Oct. 9, 1945. A. ORLOFF 2,386,497

GASOLINE TURBINE

Filed Dec. 18, 1942 2 Sheets-Sheet 1

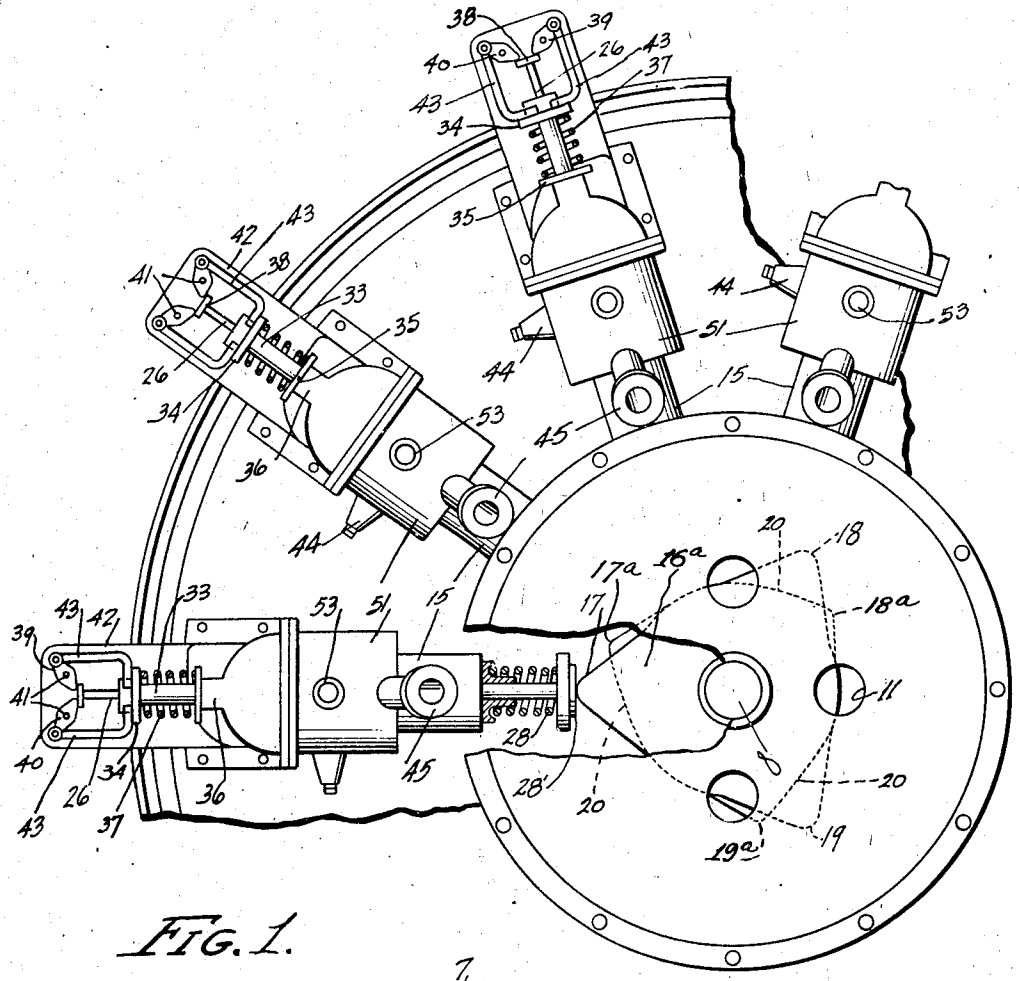


FIG. 1.

