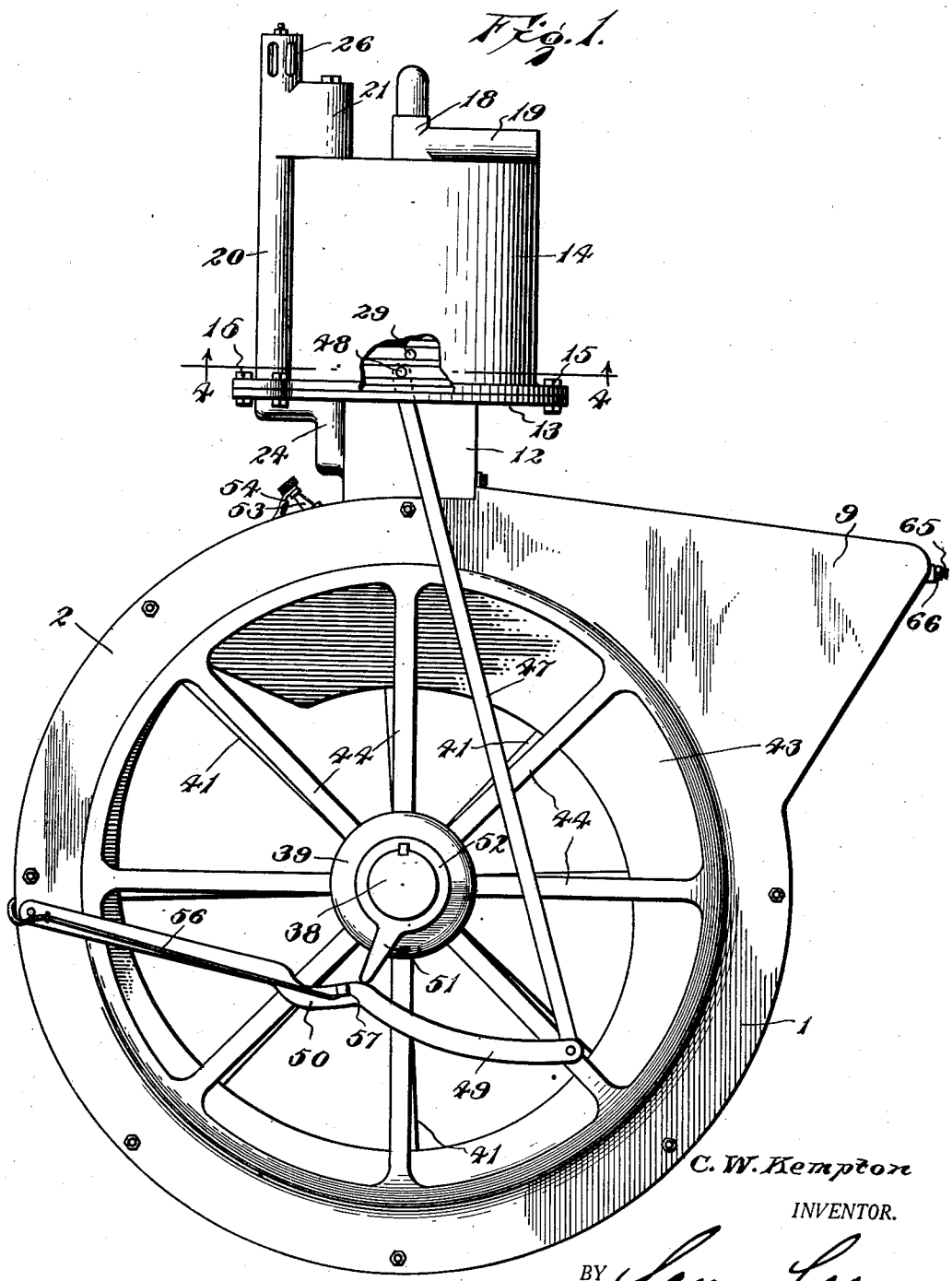
Oct. 28, 1930. C. W. KEMPTON 1,779,547

ROTARY INTERNAL COMBUSTION ENGINE

Filed Aug. 22, 1929 3 Sheets-Sheet 1

Fig. 1.



C. W. Kempton

INVENTOR.

