March 8, 1960 L. J. WELSH 2,927,426

JET TURBINES

Filed May 15, 1957 4 Sheets-Sheet 1

Fig. 1

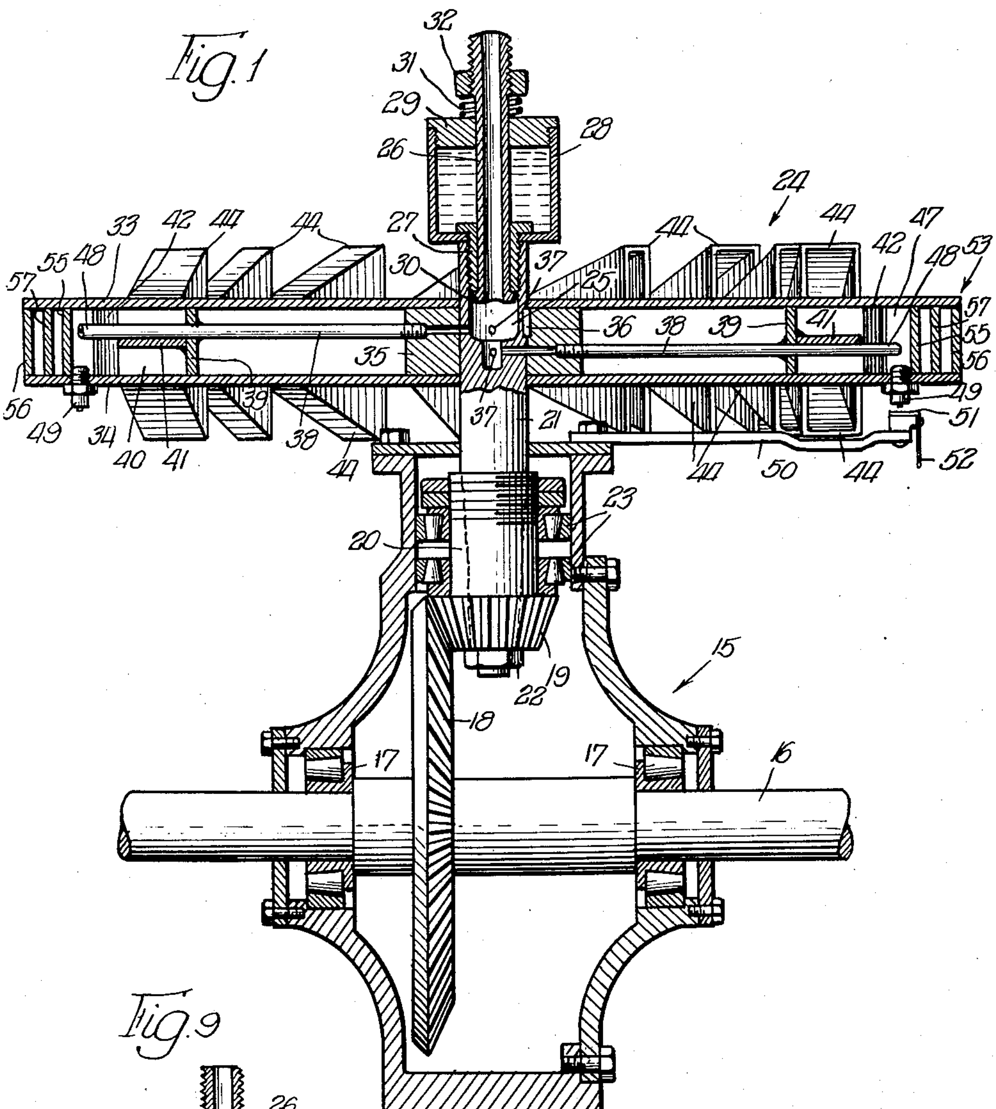
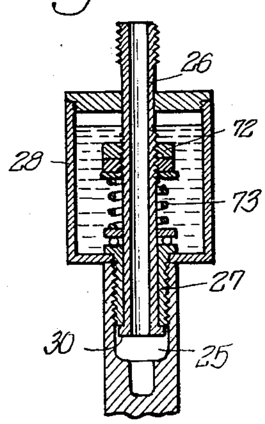



Fig. 9

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Filed May 15, 1957 4 Sheets-Sheet 2

