Oct. 16, 1928. 1,687,511

A. L. POWELL

ROTARY INTERNAL COMBUSTION ENGINE

Filed Dec. 10. 1919 2 Sheets-Sheet 1

Fig. 1.

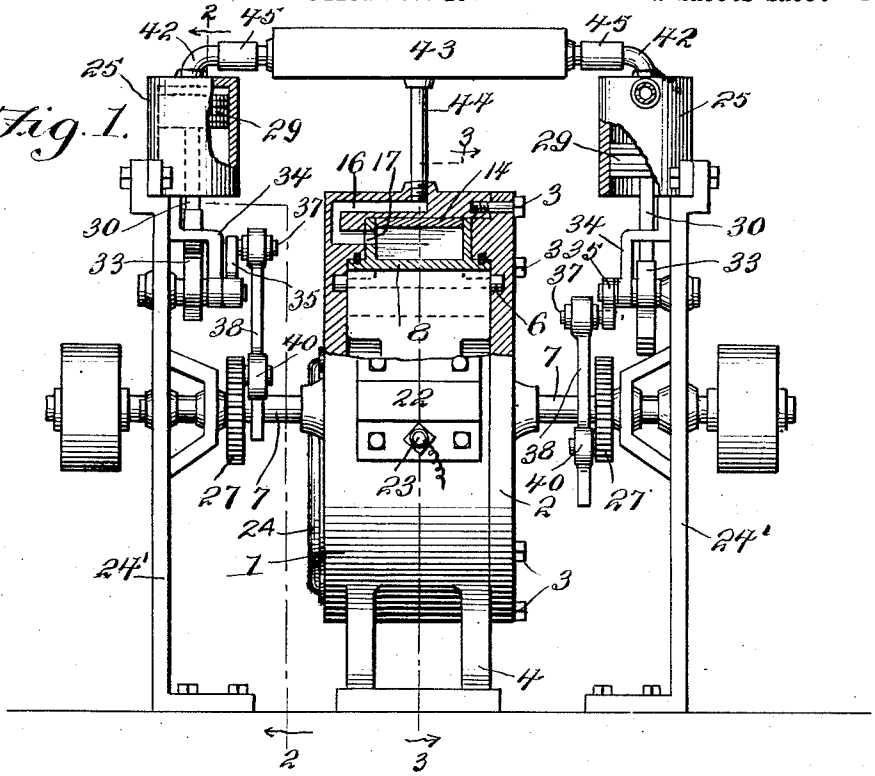


Fig. 3.

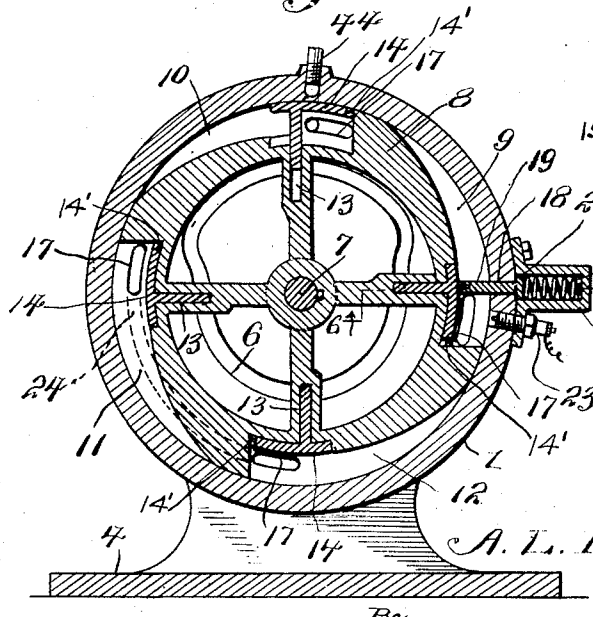
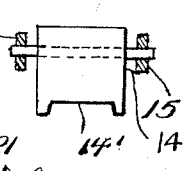


Fig. 7.



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Fig. 2.

