

Dec. 1, 1959

E. J. PARADISO
ROTARY JET ENGINE

2,914,920

Filed July 10, 1958

2 Sheets-Sheet 1

Fig. 1

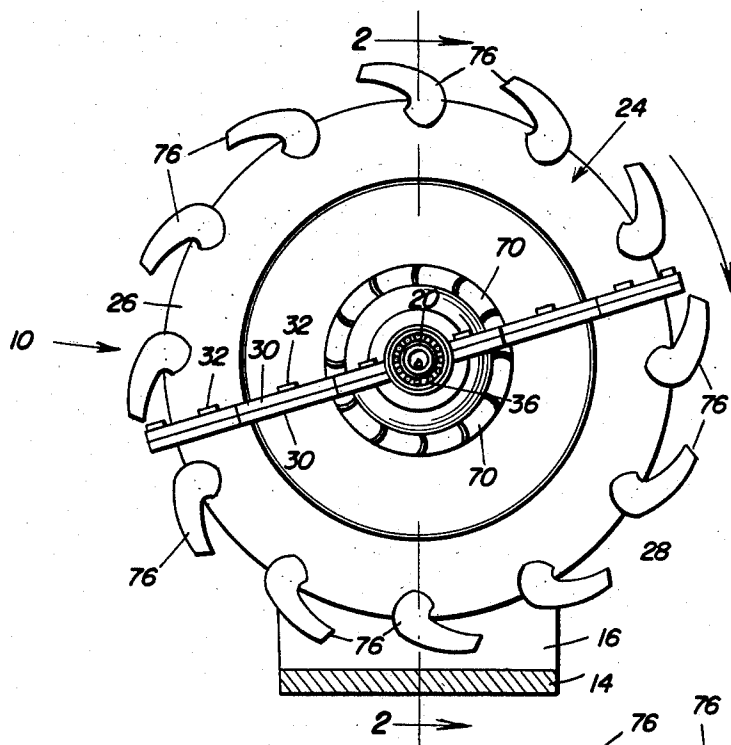


Fig. 5

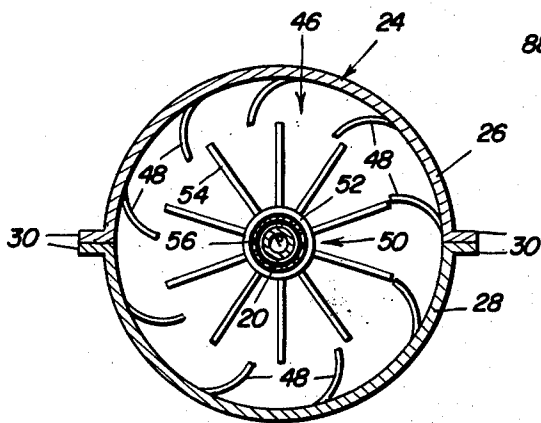
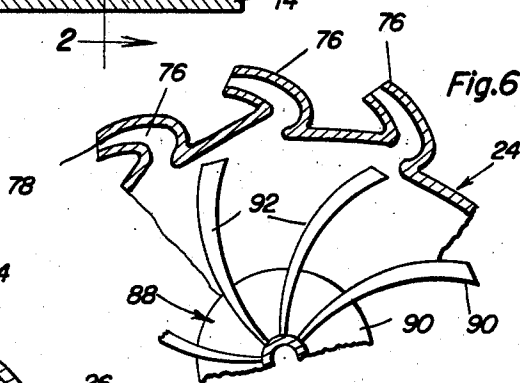