Fig. 2

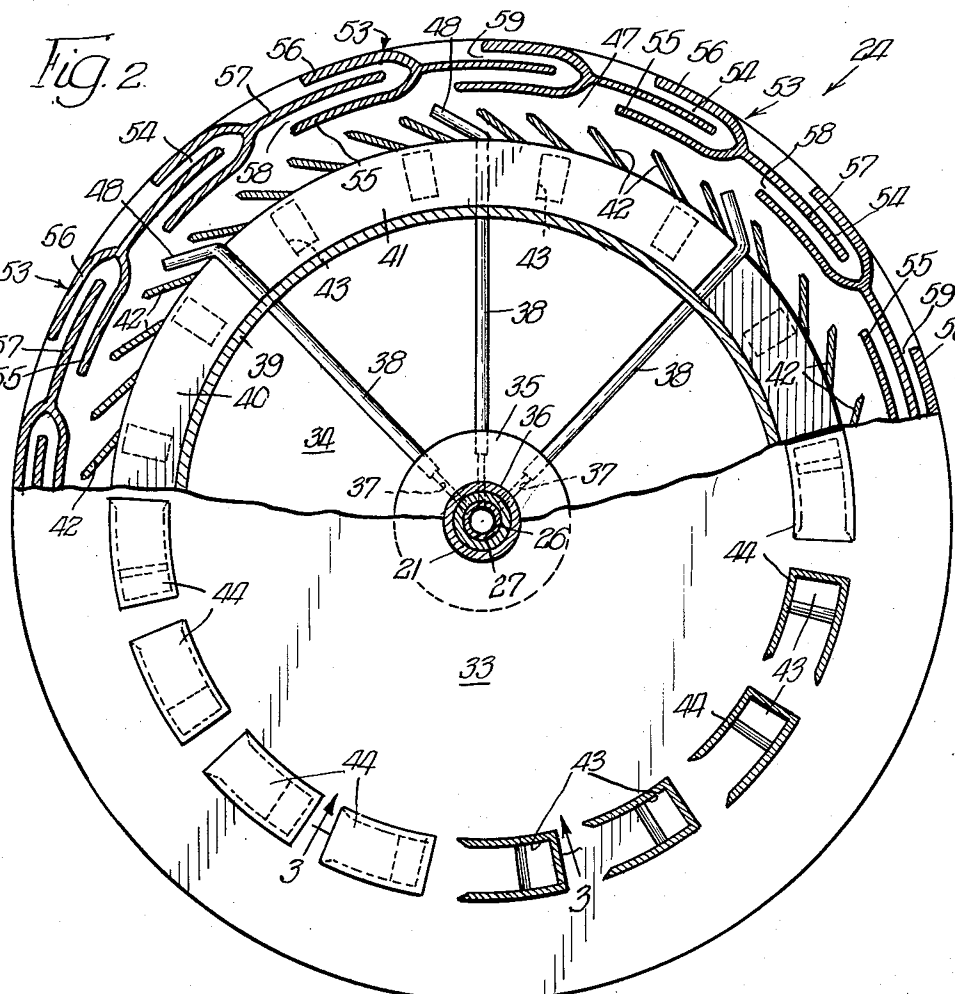
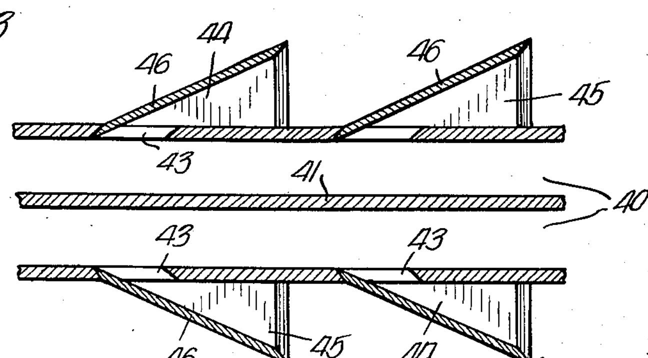



Fig. 3

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March 8, 1960 — L. J. WELSH — 2,927,426

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Filed May 15, 1957 — 4 Sheets-Sheet 3

Fig. 4

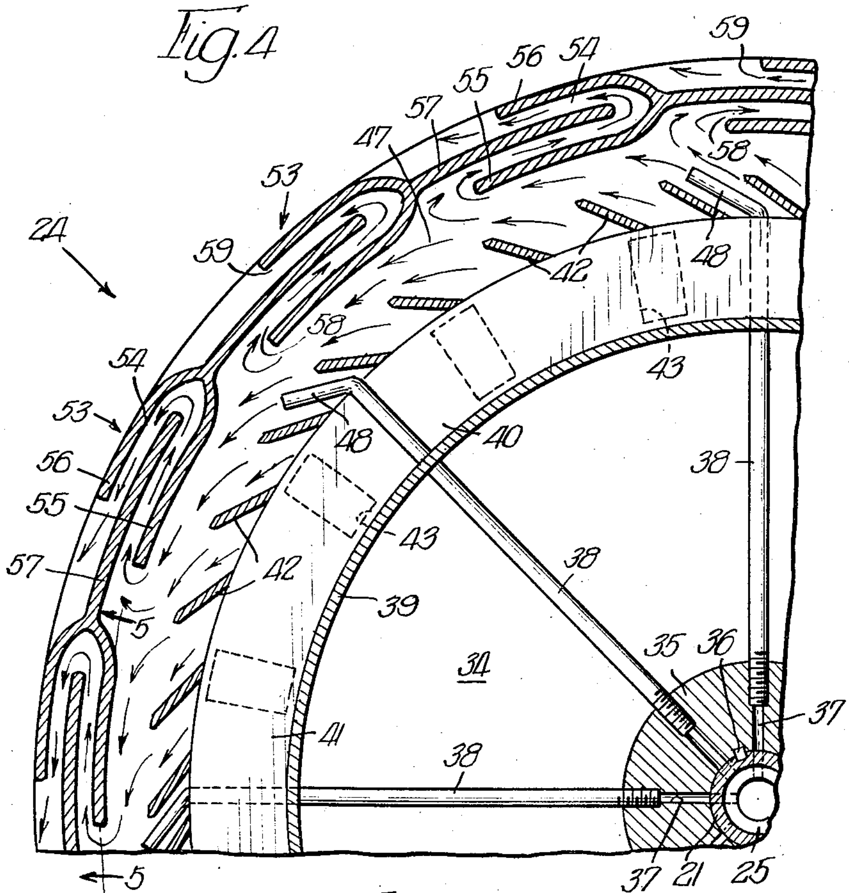
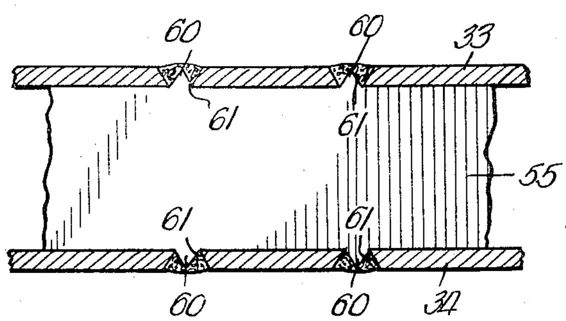



Fig. 5

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March 8, 1960 | L. J. WELSH | 2,927,426

JET TURBINES

Filed May 15, 1957 | 4 Sheets-Sheet 4

Fig. 6.