BY Lacey & Lacey,

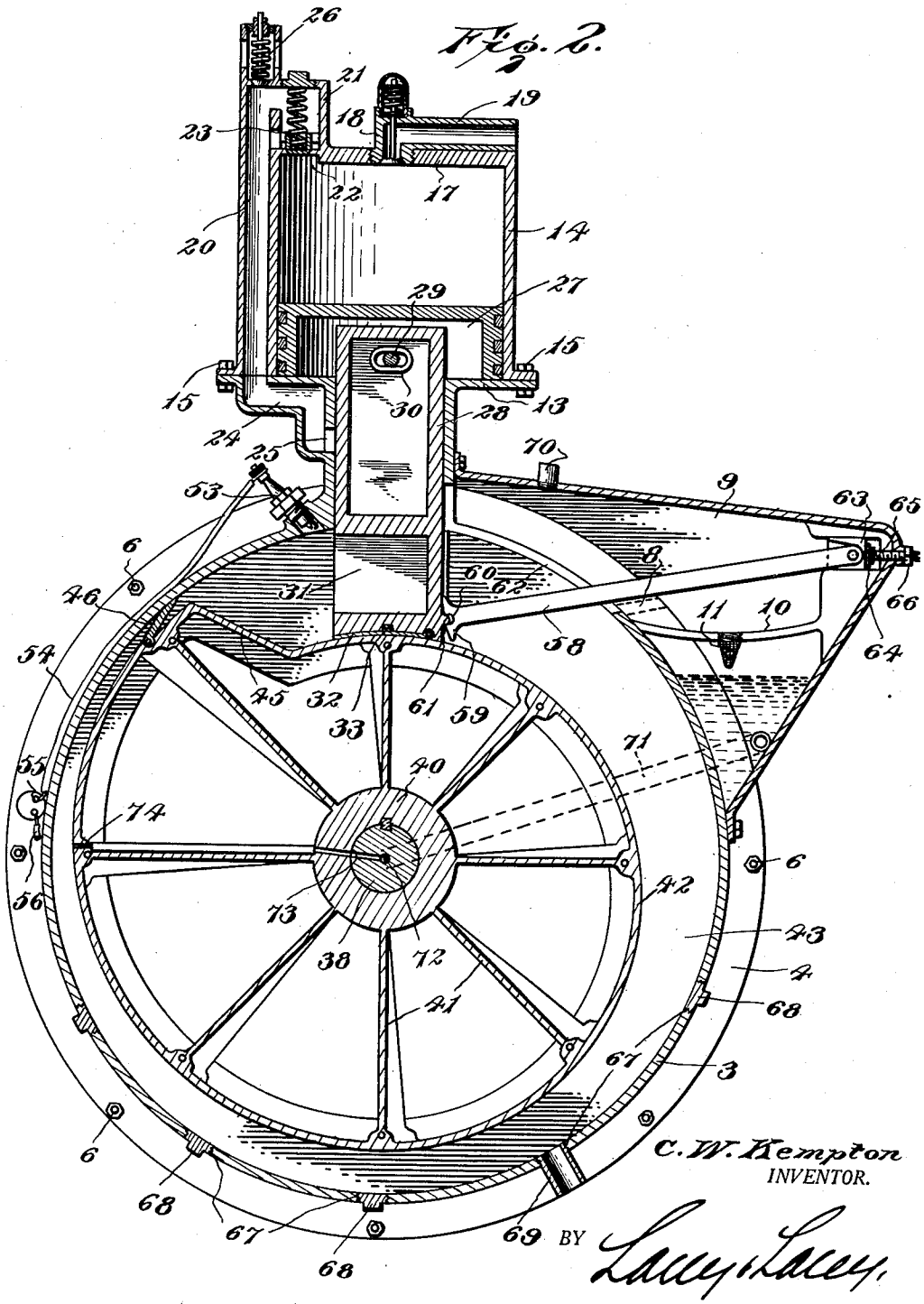
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ROTARY INTERNAL COMBUSTION ENGINE

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Fig. 2.



C. W. Kempton
INVENTOR.

BY Lacey & Lacey.

ATTORNEYS.

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ROTARY INTERNAL COMBUSTION ENGINE

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Fig. 3.