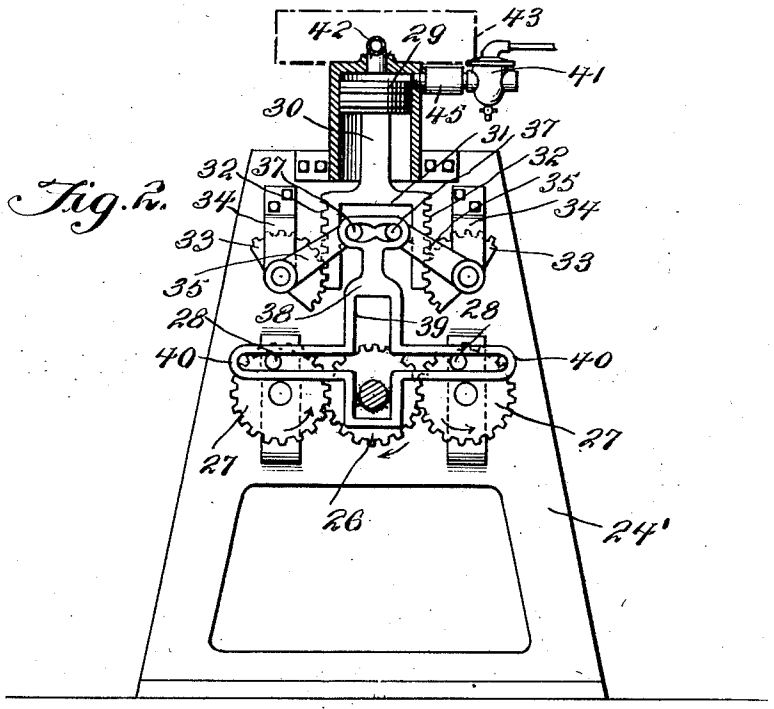


Fig. 4.

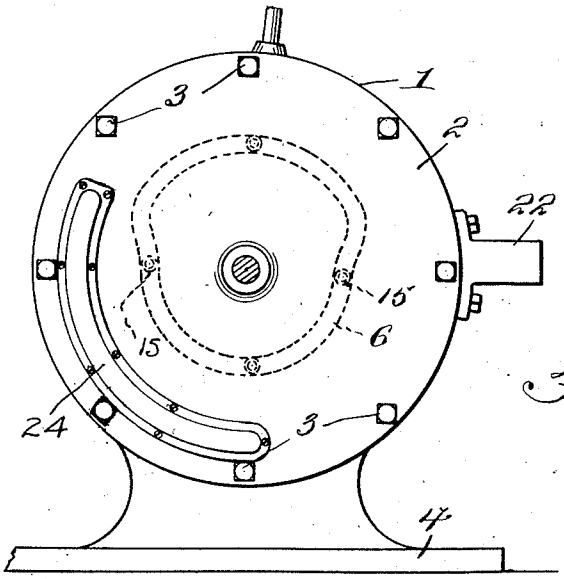


Fig. 5.

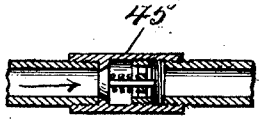
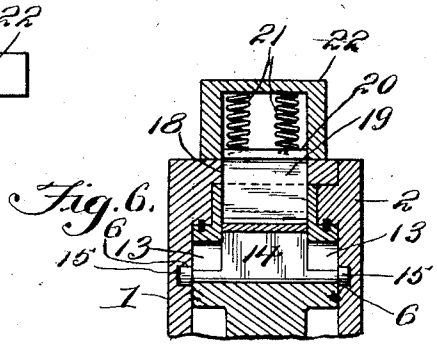


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALVAH L. POWELL, OF ROUNDUP, MONTANA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE A. L. POWELL POWER COMPANY, INCORPORATED, A CORPORATION OF MONTANA.

ROTARY INTERNAL-COMBUSTION ENGINE.

Application filed December 10, 1919. Serial No. 343,955.

This invention relates to certain new and useful improvements in power plants and deals particularly with the type of motor known as rotary internal combustion engines.

The object of the present invention resides in the manner of furnishing the rotor with a precompressed charge.

Another object of the present invention relates to the provision of auxiliary compressing elements which are operated in timed relation to the movement of the rotor to furnish the latter with the necesary charge of fluid to enable the proper operation of the engine.

Other objects and aims of the invention will readily suggest themselves to those skilled in the art upon reading the following specification in connection with the attached drawings, wherein I have shown, merely for the purpose of illustration, the preferred embodiment of my invention.

