April 15, 1952 W. K. McNAUGHT 2,592,938

JET ENGINE WITH COMPRESSOR DRIVEN BY ROTATING JETS WHICH EXHAUST INTO THRUST AUGMENTING DUCT

Filed Dec. 11, 1950 2 SHEETS—SHEET 1

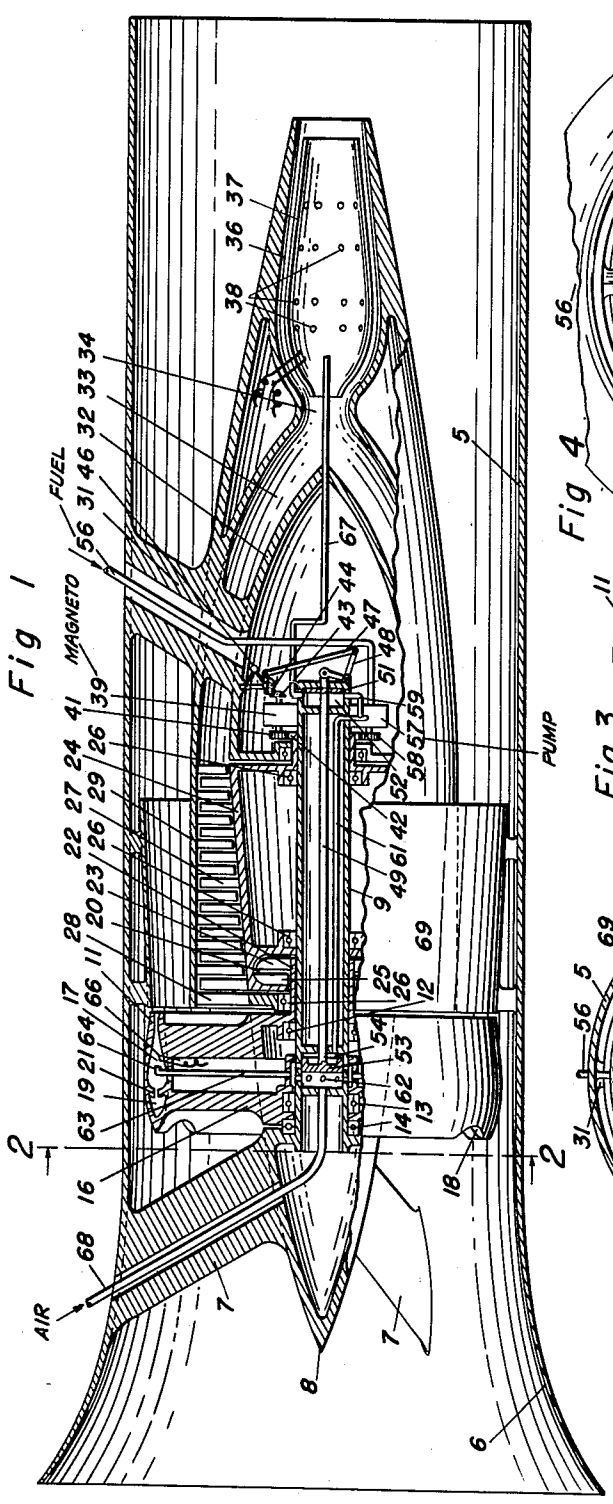

Fig 1

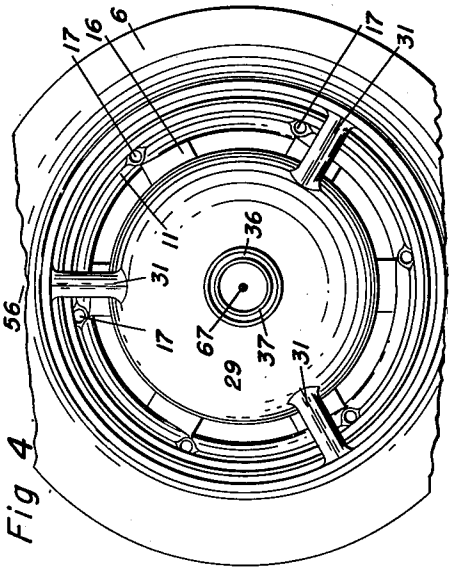

Fig 4

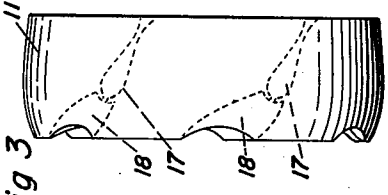

Fig 3

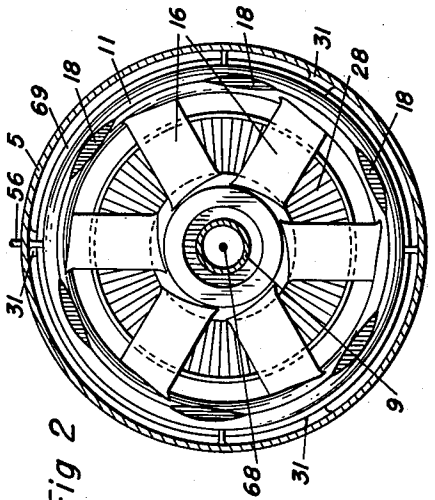

Fig 2

INVENTOR.
William K. McNaught
BY
Att'y

April 15, 1952 W. K. McNAUGHT 2,592,938

JET ENGINE WITH COMPRESSOR DRIVEN BY ROTATING JETS WHICH EXHAUST INTO THRUST AUGMENTING DUCT

Filed Dec. 11, 1950 2 SHEETS—SHEET 2

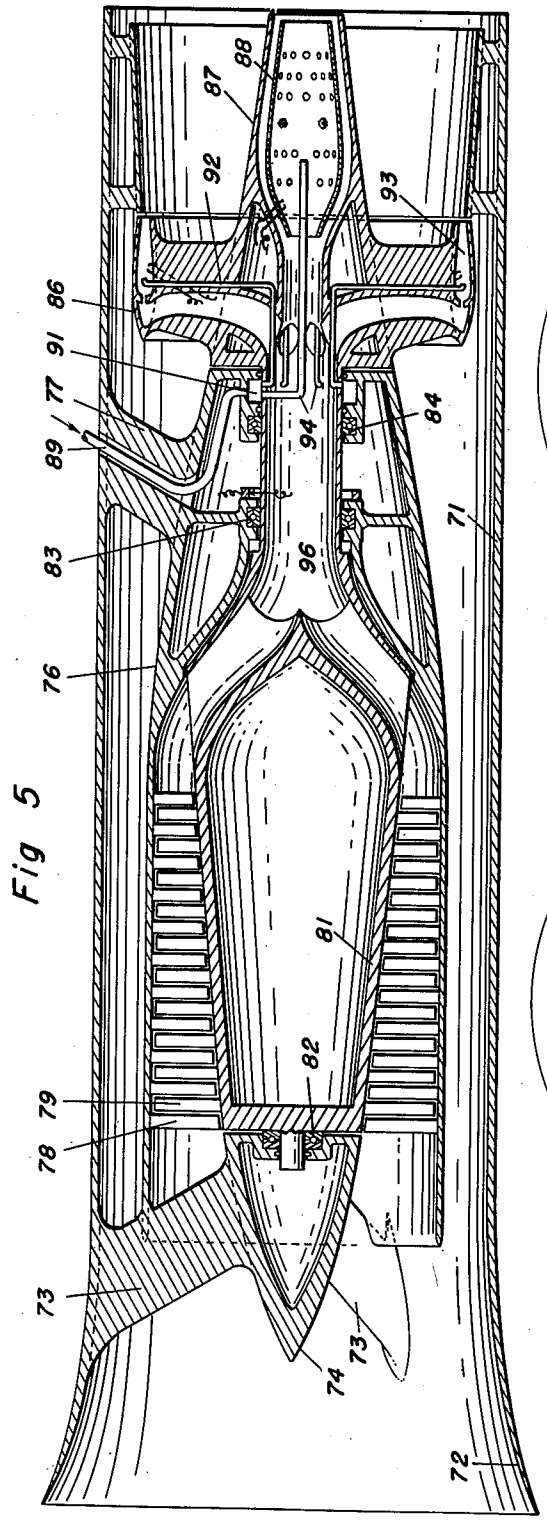

Fig 5

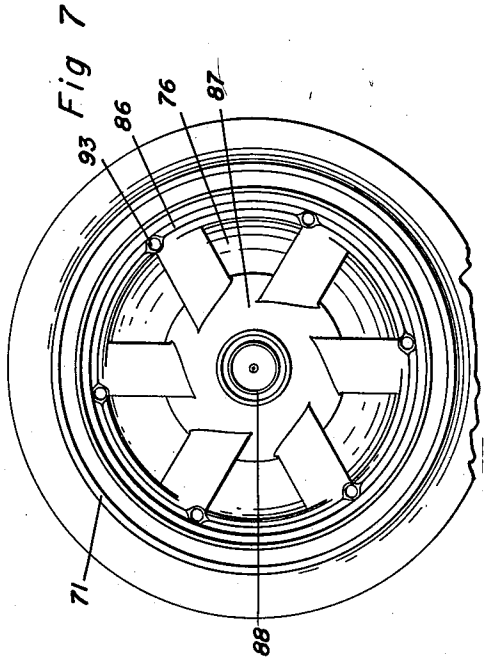

Fig 7

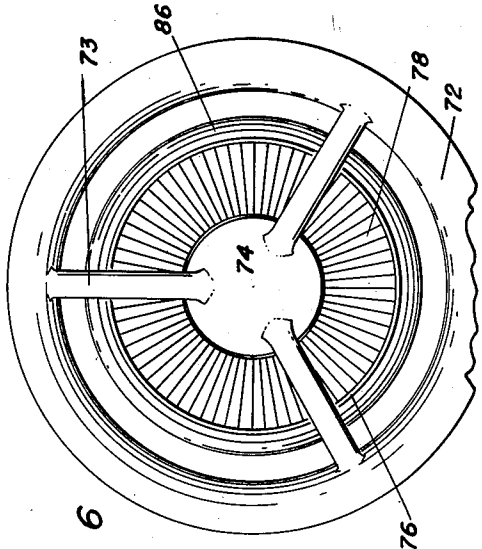

Fig 6

INVENTOR.
William K. McNaught
BY
Att'y

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JET ENGINE WITH COMPRESSOR DRIVEN BY ROTATING JETS WHICH EXHAUST INTO THRUST AUGMENTING DUCT

William K. McNaught, Sausalito, Calif.

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2 Claims. (Cl. 60—35.6)

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This invention relates to improvements in jet engines and has particular reference to a jet engine of the reactive type.

The principal object of this invention is to eliminate the customary gas driven turbine for the purpose of operating the air compressor.

A further object is to prevent back pressure due to turbine resistance.

