J. O. HEINZE.

TURBINE.

APPLICATION FILED NOV. 4, 1916.

1,316,234.

Patented Sept. 16, 1919.

2 SHEETS—SHEET 1.

Fig. 2.

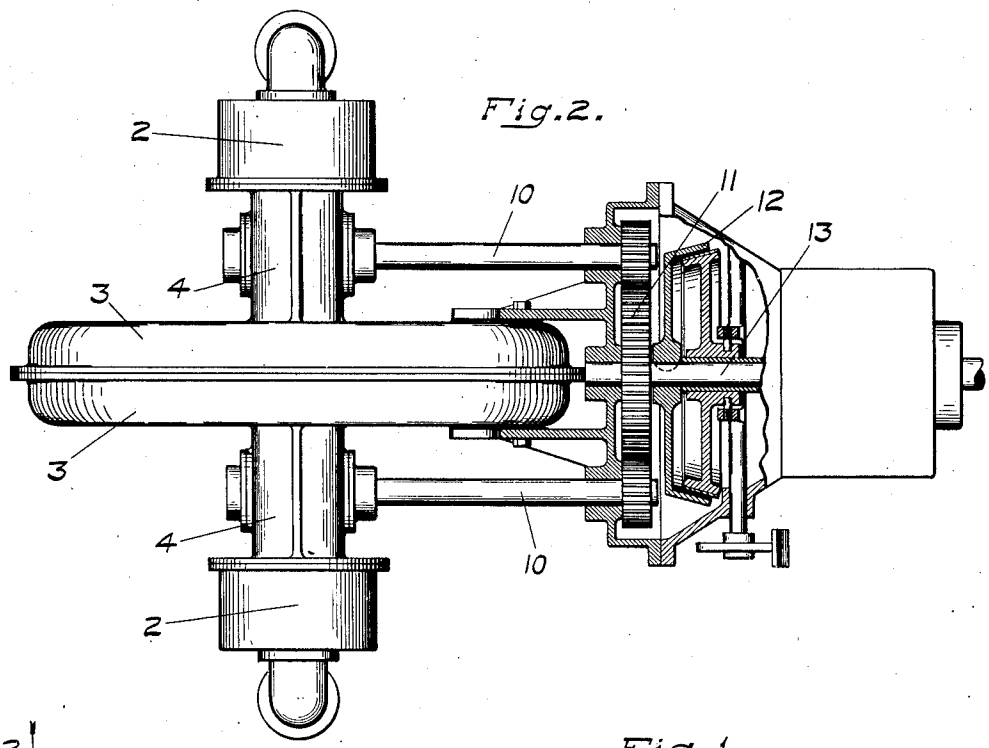
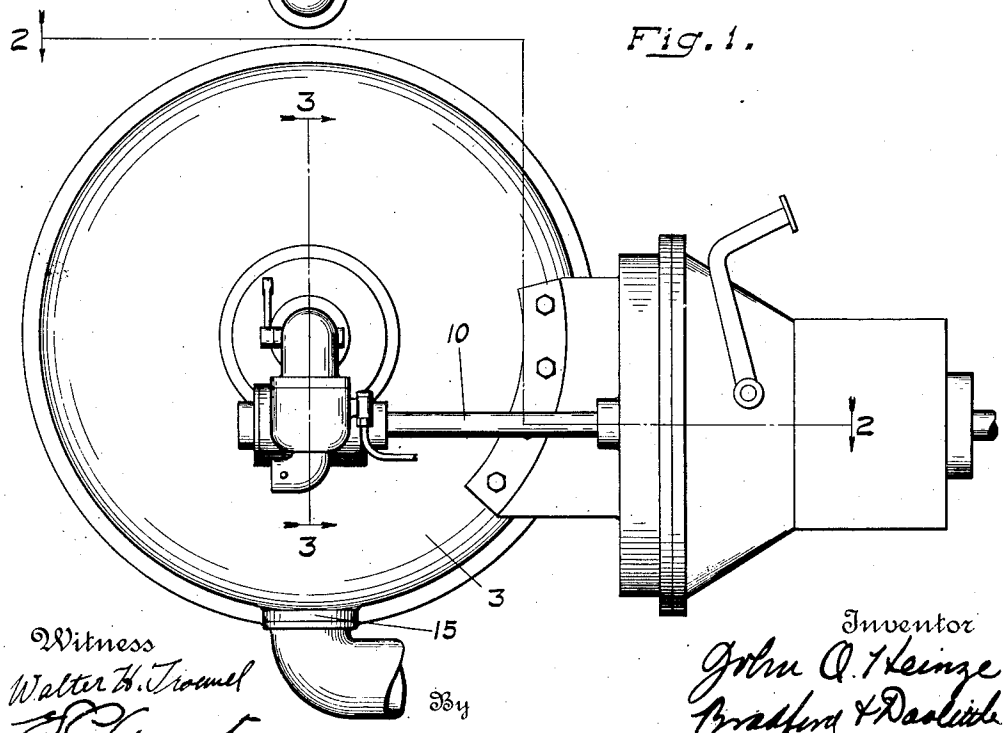


