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EXPLOSIVE ENGINE.

APPLICATION FILED OCT. 11, 1907.

926,641. Patented June 29, 1909.

2 SHEETS—SHEET 1.

Fig. 2.

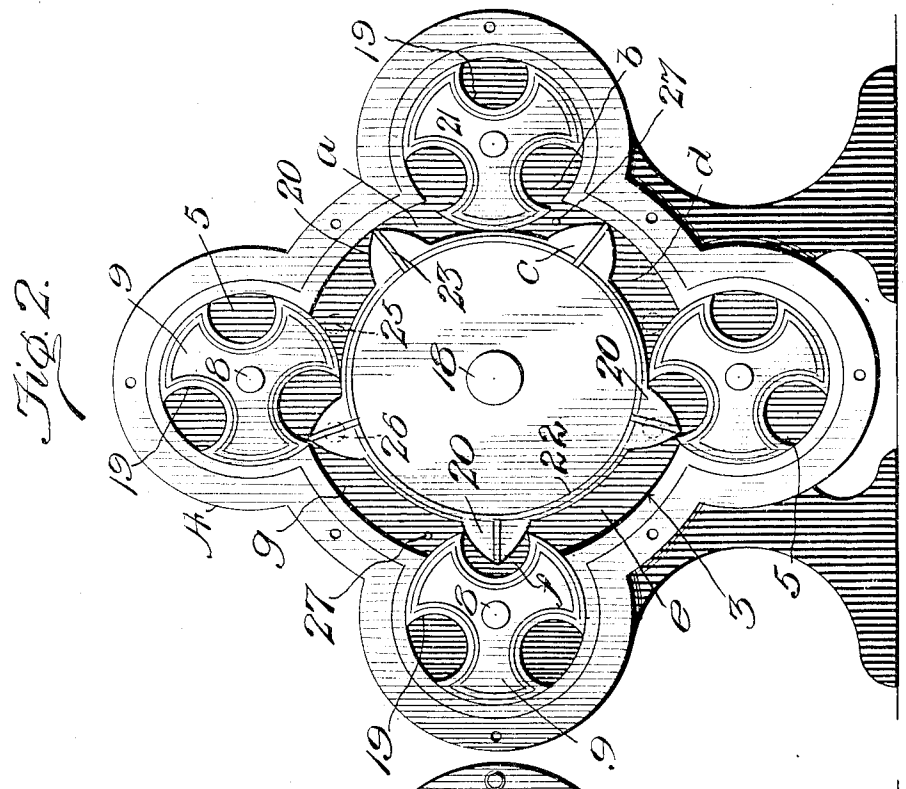
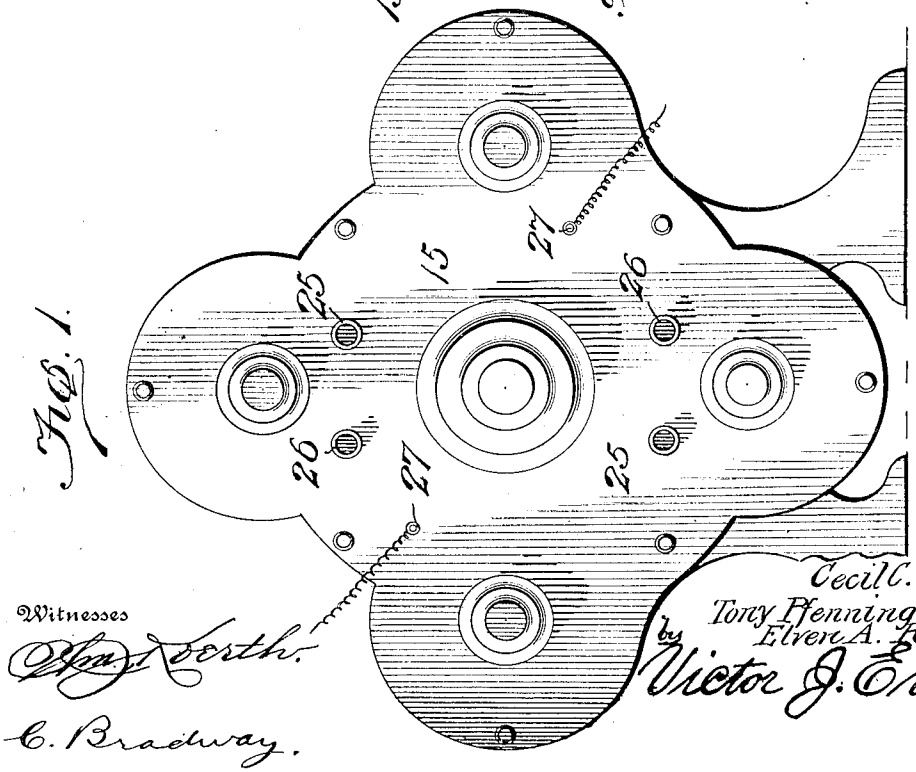


Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

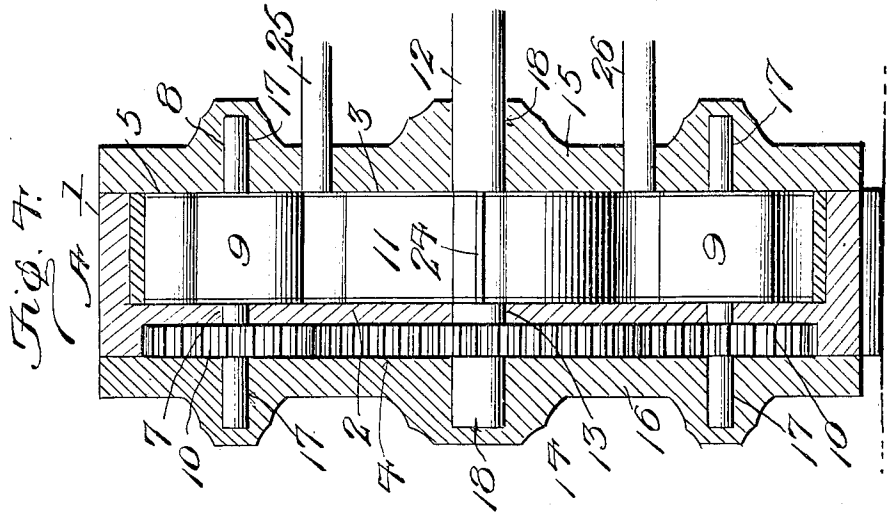
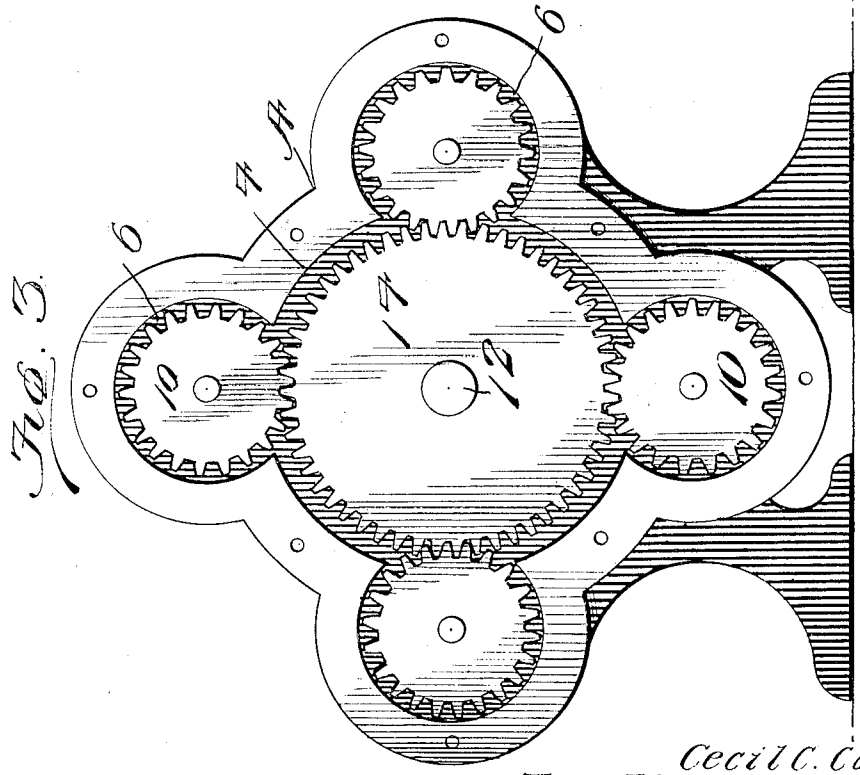