Fig. 6



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Fig. 2

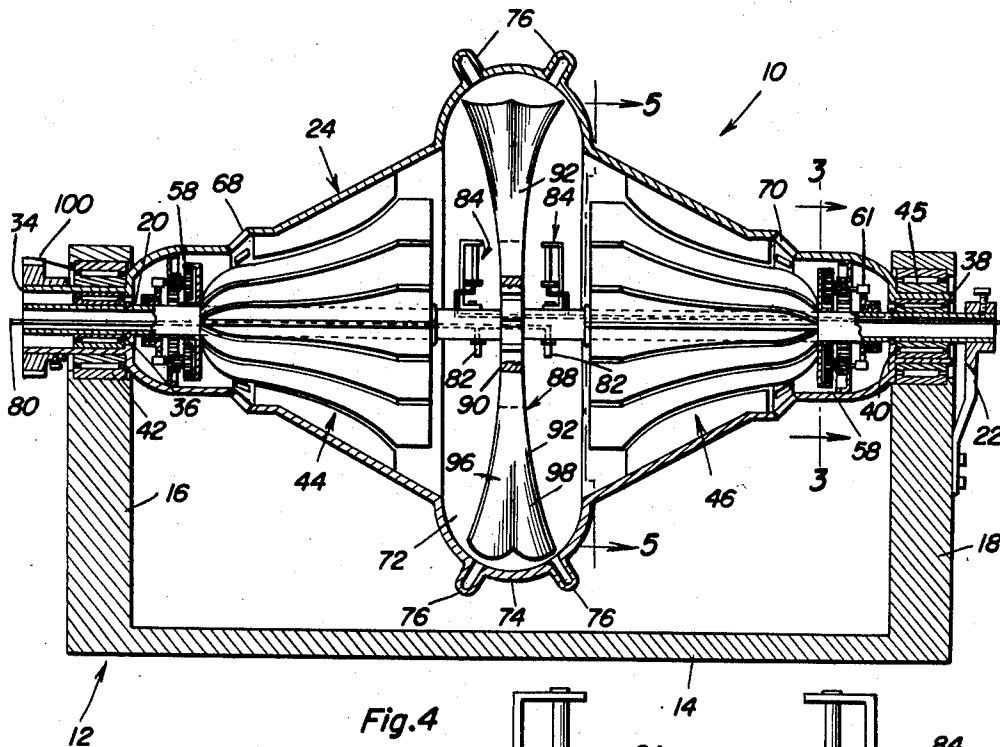


Fig. 4

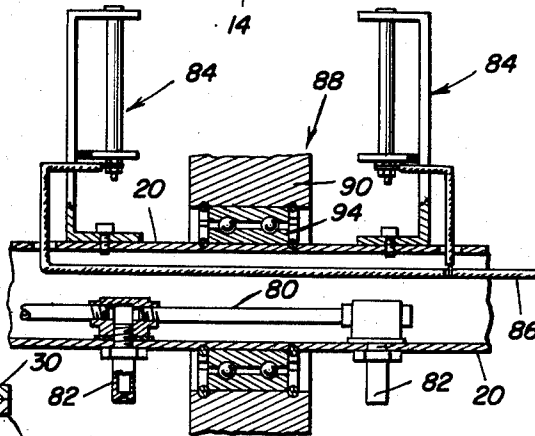
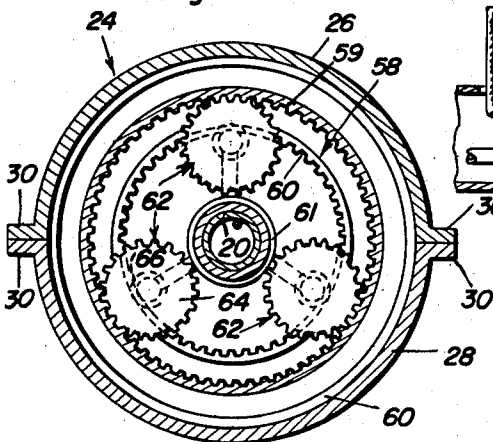


Fig. 3



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ROTARY JET ENGINE

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6 Claims. (Cl. 60—39.35)

This invention relates in general to new and useful improvements in jet engines, and more specifically to an improved jet engine of the rotary type.

Although rotary jet engines produce a high output per pound of weight, such rotary jet engines have been developed at a stage where they are extremely complicated and thus extremely expensive. It is therefore the primary object of this invention to provide a rotary jet engine which, while it has the desired output, is of an extremely simple construction and thus relatively inexpensive to manufacture.