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

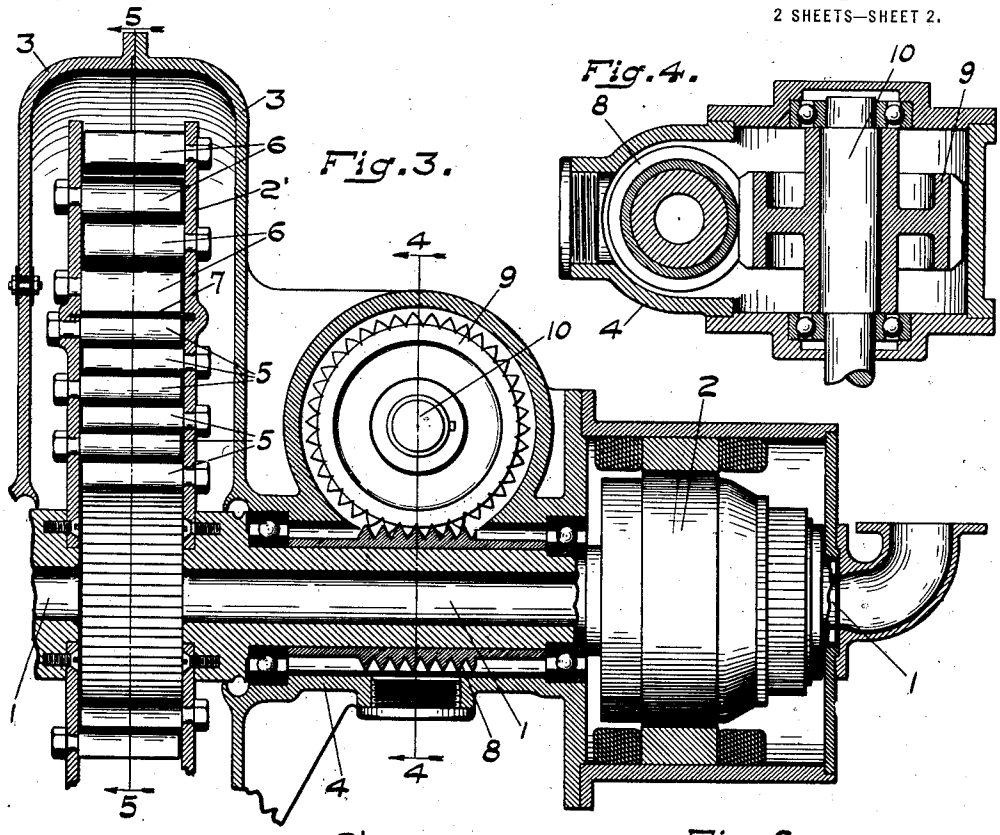


Fig. 4.

Fig. 5.

