June 24, 1930. E. A. RICHARDSON 1,767,097

ROTARY INTERNAL COMBUSTION ENGINE

Filed April 30, 1927

Fig. 3

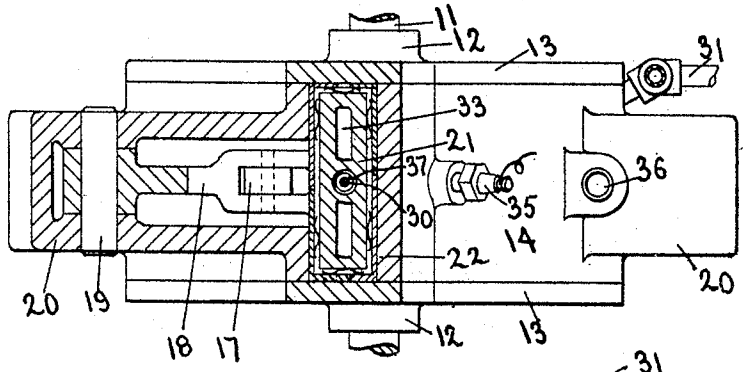


Fig. 2.

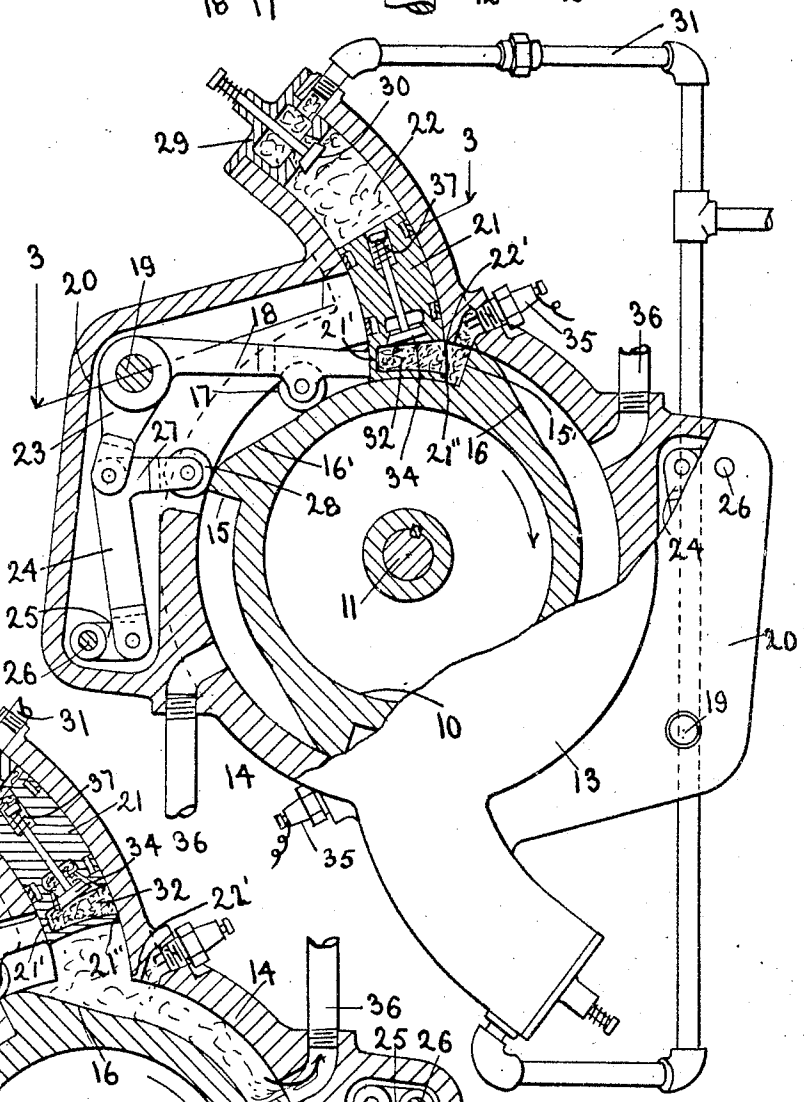
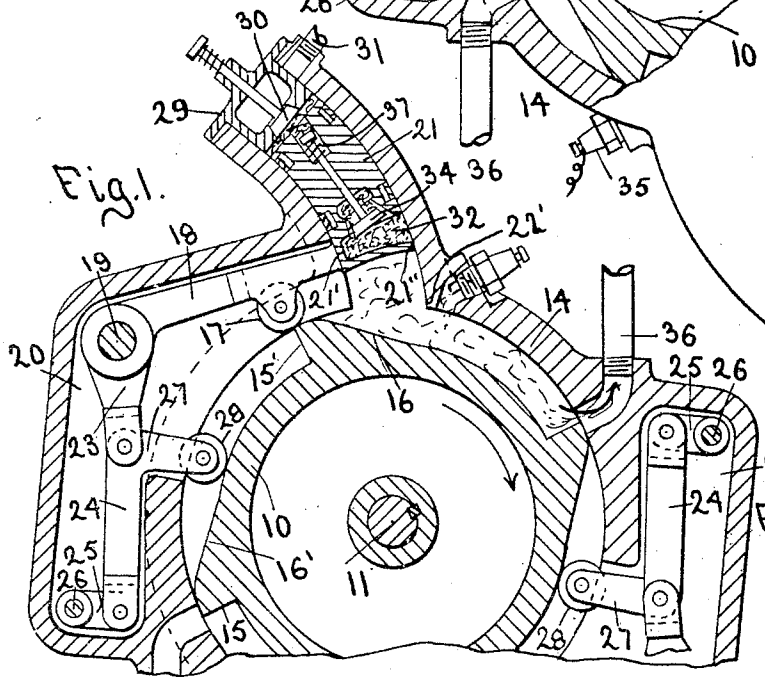