Another object of this invention is to provide an improved rotary jet engine, the rotary engine including a simple casing which has extending therefrom nozzles disposed in radiating relation, the nozzles providing the reaction to effective rotation of the casing and there being mounted in the casing suitable compressor means whereby the air necessary to provide combustion to provide the exhaust gases is compressed before entering into a combustion chamber casing.

Another object of this invention is to provide an improved rotary jet engine which includes a fixed shaft on which there is mounted for rotation an elongated casing, the casing having formed in opposite ends thereof compressors, the compressors being driven by the casing and rotating in opposite directions for drawing in air into opposite ends of the casing and forcing such air under pressure into a central combustion chamber, and there being a plurality of radially extending nozzles on the casing and communicating with the combustion chamber so as to effect rotation of the casing.

A further object of this invention is to provide an improved rotary jet engine, the rotary jet engine being simple as possible in construction so as to be inexpensive to manufacture and at the same time being economical to operate due to its relatively great efficiency.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is an end view of the rotary jet engine which is the subject of this invention with one of the end supports therefor being broken away in order to illustrate the details thereof;

Figure 2 is a longitudinal sectional view taken substantially upon the plane indicated by section line 2—2 of Figure 1 and shows the internal construction of the rotary jet engine;

Figure 3 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 3—3 of Figure 2 and shows the specific gear drive between the casing and one of the compressors;

Figure 4 is an enlarged fragmentary sectional view taken through the central part of the shaft of the rotary jet engine and shows the mounting of an impeller thereon,

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as well as the arrangement of spray nozzles from fuel and ignition electrodes;

Figure 5 is a fragmentary transverse sectional view taken substantially upon the plane indicated by the section line 5—5 of Figure 2 and shows the general details of construction of one of the compressor units; and

Figure 6 is an enlarged fragmentary sectional view taken substantially through the center of the combustion chamber and shows the arrangement of the jet nozzles carried by the casing.

Referring now to the drawings, it will be seen that there are illustrated the features of the rotary jet engine which is the subject of this invention, the rotary jet engine being referred to in general by the reference numeral 10. The rotary jet engine 10 includes the suitable stand which is referred to in general by the reference numeral 12. The stand 12 is formed of a base 14 which has extending upwardly at opposite ends thereof supports 16 and 18.

Extending through the supports 16 and 18 and fixedly secured thereto against rotation is a stationary hollow shaft 20. The shaft 20 is secured in place by means of a suitable clamp member 22 carried by at least the support 18. Rotatably journaled on the shaft 20 is a casing 24. The casing 24 is formed of a pair of identical halves 26 and 28 which have connecting flanges 30 secured together by means of suitable fasteners 32. The casing 24 includes a first reduced end portion 34 which is of a tubular construction and which is rotatably journaled on the shaft 20 by means of bearings 36. The casing 24 is also provided with a reduced end portion 38 remote from the end portion 34. The end portion 38 is also the tubular construction and is rotatably journaled on the shaft 20 by means of a suitable bearing 40. Carried by the support 16 and engaging the end portion 34 is a bearing 42. A similar bearing 45 is carried by the support 18 and engages the end portion 38. The bearings 42 and 44 serve to support the casing 24 for rotation.

Disposed in opposite ends of the casing 24 are compressor units which are referred to in general by the reference numerals 44 and 46. The compressor units 44 and 46 are disposed in opposed relation and are otherwise identical. Accordingly, only the compressor unit 46 will be described in detail hereinafter.

The compressor unit 46 includes a plurality of fixed vanes 48 which are secured to the casing 24 for rotation therewith. The vanes 48 are of the reaction type, as is best shown in Figure 5. Rotatably journaled on the shaft 20 in alignment with the fixed vanes 48 is an impeller which is referred to in general by the reference numeral 50. The impeller 50 includes a hub 52 and vanes 54. The hub 52 carries suitable bearings 56 which rotatably mounts the impeller 50 on the shaft 20.

Referring now to Figure 4 in particular, it will be seen that there is illustrated a drive train 58 for driving the impeller 46. The drive train 58 includes an internal gear 59 which is secured to the hub 52. A second internal gear 60 is secured to the casing 24 in longitudinally offset relation with respect to the internal gear 59. It is to be noted that the internal gear 60 is of a smaller diameter than the internal gear 59.