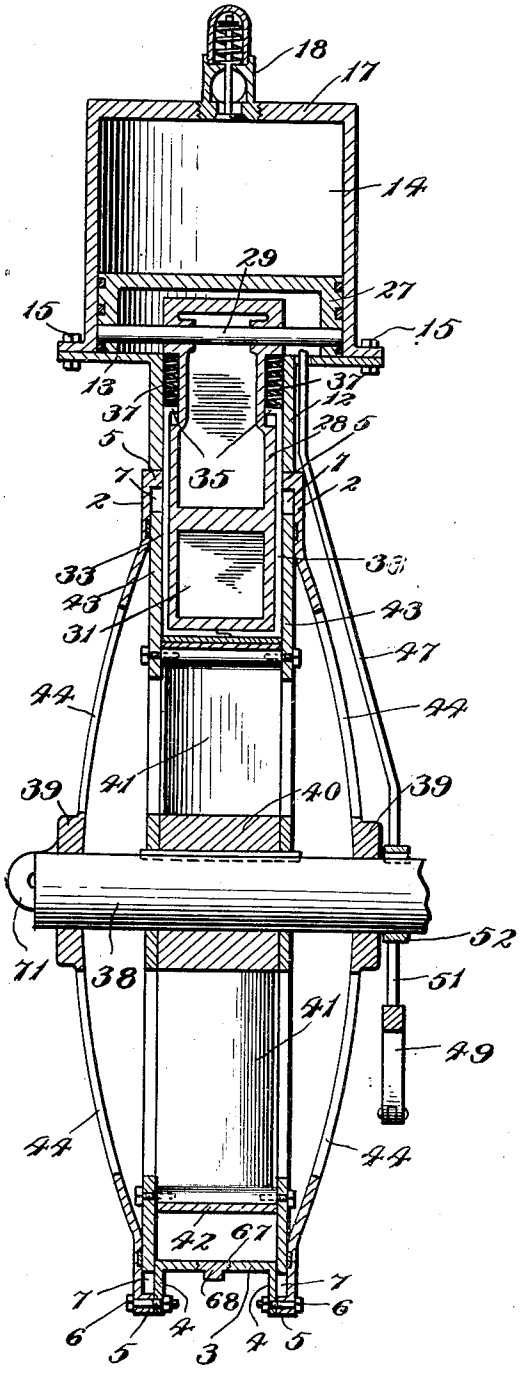


Fig. 4.

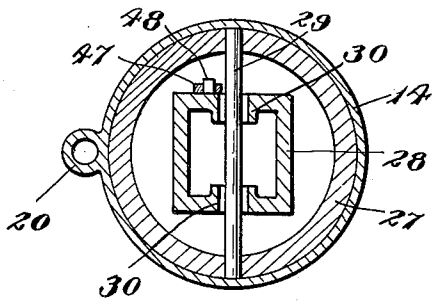
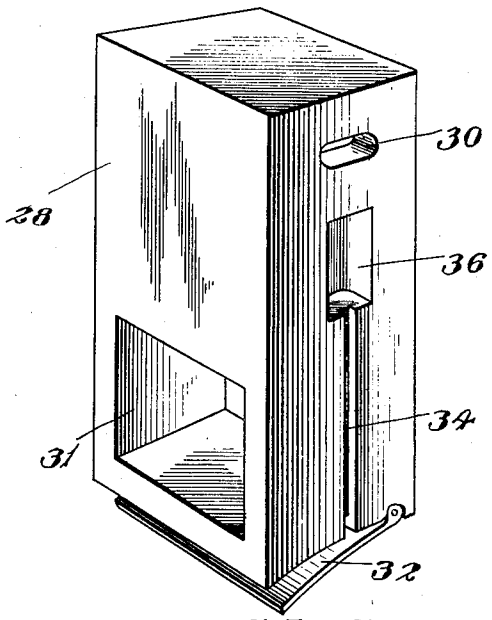


Fig. 5.



C. W. Kempton
INVENTOR.

BY Lacey & Lacey,
ATTORNEYS

Patented Oct. 28, 1930 1,779,547

UNITED STATES PATENT OFFICE

CLARENCE W. KEMPTON, OF LOS ANGELES, CALIFORNIA

ROTARY INTERNAL-COMBUSTION ENGINE

Application filed August 22, 1929. Serial No. 387,717.