Throughout the several views similar letters of reference indicate corresponding parts wherein Fig. 1 is a side elevation, partly in section of my complete engine. Fig. 2 is a cross section taken on line (2—2) Fig. 1. Fig. 3 is a cross section taken through the rotor on line (3—3) Fig. 1. Fig. 4 is a side elevation of the rotor showing the abutment actuating slot in dotted lines. Fig. 5 is a detailed view of the check valve used between the compression cylinder and the storage chamber. Fig. 6 is a detailed sectional view on line (6—6) Fig 3 and Fig. 7 is a detailed view of the sliding abutment.

In the attached drawings (1) indicates generally the rotor casing, the side portion of which designated (2) is made removable for the purpose of facilitating the interior assemblage. This removable end (2) is securely held in position by bolts or any other suitable elements (3). As shown in these drawings the rotor casing is supported upon a base (4). The interior side walls of the casing are provided with cam slots indicated at (6) for the purpose hereinafter described.

Transversely journaled through the side walls of the rotor casing is the power shaft (7) to which is rigidly secured the rotor (8) the peripheral portions of which are provided with cam-shaped pockets (9, 10, 11 and 12). The inner ends of these pockets are recessed as shown at (13) to conform to the shape and cross-area of radially slidable abutments (14). These abutments are provided on their inner ends with roller portions designated at (15), which are adapted to travel in the cam slot (6). The upper portion of these abutments is provided with elongated slots 14′ through which the compressed gas passes from below the abutments 14 to above the same and into the forward portion of the pocket. As shown more clearly in Fig. 1 the rotor casing is provided with an inlet duct (16) and the side walls of the rotor are suitably apertured as shown at (17) to constitute an inlet into the rotor pocket. The rotor casing is transversely slotted as shown at (18) to permit the passage of a sliding plate (19) the outer end of which is headed as shown as (20) against which an expansible element such as a spring (21) is adapted to bear. This spring (21) is housed within a casing shown at (22) securely fastened to the rotor casing in any suitable manner. Also extending through the rotor casing is a spark plug indicated at (23). The outlet from the rotor casing is indicated at (24).

Suitably supported upon brackets (24′—24′) are compression cylinders (25—25). These compression cylinders are actuated through suitable gearing which in the present case is shown in duplicate and is arranged upon opposite sides of the rotor. These compression cylinders are adapted to perform their charging operation opposite to one another, that is to say, while one is compressing the other is recharging. In order that they may function in this manner I provide the rotor shaft (7) with pinions (26—26) and medially arrange these pinions between intermission gears (27—27) which are suitably supported upon the brackets (24′—24′). These gears (27—27) are provided with pins (28—28) for the purpose hereinafter described. Each of the compression cylinders has arranged for reciprocating movement therein a piston (29—29) to which is secured a rod (30—30) bifurcated at its lower end as shown at (31) Fig. 2 and provided with racks (32—32). Each of the racks (32—32) are adapted to mesh with a segmental gear (33—33) suitably supported on a shaft journaled in the brackets (24′—24′) and an angle bracket (34′—34′) secured thereto. Rigidly secured to the shaft which carries the segmental gear (33—33) is an arm 35—35 the inner end of

which is provided with pins (37—37). These pins (37—37) are adapted to actuate within a slotted cross head of a reciprocating member (38—38). This member (38—38) has a vertically extending opening therein designated at (39) and extending from the side portion thereof are lobe-shaped portions (40—40) into which the pins (28—28) of the gears (27—27) are adapted to act.

Each of the compression cylinders (25—25) are connected in any suitable manner to any conventional type of gas vaporizer designated in the present case as (41). Tapped into the head portion of each compression cylinder (25—25) is a conduit (42—42) which leads to the storage chamber indicated at (43). This storage chamber is put into communication with the inlet of the rotor casing by means of a conduit (44). In order that the precompressed charge in the storage chamber (43) be held from re-entering the compression cylinders I provide in the conduits (42—42) check valves (45) shown in detail in Fig. 5.