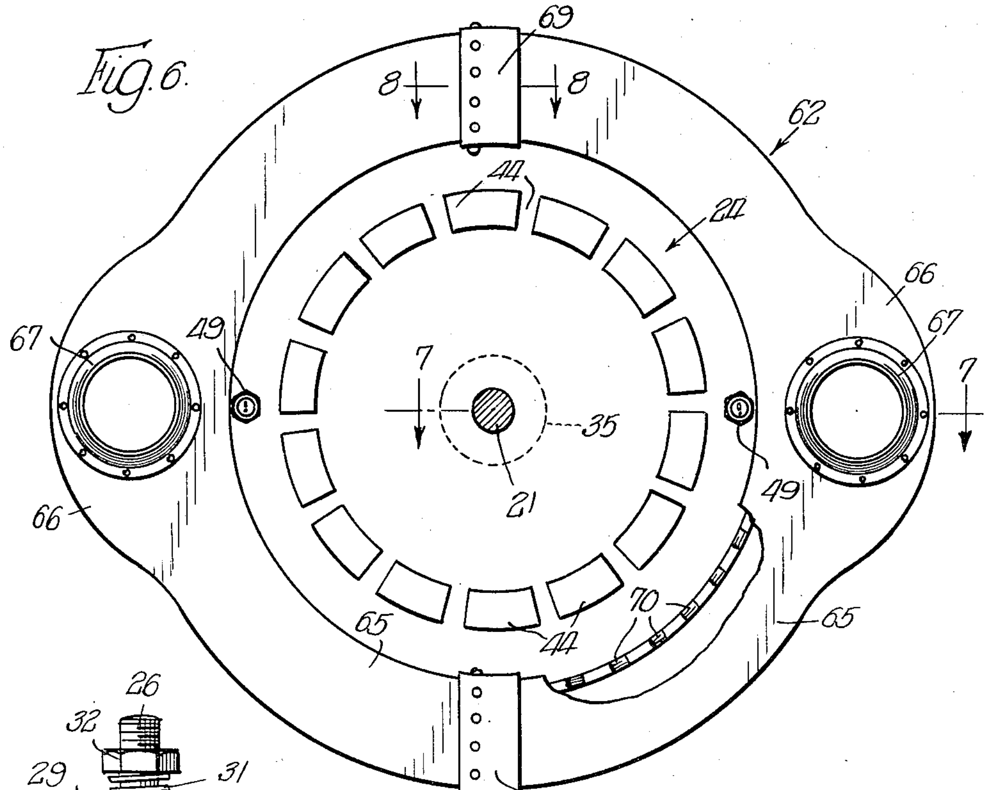



Fig. 7

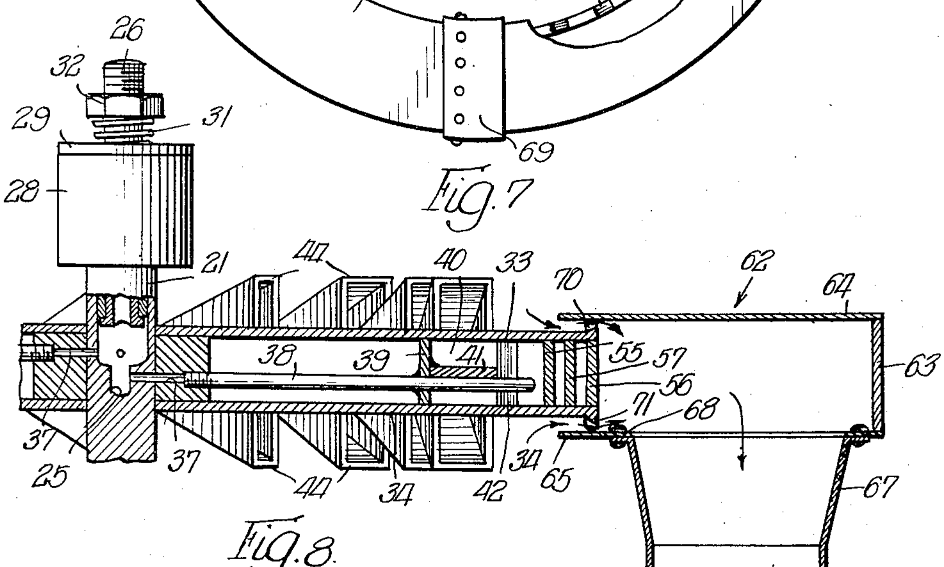
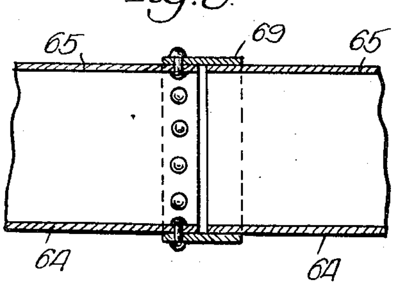



Fig. 8.

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# United States Patent Office

2,927,426
Patented Mar. 8, 1960




2,927,426

## JET TURBINES

Linnie J. Welsh, Quincy, Ill.

Application May 15, 1957, Serial No. 659,390

6 Claims. (Cl. 60—39.35)

The present invention is directed to a new and improved jet turbine in the form of a motor particularly adapted as a power source for the operation of vehicles such as automobiles and tractors.

It is an object of the present invention to provide a new and improved jet turbine of uncomplicated light-weight structure capable of developing a substantial amount of power as a result of improved efficiency of operation, the net available power provided being increased over that available from a conventional piston type motor of equal power size, the jet turbine being of a relatively small size and capable of highly efficient long life operation.

A further object is to provide a new and improved jet turbine motor which essentially eliminates the use of relatively moving parts and thus substantially eliminating the need of lubrication in operation, the operational structural features of the motor affording advantageous use of centrifugal thrust to greatly increase efficiency of operation, the motor further being provided with a muffler or exhaust silencing arrangement whereby the long life efficient operation of the same is materially enhanced.

Still a further object taken in conjunction with the foregoing is to provide a new and improved turbojet engine consisting essentially of a rotatable wheel provided with an air intake zone located radially inwardly of an air compression zone which is in communication with a combustion zone from which combustion gases are delivered into a gas expansion and exhaust zone located about the outer perimeter of the wheel, the arrangement of the zones and the structural features of the elements defining the same providing for advantageous use of centrifugal thrust in greatly enhancing the efficiency of operation of the engine.