As is best shown in Figure 2, a carrier 61 is rotatably journaled on the shaft 20. The carrier 61 has journaled thereon a plurality of planetary gears 62 which planetary gears each includes a large gear segment 64 enmeshed with the internal gear 59 and a smaller gear segment 66 which is meshed with the internal gear 60. The relationship of the gears of the drive train 58 is such that the impeller 50 is driven in the same direction as the casing 24.

In order that the compressors 44 and 46 may operate, the casing 24 is provided with suitable air inlets 68 and 70, respectively. The air inlets 68 and 70 are formed in an offset portion of the casing 24 and feeds air into the reduced ends of the compressor units 44 and 46.

Disposed intermediate the compressor units 44 and 46 is a combustion chamber 72. The combustion chamber 72 is larger than the adjacent portions of the casing 24 and that part of the casing defining the combustion chamber 72 is generally semi-circular in cross-section as at 74. That portion of the casing 24 defining the combustion chamber 72 is provided with two rows of jet nozzles 76. As is best illustrated in Figures 1 and 6, the jet nozzles 76 are generally U-shaped in outline so as to cause the reverse direction of flow of gases passing therethrough. The gases exit from the nozzles 76 as at 78 in a line generally tangential to the periphery of the casing 24. Thus as the jet streams of the exhaust gases exit from the nozzles 76, the reaction force effects the rotation of the casing 24 in the opposite direction.

In order that combustion may take place in the combustion chamber 72, there extends through the left side of the shaft 20, as viewed in Figure 2, a fuel line 80. The fuel line 80 terminates at the inner end thereof suitable ejection nozzles 82, which are best illustrated in Figure 4. The fuel injected by the nozzles 82 is continuously combined with the air forced into the combustion chamber 72 by the compressor units 44 and 46.

In order that the combustion of the fuel-air mixture may take place, there are provided suitable electrode units 84 which are carried by the central part of the shaft 20 generally in vertical planes passing through the nozzles 82. Connected to the electrode units 84 is an electric wire 86 which extends out through the right hand end of the shaft 20, as viewed in Figure 2, and is connected to the necessary electrical supply source.

In order to effect the rapid movement of exhaust gases out through the jet nozzles 76 and thus increase the effectiveness of the rotary jet engine 10, there is provided a free spinning impeller which is referred to in general by the reference numeral 88. The impeller 88 includes a central hub 90 and a plurality of radiating vanes 92, as is best shown in Figures 2 and 6.

The hub 90 is rotatably journaled on the shaft 20 intermediate the fuel injection nozzles 82 and the electrode units 84 by means of a bearing assembly 94.

As is best shown in Figure 2, the vanes 92 increase in width from the hub 90 outwardly. The vanes 92 are also of a double U cross-section so as to provide two flow paths 96 and 98. The two flow paths 96 and 98 direct the exhaust gases towards the two rows of jet nozzles 76. Thus the flow of the exhaust gases from the combustion chamber 72 outwardly through the jet nozzles 76 is accelerated by the free spinning impeller 88.

In order that power may be taken off of the rotary jet engine 10 the reduced end portion of the casing 24 is provided with a drive gear 100. The drive gear 100 may be connected to any suitable power unit through suitable gearing (not shown).

From the foregoing description of the rotary jet engine 10, it will be readily apparent that it is of the extremely simple construction so that it will be inexpensive to manufacture. At the same time, because of the particular construction thereof, it will be economical to operate due to both the efficiency of operation and the simplicity of the construction.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A rotary jet engine comprising a fixed shaft, an elongated casing, bearings mounting said casing on said shaft for rotation, a compressor unit in one end of said casing, gearing connecting said casing to said compressor unit driving said compressor unit, a combustion chamber in said casing adjacent said compressor unit, means carried by said shaft for supplying fuel to said combustion chamber, ignition means carried by said shaft for igniting a fuel air mixture in said combustion chamber, and a plurality of circumferentially spaced nozzles projecting from said casing and opening into said combustion chamber for receiving exhaust gases therefrom to rotate said casing, and a free spinning impeller journaled on said shaft within said combustion chamber for increasing the flow of exhaust gases through said nozzles.