This invention relates to internal combustion engines and more particularly to an internal combustion engine of the rotary type including a casing and a rotor rotatably mounted therein to rotate when an explosion acts against the rotor.

One object of the invention is to produce a motor of the type disclosed in which a charge of compressed fluid may be delivered into the casing of the motor in a very efficient manner and a block connected with a compressor and serving to deliver the compressed fluid held in engagement with the peripheral edge face of the rotor and reciprocated in proper timed relation thereto.

Another object of the invention is to provide improved means to brace the block against back lash which is exerted when an explosion takes place within the casing to propel the rotor and also allow the back lash brace to be adjusted in order to retain it in its proper engagement with the block and compensate for wear.

Another object of the invention is to so form the block that measured quantities of compressed fluid may be delivered into the casing of the motor and so connect this block with a compressing piston with which it is associated that it will be permitted to slide freely.

Another object of the invention is to prevent leakage when fuel is exploded to propel the rotor and at the same time reduce friction between the rotor and the inner end of the block and peripheral wall of the motor casing. Another object of the invention is to provide the engine or motor with an improved lubricating system in which oil is circulated by centrifugal force set up when the rotor is in motion.

Another object of the invention is to so form the rotor and casing that the rotor may serve as a fan for passing air through the engine and very effectively cool the same. This not only allows the rotor to serve as a cooling fan for the motor but also reduces the weight of the motor.

The invention is illustrated in the accompanying drawings wherein

Figure 1 is a view showing the improved motor or engine in side elevation,

Figure 2 is a vertical sectional view through the improved engine,

Figure 3 is a vertical sectional view taken transversely through the engine at right angles to the view shown in Figure 2,

Figure 4 is a transverse sectional view through the compressor taken along the line 4—4 of Figure 1,

Figure 5 is an enlarged prospective view of the delivery block associated with the compressor.

This engine is of the rotary type and includes a casing 1 having side walls 2 and a peripheral wall 3 disposed between the side walls and formed with outstanding flanges 4. The flanges 4 bear against annular ribs 5 which project inwardly about the margins of the side walls 2 where they are secured by bolts 6 thereby providing circumferentially extending faces 7 between the flanges 4 and side walls which constitute oil pockets. Adjacent the top of the casing each rib 5 is formed with a substantially radially extending groove constituting an oil passage 8 through which oil may pass from the pockets and return to the oil pan or reservoir 9 which projects from one side of the casing as shown in Figures 1 and 2. Referring to Figure 2 it will be seen that the oil is returned to the oil reservoir above a partition 10 extending horizontally therein and having a passage guarded by a screen 11 serving to remove sediment and other foreign matter from the oil before it is delivered into the lower portion of the reservoir.

At the upper end of the casing is provided a neck 12 which projects upwardly from the peripheral wall 3 and at its upper end is surrounded by an outstanding flange 13 constituting a lower head for a compressor cylinder 14 which rests upon this flange and is secured thereon by bolts 15. An inlet port 16 is formed in the upper head 17 of the compressor cylinder and into this port is screwed an inwardly opening check valve 18 normally held closed and provided with a side extension or neck 19 adapted to be connected with a suitable source of gas-

eous fuel supply. At one side of the cylinder 14 is provided a vertically disposed fuel passage or conduit 20 the upper end of which communicates with a dome 21 opening into the cylinder about the exhaust port 22 thereof and this dome constitutes a valve housing in which is disposed an outwardly opening check valve 23 normally held closed and adapted to be forced upwardly to an open position when the compressor is in operation so that a charge of compressed fuel may be forced into the conduit 20 through which it passes. At its lower end the conduit 20 communicates with a conduit 24 provided at the corresponding side of the neck 12 and constituting a continuation of the conduit 20 and this conduit is formed at its lower end with a port 25 opening into the neck 12. The upper end of the conduit 20 carries a safety valve 26 normally held closed but permitted to open outwardly in case the engine should backfire. A piston 27 is slidably mounted in the cylinder 14 and is connected with the upper end of a block 28 by a wrist pin 29. It should be noted that the openings 30 formed in the block to receive the wrist pin are elongated transversely of the block thereby permitting sufficient play between the block and piston to prevent binding. The block has been shown rectangular in shape but it will be understood that it may be circular in cross-section or any other shape desired. This block fits snugly in the neck 12 and is of sufficient length to extend downwardly into the casing 1 when the piston is in its lowered position shown in Figure 2. The upper portion of the block is formed hollow in order to reduce its weight and the lower portion of the block is formed with a recess or chamber 31 adapted to be filled with compressed fuel when the piston and block have been moved upwardly a sufficient distance to allow gas forced through the passages 20 and 24 from the cylinder to pass through the port 25 and into the chamber. Therefore, only a measured quantity of compressed gas will be delivered into the casing when the block and piston are returned to the lowered position. A plate 32 is pivoted to the lower or inner end of the block 28 for a purpose to be hereinafter set forth and in order to eliminate leakage at the sides of the block there has been provided sealing strips 33 which fit into grooves 34 formed in the sides of the block and at their upper ends are bent to form fingers 35. These fingers 35 extend into recesses or pockets 36 formed in the block and are engaged by springs 37 serving to urge the strips downwardly. The strips project outwardly from the grooves 34 and bear against the opposed side walls of the neck and ribs 5 of the casing and their lower ends bear against the plate 32.

