D. F. LAWRENCE.

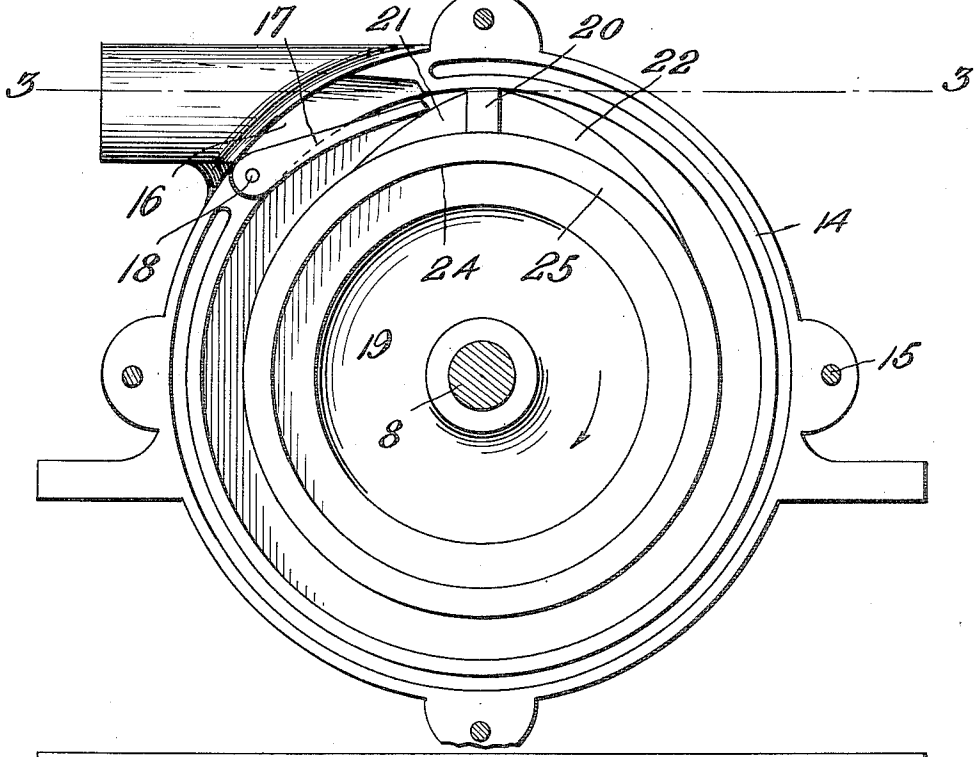
MOTOR.

APPLICATION FILED NOV. 10, 1909.