2. A rotary jet engine comprising a fixed shaft, an elongated casing, bearings mounting said casing on said shaft for rotation, a compressor unit in one end of said casing, gearing connecting said casing to said compressor unit driving said compressor unit, a combustion chamber in said casing adjacent said compressor unit, means carried by said shaft for supplying fuel to said combustion chamber, ignition means carried by said shafts for igniting a fuel air mixture in said combustion chamber, and a plurality of circumferentially spaced nozzles projecting from said casing and opening into said combustion chamber for receiving exhaust gases therefrom to rotate said casing, said nozzles being generally U-shaped in cross section whereby the direction of exhaust gas flow is reversed while passing through said nozzles, and a free spinning impeller journaled on said shaft within said combustion chamber for increasing the flow of exhaust gases through said nozzles.

3. A rotary jet engine comprising a fixed shaft, an elongated casing, bearings mounting said casing on said shaft for rotation, a compressor unit in one end of said casing, gearing connecting said casing to said compressor unit driving said compressor unit, a combustion chamber in said casing adjacent said compressor unit, means carried by said shaft for supplying fuel to said combustion chamber, ignition means carried by said shaft for igniting a fuel air mixture in said combustion chamber, and a plurality of circumferentially spaced nozzles projecting from said casing and opening into said combustion chamber for receiving exhaust gases therefrom to rotate said casing, said compressor unit including an impeller rotatably journaled on said shaft and vanes on the interior of said casing cooperating with said impeller, said casing and said impellers rotating in the same direction.

4. A rotary jet engine comprising a fixed shaft, an elongated casing, bearings mounting said casing on said shaft for rotation, compressor units mounted in opposite ends of said casing in opposed relation, a combustion chamber intermediate said compressor units, drive means between said casing and said compressor units for driving said compressor units, means carried by said shaft for supplying fuel to said combustion chamber, ignition means carried by said shaft for igniting a fuel air mixture in said combustion chamber, and a plurality of circumferentially spaced nozzles projecting from said casing and opening into said combustion chamber for receiving exhaust gases therefrom to rotate said casing, and a free spinning impeller journaled on said shaft within said combustion chamber for increasing the flow of exhaust gases through said nozzles.

5. A rotary jet engine comprising a fixed shaft, an elongated casing, bearings mounting said casing on said shaft for rotation, compressor units mounted in opposite ends of said casing in opposed relation, a combustion chamber intermediate said compressor units, drive means between said casing and said compressor units for driving said compressor units, means carried by said shaft for supplying fuel to said combustion chamber, ignition means carried by said shaft for igniting a fuel air mixture in said

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combustion chamber, and a plurality of circumferentially spaced nozzle projecting from said casing and opening into said combustion chamber for receiving exhaust gases therefrom to rotate said casing, said nozzles being arranged in two longitudinally spaced rows, and a free spinning impeller journaled on said shaft within said combustion chamber for increasing the flow of exhaust gases through said nozzles.

6. A rotary jet engine comprising a fixed shaft, an elongated casing, bearings mounting said casing on said shaft for rotation, compressor units mounted in opposite ends of said casing in opposed relation, a combustion chamber intermediate said compressor units, drive means between said casing and said compressor units for driving said compressor units, means carried by said shaft for supplying fuel to said combustion chamber, ignition means carried by said shaft for igniting a fuel air mixture in said combustion chamber, and a plurality of circum-

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ferentially spaced nozzles projecting from said casing and opening into said combustion chamber for receiving exhaust gases therefrom to rotate said casing, said nozzles being arranged in two longitudinally spaced rows, and a free spinning impeller journaled on said shaft within said combustion chamber for increasing the flow of exhaust gases through said nozzles, said impeller including a plurality of vanes, each of said vanes increasing in width outwardly and being of a double U cross section to provide two paths of flow aligned with said rows of nozzles.

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