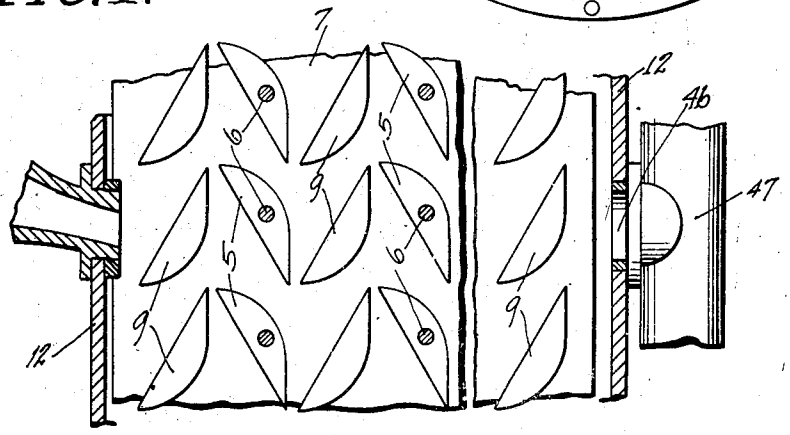


FIG. 2.

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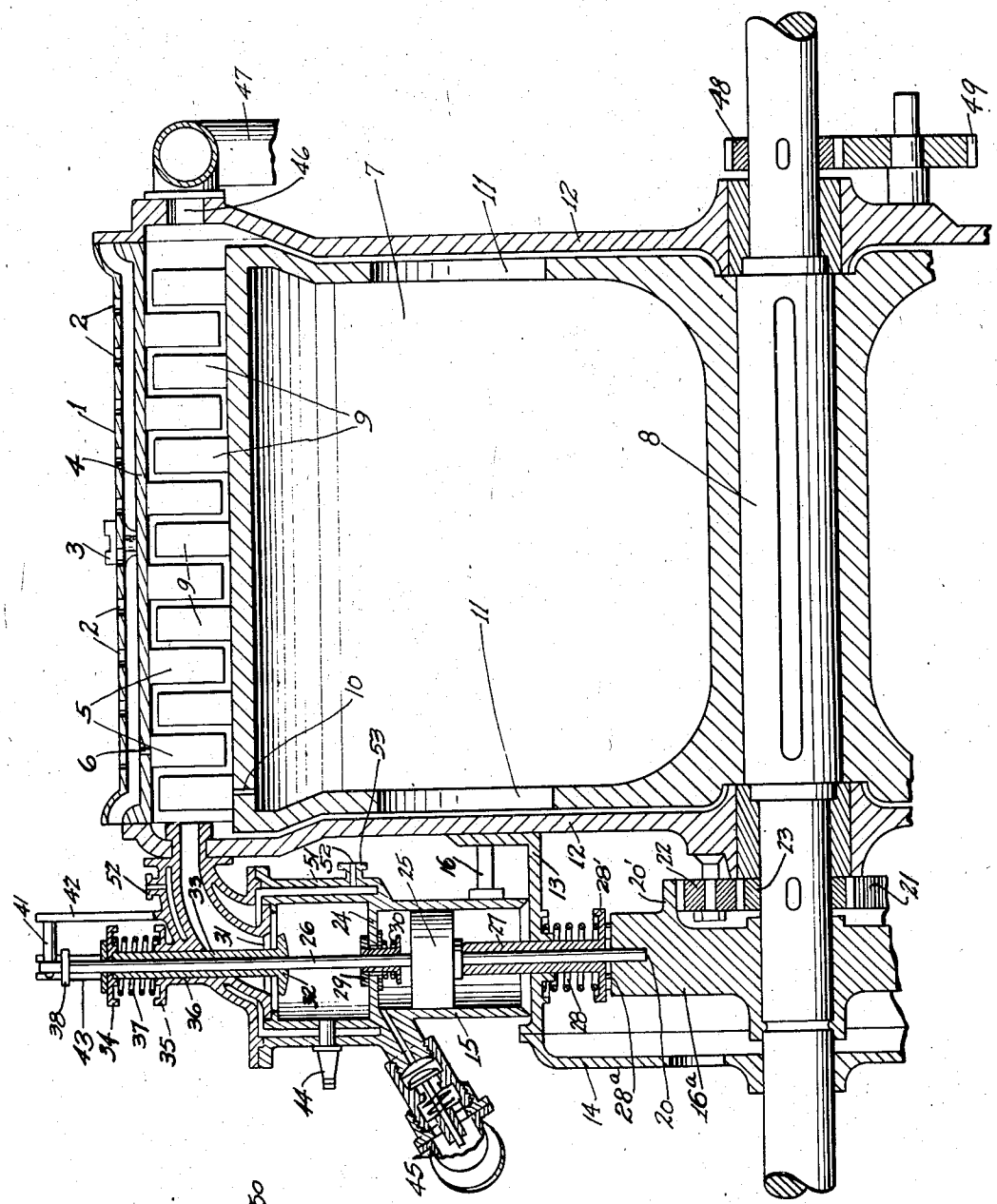