The shaft 38 of the engine extends transversely through the casing and is rotatably mounted in bearings 39 formed centrally thereof. The shaft may project from the casing as far as desired and may have a propeller mounted thereon or means associated with the extended end portion of the shaft so that power may be taken therefrom. A rotor is disposed within the engine casing about the shaft and has its hub 40 fitting snugly upon the shaft and keyed or otherwise firmly fixed thereto so that the rotor and shaft turn as a unit. Spokes 41 radiate from the hub to the peripheral wall 42 of the rotor and these spokes extend the full width of the rotor between the side walls 43 thereof and are fixed transversely so that when the rotor is in motion the spokes may act as fan blades and cause air to pass through the engine for cooling purposes. It should be noted that the side walls are of a spider formation as shown in Figures 1 and 3 thereby providing spaced radially extending strips 44 between which air may pass. It will thus be seen that the rotor not only serves as a rotor but also constitutes a cooling fan. From an inspection of Figure 2 it will be seen that the peripheral wall 42 of the rotor extends in a spiral for substantially the entire circumference of the rotor to provide a cam surface upon which the plate 32 at the inner end of the block 28 rests and the adjacent ends of the cam surface are joined by a diagonally extending portion 45 constituting a shoulder against which the force of the exploding fuel acts in order to impart rotary motion to the motor. It should also be noted that the sealing strips 33 bear against the inner faces of the side walls or plates 43 as shown in Figure 3 in order to prevent loss of power when the motor is in operation and that the plate 32 is held against the annular wall 42 of the rotor by these strips. A plate 46 similar to the plate 32 is pivoted to the wall 42 adjacent the outer end of the shoulder 45 and when the engine is in operation the centrifugal force exerted will move this plate outwardly until its free end bears against the wall 3 of the casing and very effectively prevent loss of power.

When the engine is in operation the rotor rotates in the casing with the shaft and as the rotor turns the cam or peripheral wall 42 will force the block and piston upwardly thereby causing gas in the upper portion of the cylinder to be forced out through the port 22 and down through the conduits 20 and 24. When the piston and block are in their uppermost position the chamber 31 will have become filled with compressed gas and by this time the lower or inner end of the block will have passed over the plate 46 and be in a position to move downwardly along the shoulder 45 to the position shown in Figure 2. The block must move rapidly during this