Other objects not specifically set forth will become apparent from the following detailed description made in conjunction with the drawings wherein:

Fig. 1 is a fragmentary section in elevation of the jet turbine of the present invention illustrating the operative mounting of the same relative to a drive shaft;

Fig. 2 is a fragmentary, partly sectioned top plan view of the turbine wheel;

Fig. 3 is an enlarged fragmentary section taken generally along line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary plan view of the turbine wheel having portions thereof in section to illustrate operation of the wheel;

Fig. 5 is an enlarged fragmentary section taken generally along line 5—5 of Fig. 4;

Fig. 6 is a bottom plan view on reduced scale of the turbine wheel illustrating the exhaust silencing assembly mounted relative thereto and forming a part of the present invention;

Fig. 7 is an enlarged fragmentary section taken generally along line 7—7 of Fig. 6;

Fig. 8 is an enlarged fragmentary section taken generally along line 8—8 of Fig. 6; and



Fig. 9 is a fragmentary section in elevation of a modified form of fuel delivery arrangement for use in the engine assembly of Fig. 1.

Referring to Fig. 1 a reduction gear box 15 of known type is illustrated as including a drive shaft 16 extending therethrough and suitably journalled by roller bearings 17. Within the box 15 the shaft 16 carries a large bevel gear 18 suitably keyed thereto and meshed at the top thereof with an input bevel gear 19 provided with an upwardly extending, integral collar or sleeve 20 having a conical central opening therethrough which is wedgingly engaged on the lower conical end portion of an input spindle or shaft 21 and held thereon by a nut 22. The integral structure including the gear 19 and collar 20 is suitably keyed to the shaft 21 and journalled in the top portion of the gear box 15 by roller bearings 23. The shaft 21 is rotated by the new and improved turbine wheel 24 of the present invention to drive the output shaft 16 through the reduction gear arrangement within the gear box 15. The particular installation disclosed is especially adapted for use in vehicles such as automobiles and tractors and is merely illustrative of one manner of use of the turbine wheel 24 of the present invention.

The top end portion of the input shaft 21 is hollowed out to provide centrally inwardly thereof a fuel delivery chamber 25 having in communication therewith an intake pipe or valve 26 which is movably received through a collar or sleeve 27 threaded into the uppermost end of the shaft 21. An oil chamber 28 is attached with the upper end of the shaft 21 by the collar 27 and is closed at the top thereof with a threaded plug 29 being centrally apertured and receiving therethrough the intake tube 26. The bottom end of the tube 26 is provided with a radial flange 30 which is seated against the bottom edge of the sleeve 27 and resiliently held in this position by a coil spring 31 received about the tube 26 outwardly of the oil chamber 28. A holding nut 32 is threadedly received on the uppermost end of the intake tube 26 to provide a seat for one end of the spring 31, the other end of the spring being received against the top surface of the plug 29. The spring 31 functions to hold the tube 26 out of the chamber 25 to prevent interference thereby with fuel delivery in a manner to be described.

Suitable fuel delivery means, such as copper tubing, is connected to the top end of the intake tube 26 to deliver fuel into the chamber 25 and upon rotation of the input shaft 21 by operation of the turbine wheel 24, the intake tube 26 is held stationary against rotation within the upper end of the shaft 21 while the remaining elements rotate with the shaft 21. The oil chamber 28 provides lubrication within the sleeve 27 and the spring 31 holds the shoulder 30 in sealing engagement with the lowermost end of the collar 27 to prevent loss of lubricant into the chamber 25. The spring 31 serves an additional function which will be subsequently described in connection with the operation of the turbine wheel 24.

Referring particularly to Figs. 1 and 2, the turbine wheel 24 is formed from a top plate 33 and a bottom plate 34, both of which are of equal diameter and disk-like shape while being centrally apertured for mounting on the input shaft 21 in spaced relation to one another. The plates 33 and 34 are held together at the centers thereof by a spacer 35 which is shrunk-fitted onto the input shaft 21 in position to surround the fuel delivery chamber 25. The spacer 35 is additionally fixed to the shaft 21 by any suitable arrangement such as a key 36 for positive rotation of the turbine wheel 24 with the shaft. The shaft 21 and spacer 35 are provided with a plurality of vertically offset drilled ports 37 which are circumferentially arranged and extend radially outwardly therefrom being in communication with a plurality of fuel delivery pipes or tubes 38 which at their innermost ends are threadedly received within enlarged outer end portions of each port 37. The tubes 38 extend radially outwardly intermediate the plates 33 and 34 and are received through aligned openings in an annular upstanding wall or ring 39 extending vertically between the inner surfaces of the plates 33 and 34 and suitably attached thereto. The wall 39 defines the inner perimeter of an air intake chamber or zone 40 which is circumferentially continuous and positioned near the outer perimeter of the wheel 24.

The air intake zone 40 is subdivided by a horizontally directed baffle plate or ring 41 which is suitably attached to the outermost surface of the wall 39 and extends radially outwardly into outer end engagement with a plurality of circumferentially arranged compressor blades or fins 42. Both the top plate 33 and bottom plate 34 are provided with a ring of rectangularly shaped openings 43 which are circumferentially spaced and in communication with a plurality of air scoops 44. As particularly shown in Figs. 2 and 3, the air scoops 44 are each defined by upstanding side walls 45 and a rearwardly inclined top wall 46. The scoops 44 open in the direction of rotation of the wheel 24 and the forward edges of the side walls 45 and top walls 46 are bevelled to provide for reduced air flow resistance. Similarly, the forward edges of the openings 43 are bevelled to eliminate sharp edges for contact by air flow.