971,854. Patented Oct. 4, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



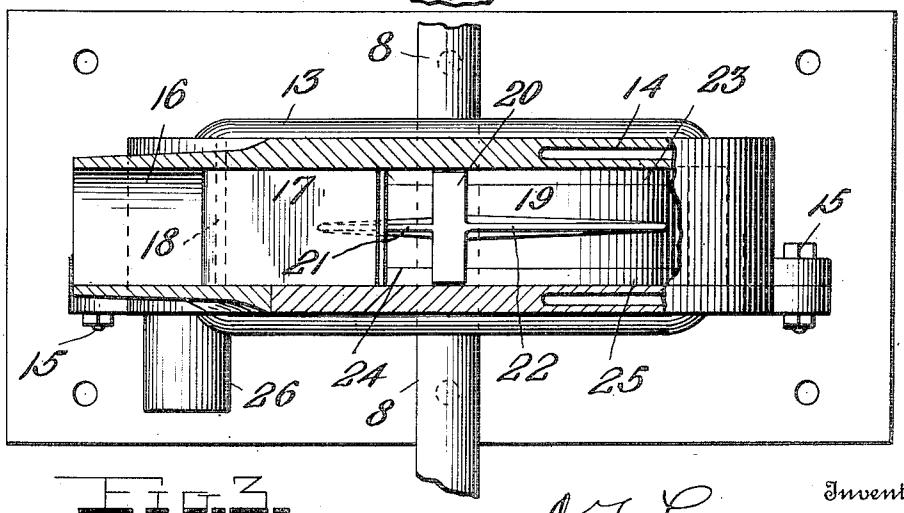


Fig. 3.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

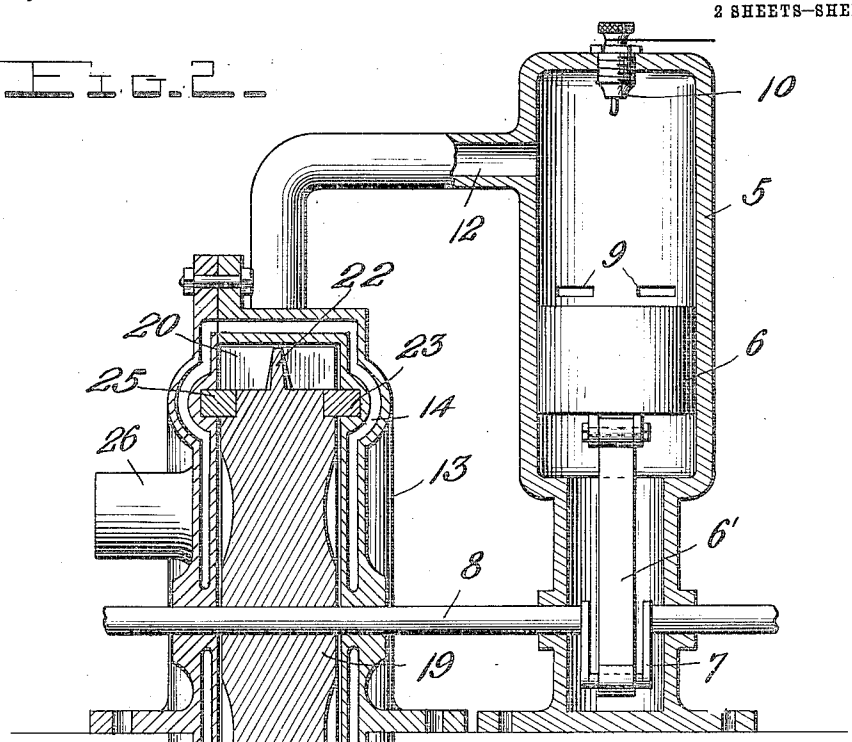
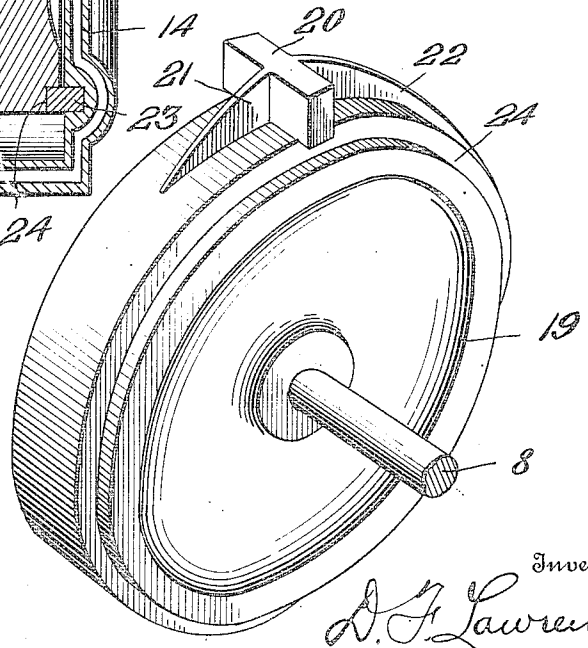


Fig. 4.



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MOTOR.

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Application filed November 10, 1909. Serial No. 527,278.

To all whom it may concern:

Be it known that I, DANIEL F. LAWRENCE, a citizen of the United States, residing at Brandon, in the county of Rutland and State of Vermont, have invented certain new and useful Improvements in Motors, of which the following is a specification, reference being had to the accompanying drawings.

This invention has relation to certain new and useful improvements in rotary motors and more particularly to a device of this character which is adapted to be employed in combination with an internal combustion engine to provide a muffler therefor and materially increase its power with the use of a minimum supply of the actuating fluid.

