T. C. MAHON AND J. P. BURNES.

INTERNAL COMBUSTION ROTARY ENGINE.

APPLICATION FILED SEPT. 26, 1919.

1,427,692. Patented Aug. 29, 1922.

Fig. 1.

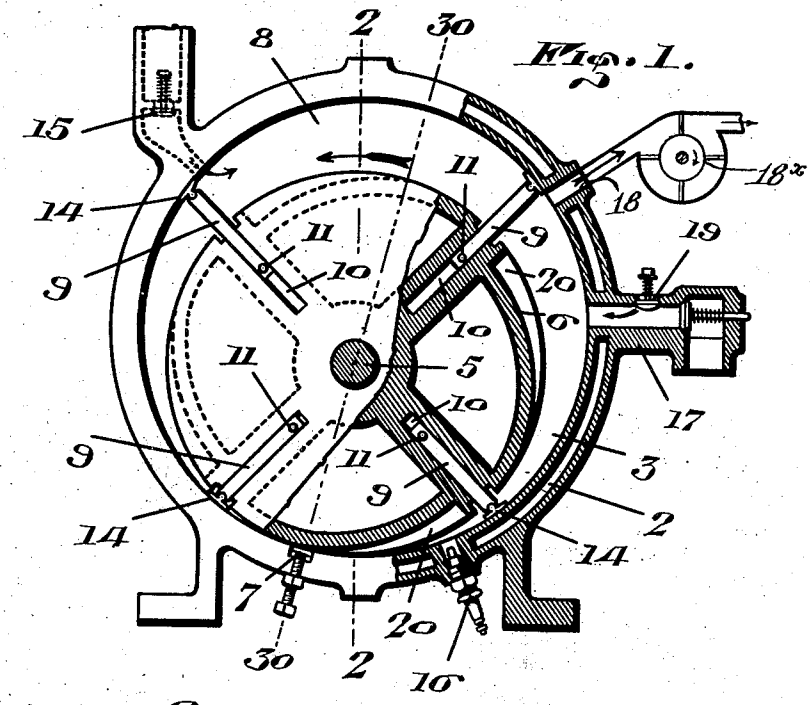


Fig. 2.

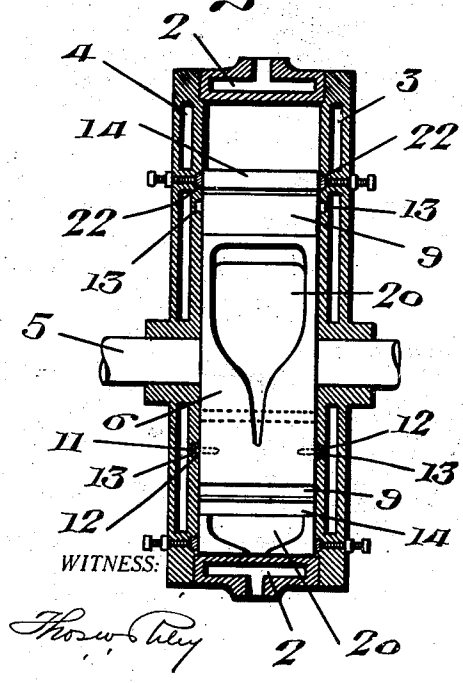
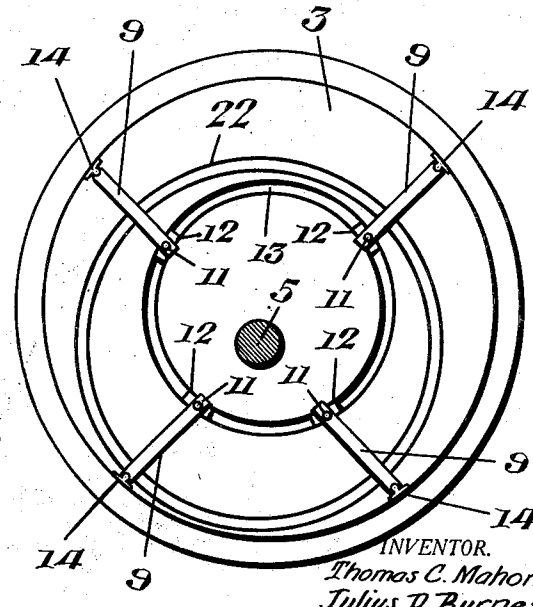


Fig. 3.



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INTERNAL-COMBUSTION ROTARY ENGINE.

1,427,692. Specification of Letters Patent. Patented Aug. 29, 1922.

Application filed September 26, 1919. Serial No. 326,492.