As particularly shown in Fig. 2, the compressor blades 42 are radially inclined so that their outer ends are directed away from the direction of rotation of the wheel 24. Still further, the outer vertical edge of each blade 42 is sharpened by bevelled surfaces to provide for reduced air flow resistance of the type previously described in connection with the bevelled edges of the air scoops 44. The ring of spaced compressor blades 42 defines the inner perimeter of a circumferentially continuous combustion zone or chamber 47 having in communication therewith the outermost ends of the fuel delivery tubes 38. The outer end portion 48 of each tube 38 is inclined in a direction away from the direction of rotation of the wheel 24 and extends between spaced compressor blades 42 in substantially parallel relation therewith. In this manner air is picked up by the scoops 44, delivered into the air chamber 40, compressed by the blades 42, delivered into the combustion zone 47 and mixed therein with fuel delivered into the combustion zone 47 by the tubes 38.

Referring to Fig. 1, the bottom plate 34 has mounted therethrough oppositely positioned spark plugs 49 the innermost ends of which are in communication with the combustion zone 47. The top portion of the gear box 15 in which the input shaft 21 is journalled carries a radially directed arm 50 provided at the end thereof with an electrode plate 51 having connected thereto the negative lead 52 of any suitable ignition system. The electrode plate 51 is positioned by the arm 50 in spaced relation to the negative electrode of the plugs 49 at approximately 1/16 of an inch to provide for energization of each spark plug 49 upon rotation of the wheel 24 to initiate combustion in the combustion chamber 47. Any suitable starter system such as a starter motor of the type in conventional use in automobiles can be used to initially rotate the drive shaft 16 and thus turn the wheel 24 until one of the plugs 49 is energized by arcing between the negative electrode thereof and the electrode plate 51 to initiate combustion within the chamber 47. Once combustion is commenced, energization of the ignition system is no longer necessary as combustion is self-sustaining and use of one or both of the spark plugs 49 is entirely adequate to immediately start the turbine motor.

The outer perimeter of the combustion zone 47 is defined by a plurality of nested or interleaved exhaust flutes 53 which are generally Y-shaped in cross section as shown in Figs. 2 and 4 and which define therebetween a plurality of circumferentially arranged, tortuous passageways 54 into which the combustion gases are delivered for expansion and exhausting outwardly of the wheel 24 to rotate the same in reaction type operation. Each of the exhaust flutes 53 is defined by an upstanding inner wall segment 55 integrally joined with an outer upstanding wall segment 56 having received therebetween in spaced parallel relation a wall segment 57 forming a part of an adjacent exhaust flute 53. The wall segment 57 extends in the direction of rotation of the wheel 24 and defines with the inner free end of the wall segment 55 an inlet port or opening 58 through which combustion gases are introduced into the passageway 54. The wall segment 57 further defines with the free end of the wall segment 56 an outlet passageway or port 59 through which the combustion gases following expansion are exhausted from the wheel 24 to provide the power necessary to operate the same.

All of the elements described which form the wheel 24 are fixed relative to one another for rotation with the wheel 24, and as a result, there are no moving parts provided which must be lubricated to prevent undue frictional wear. All of the elements are welded in position to provide for a strong wheel structure capable of exceptionally high rotational speeds. One preferred form of interconnecting the vertically directed elements, such as the compressor blade 42 and the wall segments of the exhaust flutes 53 between the plates 33 and 34, is shown in Fig. 5. The wall segment 55 shown therein is provided with spaced upwardly and downwardly projecting V-shaped ribs 60 which are received in apertures 61 carried by the plates 33 and 34, the spaces between the edges of the apertures 61 and the edges of the ribs 60 being filled by weld to fixedly hold the wall segment 55 in its operative position. In this manner a strong unitary structure is provided.

In operation of the turbine wheel 24 as particularly shown in Fig. 4, combustion is initiated in the combustion zone 47 by the spark plugs 49 and upon rotation of the wheel 24 air is delivered into the air chamber 40 through the scoops 44. This action forces air between the compressor blades 42 wherein the air is compressed and introduced into the combustion chamber 47. The wall 39 prevents air from being delivered radially inwardly between the plates 33 and 34 and the baffle ring 41 provides for better control of air flow toward the compressor blades 42. By subdividing the air chamber 40 with the baffle ring 41, air confusion does not result and a quicker and more direct air route is provided for delivering air into the compressor blades. Fuel is delivered through the tubes 38 into the combustion chamber 47 and mixed with the compressed air therein for ignition purposes. The fuel lines or tubes 38 are circumferentially offset in an alternating manner for wheel balancing purposes and a sufficient number of tubes 38 will be preferably used to provide one fuel line for each pair of exhaust flutes 53. For greatest operational efficiency however, a single fuel line may be provided for each separate exhaust flute but from an economical standpoint it has been found that highly efficient operation can be obtained by merely providing a single fuel line for each pair of exhaust flutes.

Fuel is delivered through the intake valve or tube 26 into the delivery chamber 25 from which it moves outwardly through the tubes 38. The tube 26 is spring mounted to hold the same in place and to prevent leakage of fuel and oil. This is necessary particularly when the jet turbine motor is shut off following operation. A strong vacuum is formed in the fuel delivery chamber 25 and tends to pull the delivery tube 26 downwardly into the chamber 25. The spring 31 functions to prevent displacement of the tube 26 which will result in oil leakage from the oil chamber 28. The combustion gases formed in the combustion chamber 47 moves through the passageways or ports 58 into the passageways 54 of the exhaust flutes 53 and during their travel therein expansion takes place to provide for exhausting of the same from the ports **59** at a greatly increased velocity for high speed operation of the wheel **24**.