Fig. 1.



INVENTOR
Ernest Albert Richardson
by Fred W. Fridle
Atty

Patented June 24, 1930

1,767,097

UNITED STATES PATENT OFFICE

ERNEST ABERT RICHARDSON, OF COCHITUATE, MASSACHUSETTS

ROTARY INTERNAL-COMBUSTION ENGINE

Application filed April 30, 1927. Serial No. 187,873.

My invention relates to rotary internal combustion engines. One object of my invention is to provide a rotary internal combustion engine in which a charge of explosive mixture is admitted to a chamber in which a recessed piston reciprocates, is compressed into the recess as the piston reciprocates in one direction; is transferred by the reciprocation of the piston in the opposite direction to firing position relative to the rotor of the engine during which transfer action a charge is drawn into the chamber for compression and transfer in the succeeding cycle.

A second object is to provide the rotor with suitable peripheral cams by means of which, through suitable connections, the transfer piston may be reciprocated to synchronize with peripheral abutments on the rotor.

My invention consists in the novel combinations of elements and the functions of the reciprocating piston, all of which are explained and described in the accompanying specifications and illustrated in the drawing forming a part thereof.

In the drawing, Fig. 1 is a sectional elevation of a portion of a preferred form of my invention in which the parts are shown in a position in which a charge of explosive mixture previously admitted to the piston chamber has been compressed into the recessed piston to be transferred to firing position.

Fig. 2 is a sectional elevation showing the parts in firing position and a subsequent charge admitted above the piston to be compressed into the recess on the return reciprocation.

Fig. 3 is a sectional plan on 3—3 Fig. 2.

In the preferred form illustrated, I have shown an engine with a single rotor having a plurality of abutments and a pair of transfer pistons, but I do not confine myself to this form as a plurality of rotors may be secured to a single transmission shaft, and the transfer members be disposed to operate singly and but once in a revolution on the respective rotors, which may be angularly disposed relative to one another to be successively fired. Such modification may be made by mechanical variation in details without extending beyond the scope of my claim, and it is conceivable that other modifications are possible to meet varying conditions.