To all whom it may concern:

Be it known that we, THOMAS C. MAHON and JULIUS P. BURNES, citizens of the Dominion of Canada, residing at North Vancouver, in the Province of British Columbia, Canada, have invented certain new and useful Improvements in Internal-Combustion Rotary Engines, of which the following is a specification.

This invention relates to a rotary internal combustion engine of that class wherein a charge of gaseous fuel is indrawn, compressed, ignited, exploded and exhausted within an eccentric space between the bore of the cylinder and a driving head rotatable within it, said head having radial extensible blades against which the explosions act to rotate the head, which vanes sweep the bore of the cylinder and are susceptible of endwise radial movement in relation to the driving head.

The invention is particularly described in the following specification, reference being made to the drawings by which it is accompanied, in which:

Fig. 1 is a side elevation and part section of the cylinder and its driving head with the cover removed.

Fig. 2 is a vertical cross section on the line 2—2 in Fig. 1, the driving head and its vanes being shown in elevation, and

Fig. 3 is a side elevation of the inner side of each end cover with the vanes shown in position radial to the driving head.

In these drawings 2 represents a water-jacketed cylinder having water-jacketed ends 3 and 4. The driving shaft 5 of the engine is eccentrically supported within the cylinder 2 in bearings in the end covers and has concentrically secured on it within the cylinder 2 a cylindrical driving head 6, the periphery of which contacts at 7 with the bore of the cylinder where the cylinder is provided with an adjustable fitting strip which ensures close fit of the driving head at that place. The driving head 6 may thus rotate within the bore of the cylinder 2 and leave an eccentric space 8 between it and the bore.

The driving head 6 is quartered across its whole width with radial slots 10 within which are fitted radial blades 9 which also fit the width of the space between the cylinder ends. The inner ends of these blades 9 have pins 11 projecting from each side to fit into segmental bearing pieces 12 which move around a groove 13 in the inner face of each end cover concentric with the bore of the cylinder.

On the outer end of each blade bearing pieces 14 are knuckle-jointed, so that as the driving head revolves, it retains its position of eccentricity within the cylinder 2 but its blades 9 are moved radially outward and inward in the slots 10 by the segments 12 fitting the concentric ring groove 13 and sweep the eccentric space between the driving head 6 and the bore of the cylinder 2.

Between each pair of vanes 9 a pocket 20 is formed in the periphery of the driving head, which pockets taper in depth from a maximum adjacent the after side of each vane to a position approximately halfway between them.

Located in the wall of the cylinder 2 at such distance from the line of contact at 7, as will afford the desired amount of compression, is an intake port 15 from a carburetter, and located a short distance in advance of the position 7, as will afford the required exposed area of a vane on which to act, is an ignition plug 16. Beyond the ignition 16 in the direction of rotation is the main exhaust outlet 17 and slightly beyond that a supplementary exhaust 18, in which suction is maintained by a fan 18× or the like, by which the residue of the exhaust gases are withdrawn, and a scavenging charge of external air is drawn in through an air valve 19 opening inward to the main exhaust port 17.

In operation, as any one vane 9 of the driving head 6 rotating in the direction of the arrow, uncovers the intake port 15 a charge of explosive mixture is indrawn from the carburetter into the space between the uncovering vane and the next vane following it, and this charge begins to be compressed as soon as the following vane passes the line 30 through the centre of eccentricity, and this compression closes the check valve of the intake.

Compression in the space between these vanes continues until the following vane has passed the position 7, the compressed charge occupying the space within the pocket 20, and when the leading vane has passed the place of ignition 16 to such distance that the after end of the pocket has passed the position 7 and the leading vane has with-

drawn from the driving head 6 and exposed a sufficient area beyond the periphery, the compressed charge is ignited and the force of its explosion acts upon the exposed area of the leading vane to rotate the driving head in the direction indicated. When this leading vane uncovers the main exhaust port 17 the products of combustion pass out through that port and as further movement of the vane uncovers the suction exhaust 18 the residue of the products of combustion are drawn out by the fan suction and an indrawn charge of air through the valve 19 scavenges the space between the vanes.

As the following vane closes the exhaust port 17 it cuts off the fresh air inflow and the suction of the fan through the port 18 produces a partial vacuum in the space between the vanes, which partial vacuum is depended on to draw into that space a fresh charge through the inlet 15 when that port is uncovered by the leading vane.

It will thus be noted that a charge is drawn, compressed, ignited, exhausted and scavenged between each pair of vanes for each revolution, so that a number of explosions is obtained with each revolution of the driving head corresponding to the number of vanes.