Another object resides in the provision of the rotor disposed within water jacketed casing, said rotor being of smaller diameter than the casing and carrying one or more radially extending vanes engaging with the inner wall thereof, said vane or vanes being adapted to automatically close the valve plate which is opened by the impact of the actuating fluid, said plate bearing upon the periphery of the rotor and directing the flow of the fluid against the vane.

A further object is to provide a motor of the above type which is adapted to be operated by the exhaust of an internal combustion engine and to impart its power to the crank shaft of said engine to reciprocate the engine piston.

With these and other objects in view, the invention consists of the novel features of construction and the combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a motor illustrating one embodiment of my invention, the front of the casing being removed; Fig. 2 is a vertical section through the motor and the reciprocating internal combustion engine; Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1; and Fig. 4 is a detail perspective view of the rotor.

Referring to the drawings 5 indicates the cylinder of an explosive gas engine, and 6 the piston which is adapted to be vertically reciprocated therein. The piston stem 6′ is connected at its lower end to the crank 7 of a power shaft 8. The cylinder wall is provided with suitable inlet ports 9 through which the gas is admitted for compression therein. In the head of the cylinder 5 a suitable spark plug 10 is disposed and is connected and operated by a carbureter not shown. An exhaust pipe 12 communicates with the upper end of the cylinder and is adapted to exhaust the exploded gases into the rotor casing of my improved motor, as will now be set forth.

My improved rotary motor which is best shown in Fig. 1 comprises a cylindrical casing 13 formed with the water jacket 14, one side of the casing being detachable, and secured to the body thereof by means of suitable fastening bolts 15 which extend through lugs or ears formed on the casing sections. The casing 13 is formed with an inlet port 16 with which the exhaust pipe 12 of the engine communicates. Pivoted in this port at its point of entrance into the interior of the casing, there is a valve plate 17. It will be noted that the under surface of this plate is concaved and forms what is practically a continuation of the inner periphery of the casing wall. This valve plate is pivoted on a pin 18 which has its ends engaged with the opposite walls of the casing, and it is normally held closed by frictional engagement therewith. The crank shaft of the engine extends centrally through the casing and has keyed or otherwise rigidly secured thereto a rotor 19. As clearly shown in Fig. 1, this rotor is concentrically arranged with relation to the casing in spaced relation thereto, being of considerably smaller diameter. Extending radially from the periphery of the rotor there is a single wing or vane 20. This vane is supported and strengthened by means of the central webs 21 and 22. It will be noted that the web 21 is of less length than the web 22. The web 22 has a two-fold function in that it not only supports and strengthens the vane 20 but is adapted to automatically lift and close the valve plate 17 with each rotation of the rotor. The edge of this latter web describes a comparatively long arc and as the vane approaches the plate 17, the web engages therewith and owing to its gradually increasing width, securely closes the valve plate while the possibility of injury or disruption of the various parts is avoided. As soon, however, as the vane 20 passes the valve plate, the plate is immediately opened by the impact of the gases thereagainst which have been exhausted through the exhaust pipe 12 of the engine into the inlet port 16. This plate

prevents any movement of the gases rearwardly of the vane or in the opposite direction in which the rotor is moving. Thus the full force of the gases upon the vane will be obtained and the positive operation of the motor thus assured.

In the operation of the device, when the piston 6 is in the position shown in Fig. 2, the gases are being admitted to the engine cylinder from the ports 9. As the piston moves upwardly these gases are compressed in the head of the cylinder and at the proper time are exploded therein. This explosion causes the reverse movement of the piston while the gases are exhausted from the cylinder through the pipe 12 and into the motor casing. The movement of these gases is very rapid and as the valve plate is opened and the gases impinge upon the rotor vane 20, the power derived from the rotor will be imparted to the power shaft to assist in the reciprocation of the piston and thus materially increase the power of the engine. Each time the explosion within the cylinder occurs the piston is driven down below the inlet ports 9 so as to again admit the gases thereto and as the exhausted gases operate upon the rotor vane, the power is utilized in accomplishing the return movement of the piston through the crank 7. It will be understood that at the lowest period of the stroke of the piston the inlet ports 9 are disposed above the bottom of the same, so that no gases may accumulate in the lower portion of the engine cylinder.