Fig. 3.



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EXPLOSIVE-ENGINE.

No. 926,641. Specification of Letters Patent. Patented June 29, 1909.

Application filed October 11, 1907. Serial No. 396,959.

To all whom it may concern:

Be it known that we, CECIL C. COFFEY, TONY PFENNIGHAUSEN, and ELVIN A. ROBINSON, citizens of the United States of America, residing at Riverside, in the county of Riverside and State of California, have invented new and useful Improvements in Explosive-Engines, of which the following is a specification.

This invention relates to explosive engines of the rotary type in which the impulse from successive explosions causes rotation of the rotary piston or drum of the engine, and relates more particularly to an engine of that class in which the rotatable element is provided with radial abutments which coöperate with synchronously rotated valves to compress the charges at one stage in the movement of the element and to receive the impulses from the explosions of another stage.

The invention has for one of its objects to improve and simplify the construction and operation of devices of this character, so as to be comparatively easy and inexpensive to manufacture, composed of few parts, and efficient in action.

A further object of the invention is the provision of an engine comprising a rotatable element having a plurality of abutments or radial projections thereon, and valves coöperating with the projections for producing the necessary functions to carry out the operation of the engine, there being one or more sets of valves, one valve of which assists in the compression of the charges and the utilization of the exploded gases, while the other is essential to the exhaust and the admission of the spent gases and charges.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claim appended hereto.

In the accompanying drawings, which illustrate one of the embodiments of the invention, Figure 1 is a front view of the engine. Fig. 2 is a similar view with the front head removed. Fig. 3 is a rear view with the rear head removed. Fig. 4 is a central vertical section of the engine.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawings, A designates the body of the engine which is preferably a casting formed with a cylindrical casing 1 and a transverse partition 2, there being on opposite sides of the partition, a piston chamber 3 at the front and a gear chamber 4 at the rear. At diametrically opposite points are pockets or compartments 5 in which are housed valves, and on the opposite side of the partition 2 and in line with the compartments 5 are pinion containing compartments 6. In the partition 2 are openings 7 through which project valve-carrying shafts 8, and on the shafts are valves 9 and pinions 10 disposed respectively in the compartments 5 and 6, the said pinions forming drivers for the valves.

In the piston chamber 3 is a rotary piston 11 that is mounted on a shaft 12, the said shaft extending through an opening 13 in the partition 2 for receiving a gear 14 disposed in the chamber 4 and meshing at diametrically opposite points with the pinions 10, so that all of the valves will be driven simultaneously. The open sides of the chambers in the casing are closed by front and rear heads 15 and 16 and these heads are provided with bearings 17 in which the ends of the pinion shafts rotate and also with central bearings for the main shaft 12.

In the present instance, two sets or pairs of valves 9 are employed and are arranged on two right-angularly disposed diagonal lines, and each valve is provided with three cavities or cups 19 arranged at one hundred and twenty degrees apart, and into these cavities engage projections or abutments 20 extending radially from the piston or drum 11 and arranged seventy-two degrees apart. In other words, the piston is provided with one more abutment than there are number of valves, when each valve is provided with three cavities or pockets. The drum is of smaller diameter than the chamber 3 so that