The structural arrangement of the wheel **24** of the present invention is of particular importance in that it provides for advantageous use of centrifugal thrust which occurs during rotation of a disk or wheel about an axis. The centrifugal thrust developed provides additional power which is advantageously used by the turbine wheel of the present invention to increase the efficiency of operation of the same in several respects. Centrifugal thrust will aid in fuel delivery through the tubes **38**, air delivery to the compressor blades **42**, and maintaining of pressure differential within the combustion chamber **47** which enhances efficient utilization of the combustion gases by the exhaust flutes **53**. The centrifugal thrust advantageously used during operation of the wheel **24** of the present invention increases with an increase in rotational speed of the wheel. With the added action of centrifugal thrust on the combustion gases in the combustion chamber **47**, the combustion pressure against the exhaust flutes **53** is greatly increased and is substantially greater than the back pressure developed by combustion against the compressor blades **42**. This increase in pressure differential within the combustion zone **47** can, for example, establish an outwardly directed total thrust which may be 35% greater than the back pressure operating in a direction toward the compressor blades. If the turbine is operated at a speed of approximately 25,000 r.p.m., the combustion pressure against the exhaust flutes **53** may be as much as 35% greater than the back pressure against the compressor blades **42** to provide for greatly increased power supplying pressure differential within the combustion chamber **47**. The air scoops and compressor blades are located well within the radius of location of the exhaust flutes to further make full use of centrifugal thrust in increasing the flow of air outwardly through the air chamber and compressor blades into the combustion zone. With the structural arrangement described, centrifugal force is harnessed and utilized to provide for a substantial increase in power of operation without any increase in cost of operation. The net power output of the turbine motor of the present invention may be as much as or more than 60% utilization of power input thereby providing substantial savings of power both from the standpoint of economy of operation and efficiency of operation. Economy of operation arises from full utilization of centrifugal thrust whereas efficiency of operation arises from the elimination of moving parts requiring lubrication and increasing loss of efficiency due to development of friction.

The exhaust flutes **53** are shaped to make more efficient use of the expanding combustion gases traveling through the passageways **54** therein. While providing for efficient expansion of the combustion gases, the passageways **54** are nevertheless capable of maintaining sufficient resistance at the outlet or exhaust ports **59** to maintain the necessary high compression within the combustion zone **47**. The number of exhaust flutes **53** used will depend upon the particular use of the motor. For best efficiency, as many as **16** flutes can be used in a turbine wheel of approximately 18 inches in diameter. Such an arrangement permits more than 3 inches of travel distance for the combustion gases within the passageways **54** to fully utilize expansion of the combustion gases and permit these gases to reach their fullest and fastest speeds upon exhausting through the ports **59**. With this arrangement, the most efficient and powerful thrust or reaction results thus providing for high speed operation of the turbine wheel.

To provide the necessary length of combustion gas travel in the exhaust flutes, the inner wall segments **55** may be made longer than the outer wall segments **56** as illustrated. This arrangement spaces the exhaust ports **59** substantially away from the adjacent shoulder formed by the integral juncture of the wall segments **55** and **56** of an adjacent exhaust flute **53** to prevent undue damage by heating caused by direct discharge of the exhaust from a port **59** onto the adjacent shoulder.

Referring particularly to Figs. 6–8, a preferred form of exhaust control muffler or silencer **62** is illustrated. The silencer is of two-piece construction each portion being semi-circular for positioning about the outer perimeter of the wheel **24**. Each section as shown in Fig. 7 includes an outer vertical wall **63** to which is suitably attached horizontally inwardly directed top and bottom walls **64** and **65** respectively. The walls **64** and **65** are adequately spaced from one another to be received inwardly of the outer perimeter of the wheel **24** in spaced relation outwardly of the plates **33** and **34**. Each silencer section is provided with an enlarged portion **66** having a downwardly directed sleeve **67** attached to the bottom wall **65** thereof in register with an opening **68** therein. The sleeve **67** is adapted for attachment with an exhaust pipe of known type to deliver exhaust from the silencer segment to the rear of the vehicle.

The inner ends of one of the segments as particularly shown in Fig. 8 are each provided with a sleeve **69** suitably riveted thereto which telescopically receives therein the adjacent free end of the remaining silencer segment to interconnect the same about the wheel **24**. A friction fit may be utilized to hold the segments in interconnected relation or removable fastening means may be used if preferred. In this manner the separate silencer segments are received about the outer portion of the wheel **24** and are suitabily mounted in fixed relation relative to the wheel **24** to allow the wheel to rotate relative to the silencer **62** without contacting any part of the same while at the same time delivering exhaust combustion gases thereinto for controlled venting thereby.

As particularly shown in Figs. 6 and 7, the outer edge of each of the plates **33** and **34** carries a radially directed rim which is subdivided into a plurality of upwardly or downwardly directed tooth-like ribs **70**. The ribs **70** are circumferentially spaced and define a substantially U-shaped groove therebetween the bottom surface **71** of which is bevelled to provide an upward inclination in an outward direction. The bevel is approximately 45° relative to the horizontal and provides for a plurality of controlled intake ports about the outer perimeter of the wheel **24** whereby air is drawn into the silencer **62** to provide cushions of air moving along the inner surfaces of the top and bottom walls **64** and **65** respectively to further silence the discharge of the exhaust gases into the muffler **62**. The bevelled bottom surfaces **71** provide for controlled direction of air drawn in response to centrifugal action into the silencer **62** and these currents of air move substantially horizontally across the inner surfaces of the top and bottom walls of the silencer. Insufficient air is centrifugally drawn into the silencer to interfere with the operational efficiency of the wheel **24** but the amount of air which is introduced provides an air seal preventing escape of sound waves and providing efficient sound deadening action. The air cushions provided press out against the walls of the muffler to cushion the same against the thrust of the exhaust gases and this air cushion is automatically provided by centrifugal action arising from operation of the turbine wheel **24**. Thus, no additional power is utilized nor special operational structures provided for the provision of the exhaust silencing air currents.

The introduction of air through the grooves defined by the ribs **70** into the silencer **62** provides still a further important function enhancing efficiency of operation of the turbine wheel **24**. The drawing of the air currents across the outer surfaces of the plates **33** and **34** in close proximity to the combustion zone **47** and the gas expansion and exhaust zones defined by the flutes **53** functions to cool the structural elements of the wheel 24 and increase the operational life of the same.