The complete operation of the device is as follows:—Assuming the parts to be in position as shown in Figures 1 and 3 it will be seen that the upper rotor pocket is in position to receive a precompressed charge from the storage chamber (43). As the rotor rotates clockwise, the gas under compression passes from the reservoir 43 through the intakes 44 and 16 and through the intake port 17. This occurs only when the pocket is at the extreme top as viewed in Fig. 3. The gas under compression would then be confined beneath the abutment 14, its radially extending wall 13, the bottom of the pocket, and the abrupt wall of the rotor. As the rotor rotates during its first 90° travel the forward end of the abutment 14 passes beneath the inner end of the sliding plate 19, and immediately thereafter the rollers 15 travelling in in the cam groove 6 cause the abutment 14 to move inwardly radially, or into the position in which the abutment 14 of the pocket 9 is shown in Fig. 3. As this takes place the compressed gas passes through the slot 14′ and is confined between the sliding plate 19, the abutment wall of the rotor, the inner surface of the casing, and the upper wall of the abutment 14. The port 17 is flush against the side wall of the casing so that none of the gas can pass outwardly through the port 17; furthermore, the thickness of the abutment 14 is slightly less than the diameter of the port 17, and is slightly less than the thickness of the sliding plate 19, so that none of the gas can pass to the upper portion of the pocket; that is none of the gas can pass the sliding plate 19. The compressed gas is now exploded by the electrical connection 23 thereby rotating the rotor. When the pocket reaches the extreme lower position such as the pocket 12 in Fig. 3, the spent gas exhausts through the port 17 and the exhaust passage 24 in the exhaust pipe 46. When it again reaches a position immediately beneath the intake pipe 44, a fresh charge is forced therein. When in this position the charge is exploded and the forward movement of the rotor is had. This cycle of action occurs four times to one complete revolution of the rotor. It, of course, will be understood that as the pockets present themselves to the exhaust opening 24 the burnt charges within the pockets will be exhausted therethrough. Also during the rotation of the rotor it will be noted that the compression cylinders are acting in opposite directions, that is, while one is charging, the other is compressing and forcing its charge into the storage chamber (23).

While I have described the preferred embodiment of the invention it will of course be understood that certain variations therefrom may be resorted to without sacrificing any of the spirit of the invention and the scope of protection contemplated will appear from the claims.

What I desire to secure by Letters Patent is:—

1. A rotary explosive engine comprising a casing having an inlet and an outlet, a rotor arranged within the casing provided with a plurality of peripheral pockets each of said pockets having a port leading thereinto at the forward end thereof and adapted to alternately register with the inlet and outlet in the casing on rotation of the rotor, a movable member carried by the rotor for trapping the charge in the forward portion of the pockets, said member having a port therethrough, means for shifting said member at a predetermined point in the travel of the rotor to force the charge through the port to the opposite side of the member, a spring pressed abutment associated with the casing and adapted to coact with the movable member to entrap the charge between the said movable member and the abutment, means to ignite the charge, a power shaft having a driving pinion attached thereto and operatively connected with the rotor, in combination with a compression cylinder and means for operating the compression cylinder from the driving pinion on the power shaft in timed relation to the rotation of the rotor to force a charge into the peripheral pockets as they are brought into registration with the inlet of the casing.

2. A rotary explosive engine comprising a casing having an inlet and an outlet, a rotor arranged within the casing provided with a plurality of peripheral pockets, each of said pockets having a port leading thereinto adjacent the forward end thereof, a movable member arranged within each pocket and adapted to entrap the gaseous charge in a localized area of the pocket, a port leading through said member, means for moving said member at a predetermined point of travel

of the rotor to force the charge to the opposite side of said member, means associated with and adapted to coact with the movable member to hold the charge in the localized area of the pocket, and means to ignite said charge while the rotor is travelling between the inlet and outlet of the casing.

3. A rotary explosive engine comprising a casing having an inlet and an outlet, a rotor arranged within the casing provided with a plurality of peripheral pockets, each of said pockets having a port leading thereinto adjacent the forward end thereof, a movable member arranged within each pocket and adapted to entrap therein the gaseous charge, said member provided with a ported area, means for moving said member at a predetermined point of travel of the rotor to force the charge to the opposite side of said member, an abutment arranged within the casing and adapted to coact with the movable member to hold the charge in the forward part of the pocket, and means to ignite the charge while entrapped within the pocket between the movable member and the abutment.

In testimony whereof I hereunto affix my signature this 10th day of December, 1919.

ALVAH L. POWELL.