FIG. 3.

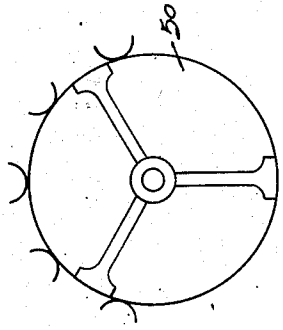


FIG. 4.

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GASOLINE TURBINE

Angel Orloff, Chicago, Ill.

Application December 18, 1942, Serial No. 469,747

3 Claims. (Cl. 60—41)

This invention relates to improvements in internal combustion engines and more particularly to gasoline turbines for use in aeroplanes, tanks, etc. One object is to provide a gasoline turbine that is economical in the use of fuel. A further object is to provide a gasoline turbine that is capable of great power and speed and that, at the same time, is of comparatively light weight. A still further object is to provide a gasoline turbine wherein the moving parts are readily accessible so that adjustments, repairs and replacements are readily made.

With the foregoing and other objects in view the invention consists in the combination and arrangement of parts to be hereinafter fully described, pointed out in the claims and illustrated in the accompanying drawings which form a part of this patent and in which:

Fig. 1 is a fragmentary view in side elevation of a turbine constructed according to the present invention.

Fig. 2 is an enlarged fragmentary horizontal cross sectional view, through Fig. 3, taken immediately above the exhaust manifold, the stator wall being omitted.

Fig. 3 is a central vertical sectional view through Fig. 1 at right angles thereto, and,

Fig. 4 is a plan view of a conventional type of timer that may be employed.

Like reference characters denote corresponding parts throughout the several views.

The invention comprises a rotor arranged within a stator, each of said members being provided with segmental members or deflectors arranged in rows, spaced apart, so that the rows of segments carried by the rotor may pass between the rows secured to the stator.

The rotor is keyed to the drive shaft that is gear-connected to a triangular cam that actuates the pistons in the cylinders that draw into the latter the fuel mixture through the intake valves, connected with the carburetor, said pistons upon their return strokes compressing the mixture which is then exploded and discharged through the exhaust valves against the said rows of deflectors, thus driving the rotor, the exhaust gases passing into the atmosphere from an exhaust manifold.

The reference numeral 1 denotes the motor block or casing formed with a plurality of perforations 2 to permit air circulation for cooling and within said casing and secured thereto by bolts 3 is the stator 4. To the inner periphery of the stator and arranged in rows that extend transversely thereof are the segmental deflectors 5, spaced apart, and secured by pins 6 to the stator, said deflectors extending inwardly almost to the periphery of the rotor 7 which is keyed to the drive shaft 8. Extending transversely of the outer periphery of the rotor and arranged in rows are the deflectors 9 secured thereto by pins 10, the deflectors of each row being spaced apart to permit clearance therebetween for the deflectors 5, the deflectors of the several rows carried by the stator are pitched at the same angle and those of the rotor at a common angle, a row of deflectors of the stator being pitched substantially at an angle of forty-five degrees to those of the rotor, although any one deflector is capable of manual adjustment when necessary or desirable to provide such adjustment as to give the most power. All deflectors 9 are set alike or at a common angle and manual adjustment of the same is made by first loosening the several bolts with a wrench inserted through one of the perforations 11 and then manually making the adjustments. This adjustment is made after the stator 4 is removed affording access to the deflectors. The rotor is preferably of sectional construction and perforations 11 in its ends are provided to facilitate access to the interior. When the rotor is of sectional construction this adjustment can be made by merely separating the rotor sections.