A further object is to provide the heating of air passing to the burner through the use of the secondary exhaust from the impeller unit.

A further object is to produce a device of this character which may be incorporated in the standard airplane without materially altering its construction.

A further object is to produce a device of this character which is economical to manufacture and one having a minimum number of rotating parts.

Further objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numbers are employed to designate like parts throughout the same,

Fig. 1 is a vertical cross-sectional view partly in elevation, showing my improved engine;

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a side elevation of the activator ring;

Fig. 4 is a fragmentary end elevation looking from the right;

Fig. 5 is a vertical cross sectional view of a modified form of my engine;

Fig. 6 is an end elevation looking from the left of the drawing; and

Fig. 7 is an end elevation of Fig. 5 looking from the right of the drawing.

At the present time jet engines, irrespective of their type, are used principally to power aircraft and they develop power through the expansion of ignited fuel, together with a supply of compressed air.

In some of these engines the hot exhaust gases impinge upon the blades of the turbine wheels in order to drive the air compressors. In other instances the compressed air is furnished by the forward movement of the craft to which the engine is attached, or by an auxiliary supply.

In all of these engines terrific heat is developed, which heat tends to burn out the blades of the turbine wheels, or other parts upon which the hot gases impinge.

It has therefore been customary to introduce

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an excessive amount of air in order to diminish this heat, or to use a water spray to reduce the heat.

Applicant has therefore devised an engine which will eliminate the necessity of reducing the heat, thereby enabling him to employ all of the heat generated and to derive the full benefits therefrom.

Applicant has further devised means whereby the areas upon which the hot gases impinge are cooled by the natural drafts through the engine, thus eliminating excessive deterioration of the engine parts.

Referring to the drawings, particularly Fig. 1, wherein for the purpose of illustration is shown a preferred embodiment of my invention, it will be noted that the numeral 5 designates the tubular shell having its forward end flared as shown at 6, and hereafter referred to as the throat of the engine.

Positioned within the forward end of the shell is a series of struts which serve to position a streamlined bearing housing 8 which has a rearwardly extending tubular portion 9. This tubular extension serves to support all of the rotating parts, as will be hereinafter described.

Rotatably mounted on the forward end of this tubular extension is an activator ring 11, the same turning upon bearings 12 and 13 and against a thrust bearing 14.