In Fig. 9 a slightly modified form of fuel delivery arrangement is illustrated for use in the installation of Fig. 1. The intake tube 26 carries a threadedly held collar 72 thereon interiorly of the oil chamber 28, the collar seating the upper end of a coil spring 73 which is seated at its lower end against the upper end of the sleeve 27. The spring 73 is tensioned to constantly urge the tube 26 in an upward direction to hold the bottom rib 30 thereof against movement downwardly into the fuel delivery chamber 25. As previously described, it is necessary for the tube 26 to remain stationary during rotation of the input shaft 21 and the elements carried thereby and in using this arrangement it becomes necessary to hold the tube 26 out of the fuel delivery chamber 25 when the motor is turned off following operation as a result of a vacuum being developed in the chamber 25 which tends to draw the tube 26 downwardly thereinto. Any suitable arrangement can be used, the two arrangements shown in Figs. 1 and 9 having been found entirely adequate for the purposes described.

Any suitable fuel can be used in the operation of the turbine motor of the present invention. Bottled gas has been found to be perfectly adequate and actually preferred due to the elimination of a carburetor or force pump for positive delivery of the fuel to the chamber 25 in the input shaft 21. The pressure carried by the tank containing the gas in addition to the action of centrifugal thrust on the delivery of the gas through the tubes 38 provides for adequate combined delivery forces. By advantageously utilizing centrifugal thrust, the combustion zone or chamber 47 may be unusually small in area. The centrifugal thrust materially increases gas pressure in the exhaust flute portion of the wheel to establish the requisite pressure differential on either side of the combustion chamber 47 as previously described. The centrifugal thrust will increase with increased speed of operation of the wheel thus allowing high speed operation without loss of economical fuel consumption.

The turbine motor of the present invention is intended primarily for use in automobiles and tractors although, due to its versatility, it can be readily converted to substantially any use made of a regular piston type engine. The turbojet motor described is combined in an automobile for use with a conventional form of transmission and clutch as well as starter motor in the manner previously described. Upon starting, there is no engine warming time necessary as the jet motor immediately upon attaining self-sustaining combustion is ready for load application. A jet turbine motor of 150 H.P. can be manufactured with a total weight of slightly less than 80 pounds, a height of from 8 to 10 inches and a width or diameter of 18 inches. The gauge of the metal used in fabricating the exhaust flutes and compressor blades can be much greater than conventionally practiced for increased life of operation as the additional weight added thereby is of no consequence. The motor will start at approximately 3,500 to 4,000 r.p.m., idle at approximately 5,000 r.p.m. and reach a top speed which can possibly be as high as 50,000 r.p.m. providing the material from which the motor is fabricated is of sufficient strength capable of withstanding the centrifugal thrust developed. The exhaust pressure in the combustion chamber varies with opening and closing of the throttle and the response is instantaneous thus providing for smooth uninterrupted operation. The size of motor described includes a combustion chamber which utilizes less than 25% of the total area of the wheel and, as a result, the motor will operate at substantially normal temperatures. The flow of cool air across the outer surfaces of the wheel into the exhaust silencing assembly further maintains the operational temperature of the motor at a minimum while additionally materially silencing the exhaust to an extent that quiet operation can be readily attained.

Obviously many modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A jet turbine assembly including a turbine wheel fixedly mounted on a shaft to rotatably drive the same, fuel delivery means forming a part of said shaft and defining a fuel delivery chamber therein, said wheel surrounding said shaft in close association with said chamber and being defined by spaced top and bottom plates, an annular wall extending between said plates and having extending therethrough the outer end portions of a plurality of radially directed fuel dispensing tubes the inner ends of which are in communication with said chamber, the outer surfaces of said plates carrying a plurality of cup-like air scoops in ring-like arrangement and in communication with circumferentially spaced openings in said plates located immediately outwardly of said wall, said scoops opening in the direction of rotation of said wheel, a radially extending circumferentially continuous baffle carried by the outer surface of said wall intermediate said plates and receiving said tubes alternately above and below the same, a plurality of compressor blades circumferentially arranged immediately outwardly of said baffle and extending between said plates, said blades each being radially outwardly inclined away from the direction of rotation of said wheel, and a plurality of overlapping exhaust flute elements circumferentially carried between said plates near the outer perimeter of said wheel in radially spaced relation to said blades to define therebetween a combustion zone, said flute elements defining therebetween a plurality of substantially U-shaped combustion gas expansion passageways the outermost ends of which are exhaust ports through which gas escapes to impart rotational movement to said wheel.

2. A jet turbine assembly including a turbine wheel fixedly mounted on a shaft to rotatably drive the same, fuel delivery means forming a part of said shaft and defining a fuel delivery chamber therein, said wheel surrounding said shaft in close association with said chamber and being defined by spaced top and bottom plates, an annular wall extending between said plates and having extending therethrough the outer end portions of a plurality of radially directed fuel dispensing tubes the inner ends of which are in communication with said chamber, the outer surfaces of said plates carrying a plurality of cup-like air scoops in ring-like arrangement and in communication with circumferentially spaced openings in said plates located immediately outwardly of said wall, said scoops opening in the direction of rotation of said wheel, a radially extending circumferentially continuous baffle carried by the outer surface of said wall intermediate said plates and receiving said tubes alternately above and below the same, a plurality of compressor blades circumferentially arranged immediately outwardly of said baffle and extending between said plates, said blades each being radially outwardly inclined away from the direction of rotation of said wheel, a plurality of overlapping exhaust flute elements circumferentially carried between said plates near the outer perimeter of said wheel in radially spaced relation to said blades to define therebetween a combustion zone, said flute elements defining therebetween a plurality of substantially U-shaped combustion gas expansion passageways the outermost ends of which are exhaust ports through which gas escapes to impart rotational movement to said wheel, and a circumferential sleeve-like exhaust control and silencing member received about the outer periphery of said wheel overlapping said plates and fixed against rotation therewith, said silencing member including an exhaust outlet.