Secured to one wall 12 of the casing is the cam casing 13 provided with the removable face plate 14 and arranged about the periphery of said cam casing are the cylinders 15 secured to the wall 12 by the braces 16. As the several cylinders are identical in construction and assembly but one will be described.

Within the cam casing and loose upon the shaft 8, but keyed against longitudinal movement, is the cam 16a substantially triangular and formed with peaks or points 17, 18 and 19 about its periphery for engagement by the piston rods, and with auxiliary peaks 17a, 18a and 19a for engagement by the push rods, thus providing six peaks or points, the peaks and auxiliary peaks being spaced equidistant from each other respectively about the cam periphery, the auxiliary peaks being separated from each other by cam grooves 20, this construction being disclosed in Fig. 1 in connection with Fig. 3. The cam is formed further with the interiorly recessed portion 20' having the internal teeth 21 in mesh with the gears 22, preferably three in number, that are shaft-supported by the wall 12 and in mesh with the gear 23 fast upon the shaft 8.

The cylinder 15 is divided interiorly by the partition 24 into compression-explosion and intake

chambers and in the latter is located the piston 25 fast upon the piston rod 27 that extends from cylinder 15 into the casing 13 and rests upon the cam, the lower end of said piston rod being flared and flanged to form the cap 28' to receive one end of the spring 28 that encompasses the piston rod and abuts the inner periphery of the cam casing to yieldingly retain the flared end of the piston rod the maximum distance therefrom. The lower end of a push rod 26 extends beyond the end of the piston rod and engages the said cam grooves 20 and passes over the auxiliary peaks 17a, 18a and 19a. The push rod 26 opens the exhaust valve 32 and extends through the check valve 29, piston 25 and through piston rod 27 to the cam. Beyond the piston in an outer direction the push rod extends through the partition 24, through check valve 29 therein provided with a seating spring 30, said valve being opened by the gases compressed thereagainst by the piston 25. Fast upon the push rod and adapted to open and close the port 31 in the explosion chamber is the exhaust valve 32, the stem 33 thereof extending out through the cylinder and having a flanged cap 34 secured to its outer end.

A head 35 formed upon an extension 36 of the cylinder and spaced from the head 34 cooperates therewith to confine the spring 37 that serves yieldingly to separate said cap and head the maximum distance apart, said spring encompassing the upper end of said valve stem and normally keeping the exhaust valve closed. The push rod 26 extends beyond the valve stem and through the cap 34 and at its extremity carries a flat disc 38 upon which rests the adjacent ends of the links 39, 40, each of which is pivotally connected at its longitudinal central portion by a pin 41 to a standard 42 secured to the cylinder, the remote ends of said links being pivotally connected to the ends of the U-shaped arm 43 that seats upon the said cap 34. The upper end of the cylinder above the port 31 in the explosion chamber is curved toward and tapped into the space between the stator and rotor in line with the deflectors. The explosion chamber is provided with a spark plug 44 and the intake chamber with the intake valve 45 that is connected to and receives the fuel mixture from the carburetor, not shown. Normally the spring within the intake valve 45, as shown in Fig. 3, retains the valve in retracted closed position closing the valve port to the intake chamber but when suction is induced by the movement of the piston 25 from topmost position, the return stroke, the valve is moved to open position to permit passage of the fuel thereabout and into said chamber. When this return stroke is completed and as the working stroke begins the intake valve 45 is closed again.

In each line with each row of deflectors of the stator and remote from the cylinder for that row is an exhaust port 4C formed in the casing that registers with a port in the exhaust manifold 47. A gear 48 keyed to the shaft 8 is in mesh with a gear 49 secured to the casing for driving connection with the timer 50. The cylinders are all provided with water jackets 51 fed through intake port 52 connected to the radiator and in each jacket a plug 53 is provided which, in the event of the water freezing, would be blown out and so prevent damage to the jacket. In operation the push rod travels over the cam as previously set forth while the piston rod, which is recessed parallel with the cam on its tread surface, rides over the peaks 17, 18, 19 and due to its recess 27b clears the auxiliary peaks 17a, 18a, 19a.