A ring 22 is inserted in a groove of each end cover, which grooves are concentric with the bore of the cylinder and the rings are adjustably held up by set screws to the adjacent faces of the driving head, so as to ensure a gas-tight fit of the driving head against the end covers. Similar tight fitting strips may be introduced along the edges of the vanes 9.

Means will be provided for circulating water within the jackets of the cylinder 2 and end covers 3 and 4, and also within the cavities of the driving head 6 in order to keep these parts cool. In the latter case the water is introduced through one end of the driving shaft and withdrawn from the other.

Suitable provision will also be made for lubricating the working parts. The system of water circulation and of lubrication are not material to the subject matter of this application, which concerns the arrangement of the driving head and vanes in relation to the sealing strip 7, the intake 15, ignition 16 and exhaust 17 with the provision for scavenging with fresh air.

From the after end of the pocket 20 to a position adjacent the leading side of the next vane following is a relatively narrow duct through which the residue of compressed gas is passed to the pocket as the following vane approaches the position 7.

We do not desire to be confined to the particular construction as hereinbefore described and illustrated as the same may be modified to meet the requirements of manufacture but claim as our invention and desire to be protected in the features set forth in the following claims:

1. An internal combustion rotary engine having a driving head eccentrically mounted to rotate within a cylinder, which head is provided with vanes radially projecting from it and adapted to sweep the eccentric space between the driving head and the bore of the cylinder, means controlled by the ends of the vanes for controlling the admission of a charge of gaseous fuel and air between each pair of vanes whereby that indrawn charge may be compressed as the vanes approach the smaller dimension of the eccentricity, means for igniting the compressed charge after the leading vane has passed the smaller dimension of the eccentricity, means controlled by the end of each vane for exhausting the products of combustion, means controlled by the ends of the vanes for exhausting the residue of the products of combustion and for admitting a scavenging charge of external air through the space between each pair of vanes, and means for cutting off the inflow of external air whereby a partial vacuum may exist in the space between each pair of vanes as the leading vane of each space approaches the fuel inlet.

2. An internal combustion rotary engine, comprising in combination a cylinder having end covers, a shaft rotatably mounted in the end covers to be eccentric with the bore of the cylinder, a driving head concentric with the shaft, the periphery of which head contacts on one side with the bore of the cylinder and the width of which head conforms to the length of the cylinder between the end covers, said driving head having radial slots across its width within which slots vanes adapted to sweep the eccentric space between the driving head and the bore of the cylinder are endwise movable, means for maintaining the outer ends of the vanes in contact with the bore of the cylinder, an inlet port through which a charge of gaseous fuel and air may be indrawn into the space between each pair of vanes as they approach the line of contact between the driving head and the cylinder bore, means on the other side of such line of contact for igniting the charge so compressed, means for exhausting the products of combustion from the space between each pair of vanes, means for drawing a scavenging charge of air through the space between each pair of vanes after the charge has exhausted, means for cutting off the inflow of the scavenging charge of air and leaving a residual partial vacuum between each pair of vanes.

3. An internal combustion rotary engine, comprising in combination a cylinder having end covers, a shaft rotatably mounted in the end covers to be eccentric with the bore of the cylinder, a driving head concentric

with the shaft, the periphery of which head contacts on one side with the bore of the cylinder and the width of which head conforms to that of the cylinder between the end covers, said driving head having radial slots across its width with pockets formed in its periphery between the slots, vanes endwise movable in the radial slots of the head adapted to sweep the eccentric space between the driving head and the bore of the cylinder, a groove in each end cover concentric with the bore of the cylinder within which groove are ring segments pin-connected to the inner end of each vane, an inlet port through which a charge of gaseous fuel and air is drawn into the space following each vane as that vane passes the port during rotation, said inlet port being located on that side of the eccentric space where the vanes are moving inward, whereby the indrawn charge in advance of each vane is compressed, means located on the other side of the line of contact between the driving head and the bore of the cylinder for igniting the compressed charge whereby a rotary impulse is imparted to the driving head by the pressure of the explosion, a port uncovered by the passage of each vane over it through which the products of combustion will exhaust from the space following each vane, a supplementary port in which a partial vacuum is maintained through which the residue of the products of combustion is withdrawn from the space following each vane as that vane uncovers the port, a valve opening inward for admitting a supply of external air through the main exhaust port for scavenging the space between each pair of vanes which supply of external air is cut off from the space in front of each vane as each vane passes the exhaust port whereby a partial vacuum is attained through the supplementary port in advance of each vane to indraw a charge of gaseous fuel as the inlet is uncovered by the vane in advance.

In testimony whereof we affix our signatures.

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