3. A jet turbine assembly including a turbine wheel fixedly mounted on a shaft to rotatably drive the same, fuel delivery means forming a part of said shaft and de-

fining a fuel delivery chamber therein, said wheel surrounding said shaft in close association with said chamber and being defined by spaced top and bottom plates, an annular wall extending between said plates and having extending therethrough the outer end portions of a plurality of radially directed fuel dispensing tubes the inner ends of which are in communication with said chamber, the outer surfaces of said plates carrying a plurality of cup-like air scoops in ring-like arrangement and in communication with circumferentially spaced openings in said plates located immediately outwardly of said wall, said scoops opening in the direction of rotation of said wheel, a radially extending circumferentially continuous baffle carried by the outer surface of said wall intermediate said plates and receiving said tubes alternately above and below the same, a plurality of compressor blades circumferentially arranged immediately outwardly of said baffle and extending between said plates, said blades each being radially outwardly inclined away from the direction of rotation of said wheel, a plurality of overlapping exhaust flute elements circumferentially carried between said plates near the outer perimeter of said wheel in radially spaced relation to said blades to define therebetween a combustion zone, said flute elements defining therebetween a plurality of substantially U-shaped combustion gas expansion passageways the outermost ends of which are exhaust ports through which gas escapes to impart rotational movement to said wheel, and a circumferential sleeve-like exhaust control and silencing member received about the outer periphery of said wheel overlapping said plates and fixed against rotation therewith, said silencing member being provided with at least one outlet for exhaust pipe connection and being sectionalized in telescopically assembled relation about said wheel.

4. A jet turbine assembly including a turbine wheel fixedly mounted on a shaft to rotatably drive the same, fuel delivery means forming a part of said shaft and defining a fuel delivery chamber therein, said wheel surrounding said shaft in close association with said chamber and being defined by spaced top and bottom plates, an annular wall extending between said plates and having extending therethrough the outer end portions of a plurality of radially directed fuel dispensing tubes the inner ends of which are in communication with said chamber, the outer surfaces of said plates carrying a plurality of cup-like air scoops in ring-like arrangement and in communication with circumferentially spaced openings in said plates located immediately outwardly of said wall, said scoops opening in the direction of rotation of said wheel, a radially extending circumferentially continuous baffle carried by the outer surface of said wall intermediate said plates and receiving said tubes alternately above and below the same, a plurality of compressor blades circumferentially arranged immediately outwardly of said baffle and extending between said plates, said blades each being radially outwardly inclined away from the direction of rotation of said wheel, a plurality of overlapping exhaust flute elements circumferentially carried between said plates near the outer perimeter of said wheel in radially spaced relation to said blades to define therebetween a combustion zone, said flute elements defining therebetween a plurality of substantially U-shaped combustion gas expansion passageways the outermost ends of which are exhaust ports through which gas escapes to impart rotational movement to said wheel, and a circumferential sleeve-like exhaust control and silencing member received about the outer periphery of said wheel overlapping said plate and fixed against rotation therewith, said silencing member being provided with at least one outlet for exhaust pipe connection and being sectionalized in telescopically assembled relation about said wheel, the outer surface at the outer edge of each plate being provided with radially directed tooth-like projections positioned within said silencing member and providing for centrifugal air currents within said silencing member along the inner surfaces of the walls thereof.

5. A jet turbine assembly including a turbine wheel fixedly mounted on a shaft to rotatably drive the same, said shaft being provided with a hollow end portion defining at the innermost end thereof a fuel delivery chamber, a sleeve bearing fixedly received within said hollow end portion in communication with said chamber, a fuel intake tube received within said sleeve and held against rotation with said shaft and movement into said chamber, said wheel surrounding said shaft in close association with said chamber and being defined by spaced top and bottom plates, an annular wall extending between said plates and having extending therethrough the outer end portions of a plurality of radially directed fuel dispensing tubes the inner ends of which are in communication with said chamber, the outer surfaces of said plates carrying a plurality of cup-like air scoops in ring-like arrangement and in communication with circumferentially spaced openings in said plates located immediately outwardly of said wall, said scoops opening in the direction of rotation of said wheel, a radially extending circumferentially continuous baffle carried by the outer surface of said wall intermediate said plates and receiving said tubes alternately above and below the same, a plurality of compressor blades circumferentially arranged immediately outwardly of said baffle and extending between said plates, said blades each being radially outwardly inclined away from the direction of rotation of said wheel, and a plurality of overlapping exhaust flute elements circumferentially carried between said plates near the outer perimeter of said wheel in radially spaced relation to said blades to define therebetween a combustion zone, said flute elements defining therebetween a plurality of substantially U-shaped combustion gas expansion passageways the outermost ends of which are exhaust ports through which gas escapes to impart rotational movement to said wheel.

6. A jet turbine assembly including a turbine wheel fixedly mounted on a shaft to rotatably drive the same, said shaft being provided with a hollow end portion defining at the innermost end thereof a fuel delivery chamber, a sleeve bearing fixedly received within said hollow end portion in communication with said chamber, a fuel intake tube received within said sleeve and held against rotation with said shaft and movement into said chamber, said wheel surrounding said shaft in close association with said chamber and being defined by spaced top and bottom plates, an annular wall extending between said plates and having extending therethrough the outer end portions of a plurality of radially directed fuel dispensing tubes the inner ends of which are in communication with said chamber, the outer surfaces of said plates carrying a plurality of cup-like air scoops in ring-like arrangement and in communication with circumferentially spaced openings in said plates located immediately outwardly of said wall, said scoops opening in the direction of rotation of said wheel, a radially extending circumferentially continuous baffle carried by the outer surface of said wall intermediate said plates and receiving said tubes alternately above and below the same, a plurality of compressor blades circumferentially arranged immediately outwardly of said baffle and extending between said plates, said blades each being radially outwardly inclined away from the direction of rotation of said wheel, the outermost ends of said tubes being received between adjacent blades and being inclined in substantially parallel relation therewith, and a plurality of overlapping exhaust flute elements circumferentially carried between said plates near the outer perimeter of said wheel in radially spaced relation to said blades to define therebetween a combustion zone, said flute elements defining therebetween a plurality of substantially U-shaped combustion gas expansion passageways the outermost ends of which are exhaust ports

through which gas escapes to impart rotational movement to said wheel.

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