When the push rod engages one end of a groove 20 it moves upwardly in the cylinder thus tilting links 39, 40 and depressing arm 43 which opens the exhaust valve. The piston has just completed its down stroke and has drawn in the fuel mixture from the intake valve 45, reference is here made to the piston shown at Y in Fig. 1. The piston now moves upwardly in the cylinder and forces the mixture through valve 29 into the explosion chamber and compresses it. Just after the end of the upward stroke the explosion takes place, the exhaust valve has just been opened by the push rod and connections and the force of the explosion is directed against the deflectors 5, 9. From the first deflector of the rotor the force of the explosion is sent against a deflector of the stator and from that back to the next deflector of the rotor until the entire space between the stator and rotor has been traversed, the exhaust gases then passing out through the exhaust port 46 and manifold 47. The force of the explosion against the deflectors of the rotor has caused them to actuate the rotor and shaft 8 and this movement has actuated the cam which actuates the pistons and push rods in the manner described and this movement carried on continuously constitutes the operation of the turbine.

In the present form of the turbine there are preferably ten cylinders arranged in a circle about the shaft 8 as a center, the pistons being spaced equidistant from each other although less than ten cylinders are here shown. The peaks 17, 18 and 19 being of larger diameter than the auxiliary peaks 17a, 18a, 19a are engaged by spaced bosses 28a upon the tread surface of a piston, while the auxiliary peaks of small diameter pass freely between said bosses and are engaged only by the push rods.

As there are ten cylinders equidistant from each other they are thirty-six degrees apart. The three peaks and auxiliary peaks are one hundred twenty degrees apart and while three cylinders are engaged at one time by the cam peaks the outward strokes of the pistons of these cylinders start at different times but almost simultaneously due to the size or diameter of the piston ends relative to the peak points.

The path of each piston rod and its associated push rod about the cam periphery is such as to cause orderly and proper intake, compression, explosion and exhaust of the gases in the related cylinder.

What is claimed is:

1. In a gasoline turbine including a stator, a rotor and a drive shaft keyed to said rotor; a cam keyed upon said drive shaft, gear connection between said cam and drive shaft, cylinders arranged peripherally of said cam, pistons in said cylinders, peaks upon said cam, auxiliary peaks upon said cam, said cam being grooved between said auxiliary peaks, piston rods connecting said pistons and said cam and riding over said peaks, push rods extending through said pistons and piston rods and travelling over said auxiliary peaks and through said cam grooves, deflectors carried by said rotor and stator, exhaust valves for said cylinders in line with said deflectors, and operative connection between said push rods and exhaust valves.

2. In a gasoline turbine including a stator and a rotor having a drive shaft; a grooved cam connected to said drive shaft, cylinders arranged peripherally of said cam, pistons in said cylinders, peaks upon said cam, auxiliary peaks upon said cam, exhaust valves for said cylinders, actuating

means for said exhaust valves connecting same and said cam, piston rods connecting said pistons and cam and riding over said peaks, said actuating means including push rods extending through said pistons and piston rods for engagement with said auxiliary peaks and cam grooves, and deflectors for said stator and rotor in line with said exhaust valves.

3. In a gasoline turbine including a stator, a rotor, and a drive shaft keyed to said rotor; a grooved cam upon said drive shaft, gear connection between said cam and drive shaft, cylinders arranged peripherally of said cam, pistons in said cylinders, peaks spaced equidistant from each other peripherally of said cam, auxiliary peaks upon said cam in predetermined positions relative to said first named peaks, exhaust valves for said cylinders, actuating means for said exhaust valves connecting same and said cam, piston rods connecting said pistons and cam, bosses upon said piston rods riding said peaks and clearing said auxiliary peaks, said actuating means including push rods extending freely through said pistons and piston rods for engagement successively with said auxiliary peaks and grooves, and deflectors for said stator and rotor in line with said exhaust valves.

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