movement in order to retain the block in engagement with the wall 42 and cause it to remove rapidly across the shoulder 45 and in order to do so there has been provided a pitman 47 disposed vertically with its upper end pivoted to the block as shown at 48 and its lower end pivotally connected with a rocker arm 49. This rocker arm is pivoted at its other end to the casing and intermediate its length is bowed downwardly as shown at 50 to provide a short arcuate cam surface for engagement by an arm 51 extending radially of the shaft 38 from a collar 52 keyed or otherwise rigidly fixed upon the shaft to turn therewith. This is clearly shown in Figure 1 and by referring to this figure it will be seen that while the arm 51 is in engagement with the cam surface 50 the rocker arm or lever 49 will be rapidly swung downwardly and cause the block to move inwardly very quickly along the shoulder until it reaches its innermost position. When in this position the charge of gas will have been exploded and it will act against the shoulder to impart rotary motion to the rotor. The spark plug 53 for exploding the charge of fuel is mounted in an opening formed in the annular wall 3 of the casing near the side of the neck 12 having the port 25 formed therein and a wire 54 leads from this plug to a coil 55 from which extends another wire 56 lead along the rocker arm 49 and secured to a terminal 57. This terminal 57 is located near one end of the arcuate cam surface 50 for engagement by the arm 51 and it will be seen that when the arm 51 engages this terminal which is insulated from the rocker arm 49 a circuit will be completed through the spark plug and the gas exploded. When the explosion takes place the force is between the block and the shoulder and in order to brace the block against back lash there has been provided a bracing arm 58 which has one end formed with a head 59 bearing against the block and notched as shown at 60 to form a seat receiving a lug 61 projecting from the block. This bracing arm extends through a slot 62 formed in the wall 3 of the casing and into the upper portion of the oil pan or reservoir 9 and at its outer end is pivoted to a bearing 63. This bearing is supported in a seat 64 formed in the outer end of the chamber 9 and carries a swivelled stem 65 which projects outwardly through a threaded opening formed in the chamber. A nut 66 is screwed upon the outer end of the stem 65 so that the stem may be adjusted longitudinally and thereby move the bearing 63 and bracing bar 58 longitudinally into proper position to brace the block against back lash but at the same time not interfere with sliding of the block. Openings 67 are formed in the wall 3 of the casing in spaced relation to each other circumferentially of the casing and by removing the closure plug 68 from a selected one of these openings an exhaust pipe 69 may be screwed into the opening. Therefore, the exhaust may take place at the proper time during rotation of the rotor. An auxiliary exhaust pipe 70 is provided which may also serve as a breather pipe. Oil from the reservoir passes through a pipe 71 to one end of the shaft 38 and enters a bore 72 formed axially of the shaft. A passage 73 leads radially from the bore 72 through the hub of the rotor and as the rotor turns centrifugal force will cause the oil to move outwardly through the passage 73 and along a blade or spoke 41 to the marginal wall 42 of the rotor. A port 74 is formed through the wall 42 near the spoke along which the oil passes and therefore the oil may reach the side walls of the rotor beyond the wall 42. This oil thoroughly lubricates the rotor and enters the oil pockets 7 about which it will be moved to effect lubrication of the rotor and parts of the casing with which it contacts. Superfluous oil will pass through the passages 8 and back into the reservoir above the partition 10. It will be obvious that additional passages 73 may be formed through the shaft and hub of the rotor and corresponding passages 74 formed through the rib or wall 42 of the rotor. While it has been stated that the engine is to be operated by gaseous fuels sucked into the cylinder 14 and delivered in a compressed state into the chamber 31, other fuels may be used and either compressed in the cylinder or delivered into the casing for ignition by a hot point taking the place of the spark plug and the piston and block employed to deliver compressed air into the casing to permit combustion to take place. If a particle of hot carbon should remain in the chamber 31 and be carried upwardly as the block rises and cause compressed fuel entering this chamber to be exploded no damage will take place as the force of the explosion will open the safety valve 26 and allow the exploding gases to escape to the atmosphere. The fact that the exploding gases act against the periphery of the rotor gives great power to the motor.

Having thus described the invention, I claim:

1. In an engine, a casing, a rotor rotatably mounted therein and having a circumferentially extending cam surface and a shoulder joining the ends of the cam surface, a block for feeding a charge of compressed fluid into said casing slidable through the periphery of the casing and bearing against the cam surface and shoulder of the rotor during rotation thereof, a shaft for said rotor projecting from said casing, a pitman pivoted at one end to said block, a rocker arm having one end pivoted to the other end of said pitman and its other end pivoted to said casing, means to explode a charge of fuel between the block

and shoulder, a circuit wire leading therefrom, a contact secured to said rocker arm having said wire attached thereto, a cam projecting from said shaft to bear against said rocker arm and move the block inwardly across the shoulder as the rotor rotates and engage said contact to close a circuit through the fuel exploding means.

