27 and with the exhaust gases passing into said chamber through the exhaust 20, and compresses the same in said chamber into an intimate mixture while at the same time providing the necessary oxygen for ignition by the spark plugs 25 in the usual manner. The volume of exhaust passing into the combustion chamber 27 may be regulated by means of the by-pass branch 22 and by-pass and control valve 21, through a suitable valve setting connection indicated at 30. The ignited gases under pressure behind the same pass with higher velocity through the nozzle 17 into the expansion chamber 28, expand therein, and discharge under high velocity thru the exhaust flue pipes 12 to impact against the atmosphere in jet form and thereby project the airplane forwardly. Surplus air passing through the tunnel 29 is free to enter the expansion chamber 28 by way of the space between the section 9 and the wall member 15 and to pass out of the exhaust flue pipes 12. This surplus air tends to cool the expansion chamber 28 and the wall of the section 9. The entire wall surface of the body section 3 of the casing 1 is air-cooled, as well as the shell 10, by the air passing through the tunnel 29. The tapered rear end section 4 of the casing 1 tends, under high speed operation of the plane, to create a vacuum at the rear end of the casing 1 acting to draw the gases through the flue pipes 12. The spaces between the flue pipes 12 and between said pipes and the section 9 also form exhaust outlets as will be clear. The flue pipes 12 serve to discharge the exhaust in straight lines so as not to whip or vibrate the power plant and together with said spaces serve to break up the exhaust into several streams to prevent eddies.

Any suitable means may be provided for controlling the inlet of fuel through the pipe 24, and for timing the ignition by the spark plugs 25. However, since such devices are well understood in the art, and form, per se, no part of the present invention, it has not been deemed necessary to illustrate the same.

The foregoing will, it is believed, suffice to impart a clear understanding of my invention without further explanation.

Manifestly, the invention, as described, is susceptible of modification without departing from the inventive concept, and right is herein reserved to such modifications as fall within the scope of the appended claims.

What I claim is:

1. A power plant for airplanes comprising an outer casing embodying a front tubular body section open at the front end thereof, and a tapered rear end section, a relatively smaller cylindrical shell disposed in the front section concentrically thereof and having a closed front end, an annular diametric wall in said shell relatively smaller and forming with the closed front end of the shell a combustion chamber open around the edge of said wall and having a rear central discharge opening, a tubular section smaller in diameter than said shell extending from the rear end of the casing part way into said shell concentrically thereof and forming in the front end of the same an expansion chamber, an annular baffle wall in said casing surrounding said tubular section and together with said shell and tubular section forming a wind tunnel through which atmospheric air entering the front end of the body section may pass into said combustion chamber past the annular wall in said shell, a motor, a propeller at the front end of said body section operative by said motor for forcing atmospheric air into and through said tunnel into the combustion chamber to create air pressure therein, means to convey the exhaust from the motor into said combustion chamber, means to convey liquid fuel into the combustion chamber to mix with the exhaust and air therein and form a combustible mixture for ignition and escape out of the discharge opening into the expansion chamber, spark plugs in the combustion chamber for igniting the mixture, and means for causing the ignited mixture in the expansion chamber to issue from the rear end of the tubular section in jet form.

2. A power plant for airplanes comprising an outer casing embodying a front tubular body section open at the front end thereof, and a tapered rear end section, a relatively smaller cylinder shell disposed in the front section concentrically thereof and having a closed front end, an annular diametric wall in said shell relatively smaller and forming with the closed front end of the shell a combustion chamber open around the edge of said wall and having a rear central discharge opening, a tubular section smaller in diameter than said shell extending from the rear end of the casing part way into said shell concentrically thereof and forming in the front end of the same an expansion chamber, an annular baffle wall in said casing surrounding said tubular section and together with said shell and tubular section forming a wind tunnel through which atmospheric air entering the front end of the body section may pass into said combustion chamber past the annular wall in said shell, a motor, a propeller at the front end of said body section operative by said motor for forcing atmospheric air into and through said tunnel into the combustion chamber to create air pressure therein, means to convey the exhaust from the motor into said combustion chamber, means to convey liquid fuel into the combustion chamber to mix with the exhaust and air therein and form a

combustible mixture for ignition and escape out of the discharge opening into the expansion chamber, spark plugs in the combustion chamber for igniting the mixture, and means for causing the ignited mixture in the expansion chamber to issue from the rear end of the tubular section in jet form, comprising a plurality of flue pipes in said tubular section in the rear of the expansion chamber.

3. A power plant for airplanes comprising an outer casing embodying a front tubular body section open at the front end thereof, and a tapered rear end section, a relatively smaller cylindrical shell disposed in the front section concentrically thereof and having a closed front end, an annular diametric wall in said shell relatively smaller and forming with the closed front end of the shell a combustion chamber open around the edge of said wall and having a rear central discharge opening, a tubular section smaller in diameter than said shell extending from the rear end of the casing part way into said shell concentrically thereof and forming in the front end of the same an expansion chamber, an annular baffle wall in said casing surrounding said tubular section and together with said shell and tubular section forming a wind tunnel through which atmospheric air entering the front end of the body section may pass into said combustion chamber past the annular wall in said shell, a motor, a propeller at the front end of said body section operative by said motor for forcing atmospheric air into and through said tunnel into the combustion chamber to create air pressure therein, means to convey the exhaust from the motor into said combustion chamber, means to convey liquid fuel into the combustion chamber to mix with the exhaust and air therein and form a combustible mixture for ignition and escape out of the discharge opening into the expansion chamber, spark plugs in the combustion chamber for igniting the mixture, and means for causing the ignited mixture in the expansion chamber to issue from the rear end

of the tubular section in jet form, said exhaust conveying means including a control for varying the volume of exhaust entering the combustion chamber.

4. A power plant for airplanes comprising an outer casing embodying a front tubular body section open at the front end thereof, and a tapered rear end section, a relatively smaller cylindrical shell disposed in the front section concentrically thereof and having a closed front end, an annular diametric wall in said shell relatively smaller and forming with the closed front end of the shell a combustion chamber open around the edge of said wall and having a rear central discharge opening, a tubular section smaller in diameter than said shell extending from the rear end of the casing part way into said shell concentrically thereof and forming in the front end of the same an expansion chamber, an annular baffle wall in said casing surrounding said tubular section and together with said shell and tubular section forming a wind tunnel through which atmospheric air entering the front end of the body section may pass into said combustion chamber past the annular wall in said shell, a motor, a propeller at the front end of said body section operative by said motor for forcing atmospheric air into and through said tunnel into the combustion chamber to create air pressure therein, means to convey the exhaust from the motor into said combustion chamber, means to convey liquid fuel into the combustion chamber to mix with the exhaust and air therein and form a combustible mixture for ignition and escape out of the discharge opening into the expansion chamber, spark plugs in the combustion chamber for igniting the mixture, means for causing the ignited mixture in the expansion chamber to issue from the rear end of the tubular section in jet form, and a discharge nozzle leading from the discharge opening of said combustion chamber to said expansion chamber.

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