In order to obviate the possibility of the gases escaping around either side of the rotor 19, and entering between the same and the sides of the motor casing, I provide suitable packing rings or gaskets 23 which are secured in the circumscribing recesses 24 on the opposite sides of the rotor 19. These packing rings extend beyond the sides of the rotor and into circular grooves 25 in the opposite walls of the casing 13. Thus the entrance of the gases between the rotor and the casing is absolutely prevented and the full power of the gases is obtained, whereby the positive operation of the device is assured. The gases are exhausted from the motor casing through the laterally extending exhaust port 26. This port is located at a point adjacent to the inlet port 16 and below the same, and the gases are not emitted therefrom until their full driving power has been assimilated. As clearly shown in Fig. 2, this exhaust port is preferably formed a part of the removable section of the casing 13, but this is not essential to the practical operation of the device.

From the foregoing it is believed that the practical usefulness and many advantages of my improved rotary motor will be readily understood. While it is particularly adapted for use in connection with explosive gas engines of the vertical reciprocatory type, it will be understood that it may be utilized in connection with various other makes of engines which employ gas as the actuating fluid.

The form of the device illustrated and described sets forth the preferred embodiment of my invention but it will be obvious that the device is susceptible of various minor changes and alterations without departing from the essential features or sacrificing any of the advantages of the invention.

Having thus described the invention what is claimed is:

1. In a rotary motor, the combination with a water jacketed casing, of a power shaft centrally positioned therethrough, a rotor secured upon said shaft within the casing, the periphery of said rotor being disposed in concentric relation to the inner wall of the casing, an inlet port communicating with said casing, a valve plate mounted to oscillate in said inlet port and adapted to form a continuation of the inner wall of the casing when closed, an actuating fluid supply pipe communicating with said inlet port and adapted to discharge the actuating fluid against said plate to open the same, a radially disposed vane carried by said rotor and integrally formed therewith, a web centrally extending from each side of said vane having an arcuate outer edge, the free end of said plate being adapted to engage with the arcuate edges of said webs, said webs varying in extent, whereby the rotation of said rotor will gradually move said plate to close the inlet port and permit of a comparatively quick opening of the same under pressure of the actuating fluid.

2. In a rotary motor, the combination with a casing, of a power shaft centrally positioned therethrough, a rotor secured upon said shaft within the casing, the periphery of the rotor being disposed in spaced relation to the inner wall of said casing, a packing ring seated in a peripheral circumscribing groove in the opposite sides of said rotor, said packing ring projecting into opposed circular grooves in the casing walls, an inlet and outlet port communicating with said casing, a valve plate pivotally mounted at one end in said inlet port, a single vane carried by said rotor, a web integrally formed with said vane and rotor and extending upon opposite sides of the vane, said webs having arcuate outer edges of different lengths whereby the rotation of said rotor and the engagement of the outer edge of one of said vanes with the under side of said valve plate will gradually lift the same and slowly close the inlet port, the pressure of the actuating fluid in said inlet port upon the valve plate engaging the free end of said plate with the arcuate edge of the other of the webs whereby a comparatively quick outward move-

ment of the valve plate and opening of the inlet port is effected.

3. In a rotary motor, the combination with a water jacketed casing, of a power shaft centrally positioned therethrough, a rotor secured upon said shaft and positioned within the casing, packing rings carried by said rotor and disposed in semi-circular grooves in the opposite sides of said casing, said rotor being disposed in spaced concentric relation to the inner wall of said casing, a radially extending vane integrally formed with the rotor, strengthening webs extending from the opposite sides of said vane to the periphery of the rotor, an actuating fluid inlet port, a valve plate pivoted at one end in said inlet port and having a curved surface adapted to form a continuation of the inner wall of the casing when closed, the actuating fluid being adapted to impinge upon said valve plate and open the same, the free end of the plate bearing upon the periphery of the rotor and preventing the backward movement of the fluid, the radially extending vane of the rotor being adapted to receive the impact of the gases to rotate the same.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

DANIEL F. LAWRENCE.

Witnesses:
F. P. COOKE,
E. C. POWERS.