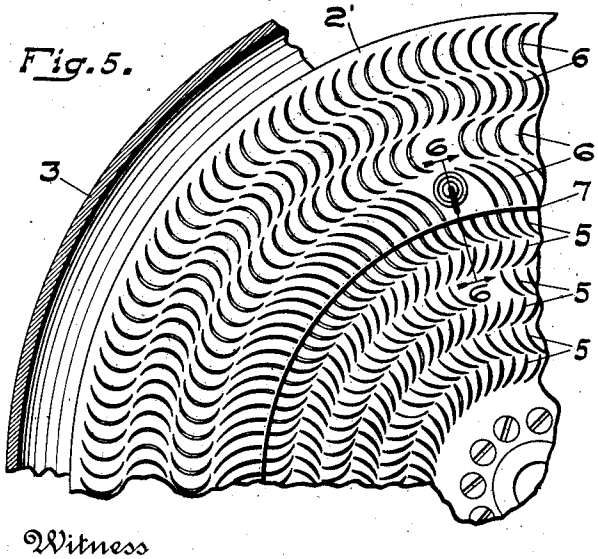
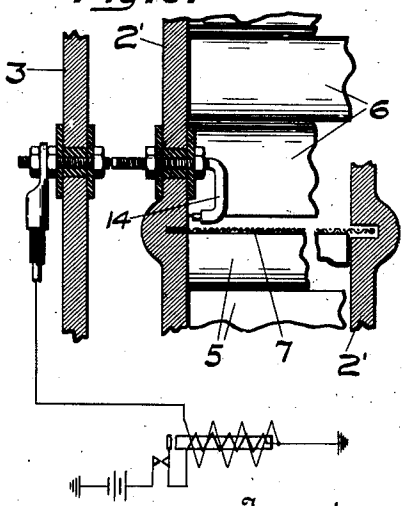


Fig. 6.



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TURBINE.

1,316,234. Specification of Letters Patent. Patented Sept. 16, 1919.

Application filed November 4, 1916. Serial No. 129,541.

To all whom it may concern:

Be it known that I, JOHN O. HEINZE, a citizen of the United States, residing at Springfield, Clark county, and State of Ohio, have invented and discovered certain new and useful Improvements in Turbine Construction, of which the following is a specification.

My said invention relates to turbines and consists in the combinations and arrangements of elements hereinafter described and particularly set forth in the accompanying claims.

The invention has for its purpose to provide a turbine of the opposed or oppositely-moving-rotor type wherein both elements thereof are provided with independent starting motors that are also operable as separate generators with the rotors working as their respective prime movers.

Another object of the invention resides in constructing and disposing the vanes of the rotors to provide a central fuel suction or charge forming chamber and a surrounding explosive or energy utilizing chamber to the end of obtaining a perfectly balanced and easy running motor, and one wherein all strains and wearing are symmetrically distributed to the working parts.

A further feature of advantage in the construction lies in the novel arrangement of transmission gearing by which the power derived from both rotors is connected to operate the driven shaft in a manner that derives the maximum efficacy from the engine.

With these objects in view, my invention is embodied in preferable form in the construction and arrangement hereinafter described and illustrated in the accompanying drawings. In these drawings, Figure 1 is a side view in elevation of the turbine; Fig. 2, a central section on the line 2—2 of Fig. 1; Fig. 3, a section on the line 3—3 of Fig. 1; Fig. 4, a section through the driving mechanism on the line 4—4 of Fig. 3; Fig. 5, a section on the line 5—5 of Fig. 3; and Fig. 6, a section on line 6—6 of Fig. 5.

Referring to the drawings, 1—1 indicate hollow shafts each adapted to connect at its outer end with a suitable source of fluid such as steam, or to a carbureter or other means for supplying a combustible mixture of air and liquid hydrocarbon. On each of these hollow shafts adjacent the outer end thereof is mounted an electric motor 2 which is supplied with current from any suitable source and which is adapted to serve as a starting means for the shafts and the rotor members carried thereby, and which are also adapted to serve as generators to recharge a battery supplying current for an ignition circuit or other purpose. On the inner end of each shaft is mounted a disk 2′ constituting a rotor member. These disks are mounted with their faces adjacent and opposing one another and they form a circular casing which is fluid tight axially and open at its periphery. They are inclosed within a cover 3 which is fixed to the shaft casing 4. The disks are adapted to be driven in opposite directions both by the starting motors and the fluid medium of the engine.