Referring to the drawing:—10 is a rotor secured to the transmission shaft 11 with bearings 12 in the heads 13 of the rotor casing 14. The rotor 10 is provided with peripheral abutments 15 against which the explosive charge is fired as will be presently explained. The abutments 15 are formed in the direction of rotation with cam faces 16 which engage the roll 17 journaled in the lever 18 hinged on the stud 19, rigid with the walls of an extension 20 of the rotor casing.

Integral with the lever 18 is the piston 21, which is adapted to be reciprocated in the chamber 22 formed as a part of the extension 20, the lever 18 on its hinge serving as a radius arm for the piston. The arm 23 forming an extension of the radius arm 18 is hinged to a bell crank, one arm of which 24 is journaled to the link 25 swivelled to the stud 26, rigid with the walls of the rotor casing extension.

The other end of the bell crank, 27 is provided with the friction roll 28, positioned to engage the periphery of the rotor 10, coordinating with the roll 17 for the purpose of reciprocating the transfer piston 21, the peripheral cams being formed in such relation to the abutments 15, that the rolls will alternately engage the cams for the purpose specified. The chamber 22 is provided with the closure 29, formed to admit explosive mixture from the supply duct 31, through the check valve 30 to the interior of the

chamber 22, and the transfer piston 21 is provided with the compression recess 32 of relatively small volume to the chamber 22 to which it is connected by ducts 33, a check valve 34 closing the ducts against the return of the compressed charge admitted to the recess. The recess 32 is open in the direction of rotation of the rotor when the transfer piston is in firing position but the wall 22′ operates as a closure as the piston is reciprocated to compress the explosive mixture into the recess 32.

The transfer piston with a charge of compressed explosive mixture as shown in Fig. 1, is reciprocated to firing position shown in Fig. 2 by the connecting means operated by the engagement of the roll 28 with the cam face 16′, where the charge is fired by a spark from the spark plug 35 against the abutment face 15′. As the transfer piston is thus operated, a partial vacuum is formed in the chamber 21, and the check valve 30 opens to admit explosive mixture thereto, and on the return reciprocation of the piston accomplished by means of the action of the roll 17 on the same cam surface 16′, the charge in the chamber is compressed into the recess of the piston, closing the check valve 30 and passing through the check valve 34 into the recess in the piston. This check valve is balanced by means of the spring 37 to resist the compression which occurs as the piston is reciprocated to a position in which wall 21″ of the recess engages the wall of the chamber at 22′, this wall serving as a closure during the compressive and transferring action until the compressed mixture is in firing position. The reaction of the fired charge between the wall 21′ of the recess and the abutment 15′ operates to rotate the rotor in the direction of the arrow and as it rotates the cams acting on the connections to the transfer piston, operate to insure the continuous and repeated functioning of the transfer piston 21. The spent gasses are exhausted through suitable ducts 36 suitably disposed relative to the firing position. Leakage of explosive mixture may be prevented by any suitable packing means, which are therefor not specifically described.

Having thus described my invention, I claim:—

In a rotary internal combustion engine, including as elements a casing, a rotor formed with peripheral abutments and corresponding cam faces, revoluble therein, a gas chamber extending therefrom and having a duct and a check valve therein; in combination therewith; a recessed piston integral with a radius arm hinged within the casing, the piston being adapted to reciprocate in the chamber; an anti-friction element connected to the arm and adapted to engage the periphery of the rotor; an extension from the radius arm; a bell crank hinged thereto, one arm of which is journaled in a link hinged within the casing, and the other arm being provided with an anti-friction element adapted to engage the periphery of the rotor and to coordinate with the anti-friction element connected with the radius arm for the purpose of reciprocating the piston in the chamber, as and for the purposes set forth.

ERNEST ABERT RICHARDSON.