This activator ring has a plurality of veins or spokes 16 which are angularly disposed, and diagonally arranged within the ring 11 are a plurality of rotating combustion chambers having a reaction nozzle 17, each having an open throat 18 which communicates with a compression chamber 19, which in turn communicates through a port 21 with the chamber 17. This ring 11 has an extension 22 which is provided with a plurality of blades 23 which react with blades 25 mounted in the oil chamber 20, the purpose of which will be later seen.

Also rotatably mounted on the extension 9 and the extension 22 is a rotor 24 which is supported by bearings 26, said rotor being driven by the fluid impeller blades 25. This rotor carries a plurality of blades 27 which are so spaced as to be positioned between similar blades 28 mounted upon an inner shell 29, having a truncated cigar shape, which inner shell is supported in the shell 5 by the struts 31.

The struts 31 also support a conical shaped housing 32 which tapers rearwardly, thus forming an air passage 33 between the shell 29 and the housing 32. This air passage is restricted as

shown at 34, where it enters the main burner, whereby the air will be compressed and delivered to the burner chamber 36, in which is mounted and spaced from the wall thereof a lining 37. This lining has openings 38 therethrough, the purpose of which will be later seen.

In order to deliver fuel to the engine and to ignite this fuel, I mount within the housing 32 a magneto 39 which is driven by a gear 41 meshing with a gear 42 formed upon an extension of the rotor 24.

This gear 41 also drives a bevelled gear 43 which in turn rotates the gear 44 of a governor arrangement 46, to which governor is attached a link 47 which is in turn pivoted to a bell crank lever 48, which bell crank serves to actuate a valve rod 49 having two valves secured thereto, one valve being shown at 51, mounted within a chamber 52, and the other valve being shown at 53, mounted within a chamber 54, both of which chambers are formed within the tubular extension 9.

A fuel supply pipe 56 enters through one of the struts 31 and serves to feed a fuel pump 57 driven by a gear 58, which gear in turn meshes with the gear 42 and is driven thereby.

The fuel pump 57 delivers fuel through the pipe 59 to the chamber 52 and through a pipe 61 to the chamber 54, which chamber 54 is provided with ports 62 which deliver fuel to pipes 63, each of which terminates in a fuel nozzle 64, there being a fuel nozzle in each of the rotating-combustion chambers 17 having a reaction nozzle.

Ignition means 66, such as spark plugs, are positioned in each of the chambers, whereby fuel issuing from the fuel nozzle may be ignited. A similar spark plug is positioned in the burner lining 37 whereby fuel passing from the chamber 52 through the pipe 67 may be also ignited. In order to simplify the drawings the circuit for the ignition means has been eliminated. However, these spark plugs are all connected to the magneto 39.

Extending through the strut 7 is a pipe 68 which serves to deliver compressed starting air to the actuator ring as will be described.

Assuming that one of my engines has been installed in an airplane and it is desired to start the same, the operator admits compressed air through the pipe 68, which flows into the chamber 54 and at this time the valve 53 is in the position shown. Therefore the air will pass through certain of the ports in the chamber and outwardly through the pipe 63, and will be discharged into the rotating combustion chamber having a reaction nozzle 17.

These jet chambers, in exhausting, due to the fact that they are inclined with relation to the axis of rotation, cause the activator ring to start to rotate. This will, in turn, rotate the blades 23 and through the oil or fluid connection the rotor 24 will commence to revolve, gaining in speed until it is practically locked to the activator ring through the fluid connection between the blades 23 and 25.

While this is taking place, the governor 46 will have started to function and will have moved the valve 59 and the valve 53 toward the left of the drawing. In so doing fuel will be delivered from the pump to the chambers 52 and 54, from which point the fluid will pass through the pipes 67 and 63 respectively to the main burner and the jet burner 17, where it will be ignited by the spark plugs; for instance, the fuel, passing through the jets 64 will also be ignited by their spark

plugs 66. From then on the engine will function in its driving capacity; that is, the activator ring will be jet propelled and will drive the compressor turbine to deliver air to the main burner which will then produce its jet reactive force.

As this engine proceeds through the air, it will be obvious that the strong drafts passing over an internal ring 69 will serve to deflect air against the outer surface of the shell 5 and will also serve to confine the exhaust of the activator ring in the space between the ring and the outer surface of the shell 29, thus heating this portion of the shell and consequently heating the air which is being compressed by the turbine.