2. In a rotary internal combustion engine, a casing having side walls and a circumferentially extending marginal wall, a rotor rotatably mounted in said casing and having a circumferentially extending marginal face defining a spiral cam surface and a shoulder joining the ends thereof, a neck rising from said casing and formed with a side port, a cylinder supported by said neck and having a valve controlled inlet and a valve controlled outlet in its outer end, a conduit connecting the outlet of said cylinder with the port of said neck, a piston slidable in said cylinder, a block slidable through said neck and joined to said piston and resting upon the marginal face of said rotor, said block being formed with a chamber to be filled with fluid forced through the conduit from the cylinder as the piston is moved outwardly during rotation of the rotor and deliver the compressed fluid into the casing when the piston and block move inwardly, means for exploding a charge of fuel after the block has moved into the casing to act against said shoulder, and a back lash brace pivotally mounted and bearing against said block.

3. In an engine, a casing, a rotor rotatably mounted therein and having a circumferentially extending cam surface and a shoulder joining ends of the cam surface, a compressing cylinder extending outwardly from said casing and having a neck at its inner end opening into the casing and formed with a side part, the cylinder having an inlet and an outlet in its outer end, a conduit connecting the outlet with the side port of said neck, a piston slidable in said cylinder, a block loosely connected with the piston and extending from said piston through said neck and bearing against the cam surface of said rotor and formed with a chamber opening through its side and adapted to convey compressed fluid from the conduit into the casing as the piston and block reciprocate, means to explode a charge of fuel in the chamber between the block and shoulder of the rotor, and an exhaust spaced circumferentially of the casing from the exploding means a determined distance.

4. In an engine, a casing, a rotor rotatably mounted therein and having a circumferentially extending cam surface and a shoulder joining ends of the cam surface, a compressing cylinder extending outwardly from said casing and having a neck at its inner end opening into the casing and formed with a side port, the cylinder having an inlet and an outlet in its outer end, a conduit connecting the outlet with the side port of said neck, a piston slidable in said cylinder, a block extending from said piston through said neck and bearing against the cam surface and shoulder of the rotor to effect reciprocation of the block and piston as the rotor rotates, fuel exploding means in the casing adjacent the side of the neck having the port formed therein, said block having its inner end portion formed with a pocket to be filled with fluid when opposite the port and deliver the fluid into the casing when the block moves inwardly, and a back lash brace pivotally mounted in said casing and having one end bearing against the inner end of said block at the opposite side thereof from its pocket.

5. In an engine, a casing, a rotor rotatably mounted therein and having a circumferentially extending cam surface and a shoulder joining ends of the cam surface, a compressing cylinder extending outwardly from said casing and having a neck at its inner end opening into the casing and formed with a side port, the cylinder having an inlet and an outlet in its outer end, a conduit connecting the outlet with the side port of said neck, a piston slidable in said cylinder, a block extending from said piston through said neck and bearing against the cam surface and shoulder of the rotor to effect reciprocation of the block and piston as the rotor rotates, fuel exploding means in the casing adjacent the side of the neck having the port formed therein, said block having its inner end portion formed with a pocket to be filled with fluid when opposite the port and deliver the fluid into the casing when the block moves inwardly, a chamber projecting from said casing, a bearing in said chamber adjustable inwardly and outwardly, and a back lash brace extending through said chamber into said casing with one end pivoted to said bearing and its other end rockably engaged with said block at the opposite side thereof from said pocket.

6. In an engine, a casing, a rotor rotatably mounted therein and having a circumferentially extending cam surface and a shoulder joining ends of the cam surface, a compressing cylinder extending outwardly from said casing and having a neck at its inner end opening into the casing and formed with a side port, the cylinder having an inlet and an outlet in its outer end, a conduit connecting the outlet with the side port of said neck, a piston slidable in said cylinder, a block extending from said piston through said neck and bearing against the cam surface and shoulder of the rotor to effect reciprocation of the block and piston as the rotor rotates, fuel exploding means in the casing adjacent the side of the neck having the port formed therein, said block having its inner end portion formed with a pocket to be filled with

fluid when opposite the port and deliver the fluid into the casing when the block moves inwardly, a chamber projecting from said casing and constituting an oil reservoir, a support in said chamber, a bearing carried by said support and adjustable toward and away from said casing, and a back lash brace extending through said chamber and into said casing with one end pivoted to said bearing and its other end in rocking engagement with said block.

In testimony whereof I affix my signature.

CLARENCE W. KEMPTON. [L. S.]