Extending axially and inwardly from the face of each disk is a series of suction and compression blades 5 which blades have a form substantially the same as that of the well known "Sirocco" pressure fan elements and the curve of their cross sections and the angle of their connection to the face of the blades are such that they will act to draw in the gaseous fluid from the hollow shaft conduits and compress the same within the supply chamber in the inner portion of the casing. The corresponding and interacting compression blades of the two oppositely rotating disks are disposed with their faces in opposite positions in order to correspond with the directions of rotation of said disks. Each disk is provided with a number of concentric series or steps of these blades and in the drawings, each disk is shown as having three of such stepped sets but a greater or less number may be provided, if desired. The concentric sets of the respective blades are arranged alternately and with the blades of corresponding sets of each disk adapted to overlap those of the other as shown in Fig. 3. These sets of compression blades occupy only the inner portion of the face of each disk.

On the remaining outer concentric circular area of the face of each rotor disk is mounted a series of interactive pressure receiving or pressure imparting elements consisting of propeller turbine blades 6 which in the particular embodiment illustrated in the drawings are preferably of the form of

blades employed in the well known Parsons turbine. Each disk is provided with several concentric series of these propeller blades and the respective blades of the two disks are curved oppositely to accord with the directions of rotation of said disks. These propeller blades are also adapted to overlap, with the blades of the respective steps projecting alternately from the two disks.

Between the blades of the inner series which constitute the gas feeding and compression members and the outer series which constitute the propeller members is mounted a wire guard screen 7 which is adapted to prevent a back flame from the space occupied by the propeller blades of the disks. This screen thus divides the casing formed by the two fluid-tight disks into an outer combustion chamber and an inner supply chamber.

The blades of the two adjacent concentric rows of the compressor elements and propeller have the tangents of their curves flattened more than the other elements, whereby an easy and comparatively direct feed of the gas is effected, from the supply chamber to the combustion chamber.

Carried by each hollow shaft 1 is a driving screw 8 adapted to engage a worm 9 carried at the upper end of a connecting shaft 10, each carrying a driving gear 11 carried by a fly wheel or clutch 12 mounted on a shaft 13 which connects with the object to be driven. A spark plug 14 provides the initial ignition for the combustible gaseous mixture in the combustion chamber. After the turbine has become started, continuous combustion is maintained by the flame of the gases. In the periphery of the casing is an exhaust opening 15 through which the spent fluid escapes.

In the operation of the particular embodiment of the invention herein described and illustrated, each rotor-carrying shaft 1 is started by its individual electric motor 2, by throwing on switches controlling the circuit through said motors and a battery, and thereupon the two rotors will be driven in opposite directions, and as they rotate, the opposite compression and suction elements 5 on the two members will draw a combustible gaseous mixture through the hollow shafts into the common inlet chamber and the casing. In the use of a combustible gaseous mixture it is necessary that the gas entering the combustion chamber have a pressure greater than that within the combustion chamber in order to enable the gas to be forced into the latter. This effect is accomplished by the form of the blades 5 and the co-action of the blades of the opposing disks as distinguished from the straight blades of an ordinary fan which merely produce suction and blowing effects. Such compression is increased to a sufficiently effective degree by the provision of several series of such blades. Of course, a suction will be induced through the conduits 1 on the source of supply by the centrifugal action of the elements 5 and hence these blades may also be properly characterized as suction means. The gaseous fluid is carried outwardly toward the periphery of the device and forced through the wire guard screen 7 into the combustion chamber, where it is ignited initially by the spark of the plug, and then continuously thereafter by the flame in the combustion chamber. As the gas expands it exerts an equal active and reactive pressure against each pair of overlapping blades carried by the respective rotors, and as both rotors are freely movable both are rotated by such expansive pressure, and the shafts 1 are thereby driven.

As the gas passes from such median line toward the periphery, its pressure will gradually decrease, but the area of the contact surface of the propeller elements will increase owing to the greater-diameters of the outer circles of blades. The exhaust passes out through the peripheral opening 15. The oppositely rotating disks turn the shafts 1 in opposite directions and in turn they drive the worms which connect with and drive the common driven shaft 13.