the segmental spaces between each pair of adjacent abutments forms working or explosion chambers and the peripheral surfaces of the valves are adapted to contact with the peripheral surface of the piston between the abutments and the abutments engage with the circular surfaces of the pockets or cavities 19, the valves and pistons meshing after the fashion of gear wheel and pinions. The flat surfaces of the valves are provided with packing members 21 that bear on the flat surfaces of the compartments 5 so that leakage of the working fluid will be prevented. The piston 11 is provided with packing members 22 set into the ends thereof to bear against the internal flat walls of the chamber 3 for the purpose of preventing leakage and the projections or abutments 20 have packing strips 23 extending radially at the sides thereof and packing strips 24 as shown in Fig. 4, that extend along the crests of the said abutments so as to contact with the internal circular surface of the chamber 3. Disposed two opposite valves are admission and exhaust ports 25 and 26 respectively, which communicate with the segmental working chambers or spaces between adjacent abutments. The exhaust ports are located on the approach side of the adjacent valves, while the admission ports are located on the leaving side of the said valves so that as an abutment approaches one of such valves, the spent gases behind the abutment will be forced out through the exhaust port until the said abutment meshes with the valve while a charge of explosive mixture will be admitted between the preceding abutment and valve so that as the piston rotates, the admitted charge will be compressed by the first-mentioned abutment and succeeding valve. Adjacent the leaving side of each of the other valves are spark plugs 27 for the purpose of igniting the charges after the same have been compressed.

In practice, the engine may be started by hand or in any other suitable manner, and by rotating the piston, a charge of mixture will be compressed in one of the other of the valves and immediately fired so that an impulse will be given to the piston which will be sufficient to set the engine into operation. As shown in Fig. 2, a charge of mixture is partially compressed in the space designated *a*, while a charge has been exploded in the space *b* and the exploded gases are operating on the abutment *c*. This forces the piston around in a clockwise direction and the exhaust gases in the space *d* on the opposite side of the abutment *c* are being discharged through the lowermost exhaust port 26. In the space *e*, a charge has been admitted and the compression thereof begun, while in the pocket *f* of the left hand valve, a charge is fully compressed and one of the abutments of the piston meshing in the said pocket so as to hold the charge compressed, and as soon as the piston moves sufficiently to throw the said abutment out of the pocket, explosion is produced by the sparking plug 27 so as to impart another impulse to the piston and the spent gases in the space *g* will be forced out through the uppermost exhaust port 26. In this manner, two impulses are given to each abutment during one revolution, making thereby ten impulses to the piston which insures an even and steady torque. The engine has the advantage of simplicity of construction and a minimum number of parts and effectiveness of operation.

The structure of the engine is such that it may be used as a compressor. The ignition device is dispensed with and power applied to the shaft so as to rotate the piston, thereby drawing fluid into the casing and causing it to be delivered under pressure.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative and that such changes may be made when desired as are within the scope of the claims.

Having thus described the invention, what I claim is:—

In an engine, the combination of a casing, heads therefor, a single partition between the heads and provided with a central bearing opening and additional bearing openings spaced around the central one, there being bearing openings in the heads alining with those of the partition, said partition dividing the casing into a piston compartment and a gearing compartment, a shaft mounted in the central bearing openings, a rotary piston secured to the shaft and provided with radial tooth-shaped abutments, a plurality of valve chambers formed in the casing and equally spaced around and communicating with the piston chamber, rotary valves in the valve chambers each valve being provided with a plurality of approximately semi-circular pockets into which the tooth-shaped abutments of the piston are adapted to enter, admission and exhaust ports arranged in one of the heads and located at opposite sides of a line passing through the center of the piston and the valves disposed at diametrically-opposite points whereby the valves and abutments coöperate to discharge the products of combustion through the exhaust port and draw in a mixture charge through the admission port, an ignition device located imme-

diately adjacent and on the leaving side of the other valve for firing the compressed charge between such valve and the approximate piston abutment, shafts secured to the valve and extending through the bearing openings of the partition, pinions on the valve shafts, and a gear wheel on the central shaft meshing with the pinions for positively rotating the said valves.

In testimony whereof we affix our signatures in presence of two witnesses.

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