However, it must be noted that this temperature, from the comparatively small jets, will not be sufficient to cause any detrimental effect, and that the air passing over the activator ring will also serve to keep the jet chambers therein functioning at a relatively low temperature.

As the compressed air which is delivered through the restricted opening 34 into the main burner chamber encounters the shell 37, a portion of the air will be delivered around the outer surface of the shell, thus maintaining it at a relatively low temperature, and, as the shell is perforated, some of the air will pass therethrough into the main burner chamber, thus providing sufficient air to maintain combustion but without the danger of extinguishing the fire due to heavy air currents.

Referring to the modified form shown in Figs. 5, 6 and 7, it will be noted that I have accomplished the same thing in a slightly different manner; that is, still using the same principle, I am compressing the air without the hot gases coming into contact with the turbine blades, thus eliminating the major trouble point common in jet engines.

The numeral 71 designates the shell of the engine, having a flared throat portion 72, and within this throat I position, as in the preferred form, struts 73, which support a streamlined bearing support 74.

These struts 73 also serve to support a truncated cigar-shaped inner shell 76 which is also supported by rear struts 77.

The shell 76 has inwardly extending spaced blades 78 between which are positioned the blades 79, mounted upon a rotor 81, having its forward end mounted in a bearing 82, while its rear end is carried by bearings 83 and 84. Secured to the rear end of the rotor in any desired manner is an activator ring 86, which is similar to the activator ring 11, and therefore needs no further description.

Also secured to the activator ring and extending rearwardly therefrom is a tapered portion 87 within which is formed the burner chamber similar to the main burner chamber 36. This chamber also has a lining 88 similar to the lining 37.

In this modified form, fuel or compressed air is introduced through a pipe 89 to a chamber 91, from which chamber pipes 92 extend to each one of the activator ring burner jets 93, and also by pipe 94 fuel is conducted to the main burner.

In starting this engine, compressed air is admitted through the pipe 89 which compressed air travels through each one of the pipes 92 and as the same issues from the jets, the reactive force starts to rotate the entire unit, together with the blades carried upon the rotor 81. As soon as sufficient speed has been reached the operator substitutes fuel for the compressed air, which fuel is ignited through the use of spark

plugs not shown, and from then on the power of the activator ring serves to compress air which is delivered from the compressor through the space between the shell 76 and the rotor and through the passage 96 to both the activator burners and the main burner, as is obvious from viewing Fig. 5.

It will thus be seen that I have created a structure which will accomplish all of the objects above set forth.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A jet engine having an outer tubular shell, an inner tubular shell, the axis of said shells coinciding, said shells being spaced from each other to form an air space therebetween, a rotor mounted in said inner shell and having its axis of rotation coinciding with the axis of said shells, co-acting blades carried by said inner shell and said rotor to form an air compressor, means for rotating said compressor, a spoked activator ring rotatably mounted in said outer shell, the axis of rotation coinciding with the axis of rotation of said rotor, said ring having a plurality of diagonally arranged combustion chambers having reaction nozzles, means for furnishing air and fuel to said combustion chambers having reaction nozzles for ignition whereby the reactive force issuing from said jet chambers will cause rotation of said activator ring and the rotor connected thereto, and a burner chamber carried by said inner shell to create a reactive force when air from said compressor is burned therein with a fuel, the exhaust from said activator jet chambers impinging upon a deflector ring positioned between said inner and outer shells.

2. A jet engine having an outer tubular shell, an inner tubular shell, the axis of said shells coinciding, said shells being spaced from each other to form an air space therebetween, a rotor mounted in said inner shell and having its axis of rotation coinciding with the axis of said shells, co-acting blades carried by said inner shell and said rotor to form an air compressor, means for rotating said compressor, a spoked activator ring rotatably mounted in said outer shell, the axis of rotation coinciding with the axis of rotation of said rotor, said ring having a plurality of diagonally arranged combustion chambers having reaction nozzles, means for furnishing air and fuel to said combustion chambers having reaction nozzles for ignition whereby the reactive force issuing from said jet chambers will cause rotation of said activator ring and the rotor connected thereto, a burner chamber carried by said inner shell to create a reactive force when air from said compressor is burned therein with a fuel, and an internal deflector ring mounted in said outer shell and spaced therefrom, said ring deflecting the gases issuing from said jets in said activator ring, whereby said gases will be cooled by said ring and air passing between said deflector ring and said outer shell.

WILLIAM K. McNAUGHT.

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