The principal feature of my invention lies in making the co-acting propeller blades which sustain the pressure of the fluid or impart pressure thereto, rotatable in opposite directions, as distinguished from those turbines in which one element is movable and the other fixed. This arrangement provides two interacting rotors as compared with a rotor and a stator and utilizes the velocity of the expanding gases in both directions. This feature is of advantage in connection with either motor or pumping devices and with constructions employing steam, air, a combustible gaseous mixture or water as the fluid medium.

Another function of the oppositely rotating rotors is to enable the neutralization of the effect of gyroscopic action on a vehicle or object on which the engine may be mounted which is a point of special importance in the utilization of the engine on aeroplanes.

It is clear that the principle of oppositely rotating blade elements may be embodied in a construction in which other forms of rotor members than disks are employed, as for instance, rotors of the character now used in turbine construction.

The compression and suction producing means is another element not dependent upon the particular form thereof herein described or upon its coöperation with the other features of the invention. This element dispenses with the necessity of using

separate forcing or compressing means for the gas or air, and also by the mounting of said elements on the same rotating supports as the propeller elements a convenient and effective mode of insuring automatically the proper relation between supply and demand of gas is provided. That is, a continuous combustion turbine engine having self-feeding and self-compressing functions is provided.

Another feature of importance which is equally useful with either the compression-suction blades or the propeller blades is the disk form of the rotors.

These disks constitute a gas tight casing, forming a compression-supply chamber and a combustion chamber, between which disks the fluid medium is admitted and in which casing compression and expansion take place. They also provide a common rotating support for the compressor and power generating elements and hence advantageous means for driving both elements at the same speed and obtaining the proper proportion between the gas supplied and the gas combusted. They also enable such distribution of the fluid medium radially from the center of the engine and throughout all radii of the disks, thus obtaining a simultaneous distribution of the fluid medium to all the power elements adjacent the compression elements, and with such distribution from admission points which rotate with the compression elements obtaining a continuous free flow of the fluid.

These disks also coöperate with the hollow conduit shafts in obtaining an axial feed of the fluid.

The hollow shafts perform the functions of driven members adapted to have external power applied thereto for starting purposes or to drive the turbine as a blower or pump, as driving members and as axial free conduits. They also form mixing chambers for the combustible vapor and air when such a mixture is used and the rotary action of the compressor members increases the thoroughness of the mixing.

Since the hollow shafts lead from independent sources of supply to a common delivery point, and are axially opposed, they also serve as effective means to enable the use and the mixing of two fluids of different character, as for instance, air and liquid hydrocarbon vapor, either that of gasolene or kerosene, or the diverse feeding of these two vapors. The two currents of fluid are directly opposed and thus meet and mix with considerable force.

Having thus described my said invention, what I claim is:

1. In a turbine engine the combination of a casing, a hollow shaft journaled in the casing, a rotor mounted on said shaft and operable in the casing, said rotor receiving the fluid medium by radial flow from said hollow shaft, and a screen mounted on the rotor and separating the rotor into concentric areas for receiving and expending the fluid operating medium, substantially as set forth.

2. In an internal combustion engine the combination of a casing, axially opposed and hollow shafts journaled in the casing, co-acting and oppositely working rotors mounted on the adjacent ends of said shafts and operable in the casing, said rotors receiving therebetween the combustible charges by radial flow from said shafts respectively, a screen located between the rotors and separating the rotors into concentric areas for receiving and expending the combustible charges, substantially as set forth.

3. In a turbine engine the combination of a casing having shaft journal bearings opposed hollow shafts journaled in said bearings and communicating at their outer ends with a supply of gas and at their inner ends with the engine, opposing disks carried by said shafts, suction and compression blades carried by said disks, and pressure blades also carried by said disks.

4. In a turbine engine the combination of a pair of opposed suitably mounted hollow shafts, opposing disks carried by said shafts, suction and compression blades carried by said disks adjacent the axis thereof, pressure blades carried by said disks adjacent the periphery thereof and a screen disposed between the suction and compression, and pressure blades in and for the purpose described.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Marion county, Indiana this 29th day of September, A. D. nineteen hundred and sixteen.

JOHN OTTO HEINZE. [L. S.]

Witnesses:
H. P. DOOLITTLE,
A. C. RICE.