D. F. LLEWELLYN.

ENGINE.

APPLICATION FILED JULY 11, 1916.

1,242,826.

Patented Oct. 9, 1917.

3 SHEETS—SHEET 1.

Fig. 1.

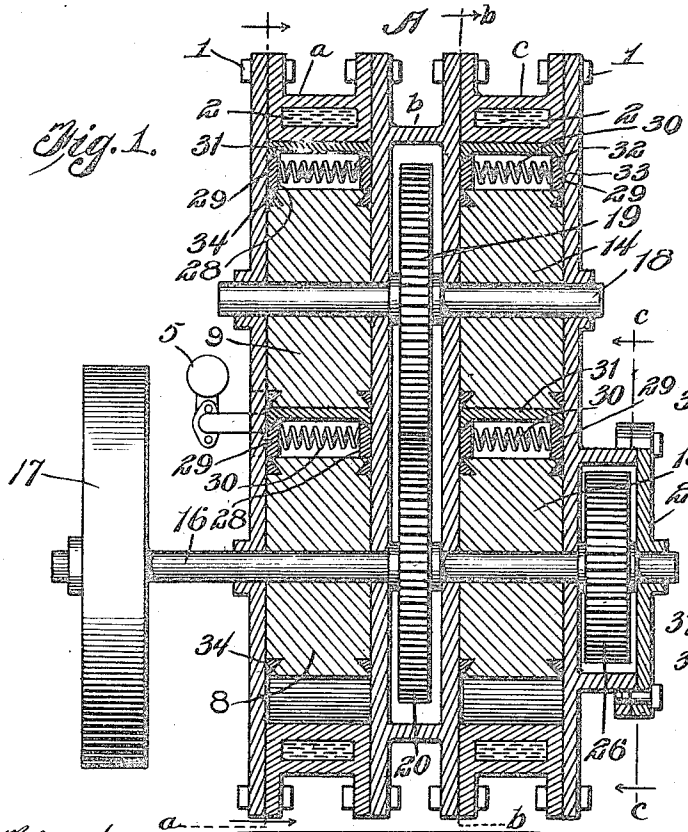


Fig. 5.

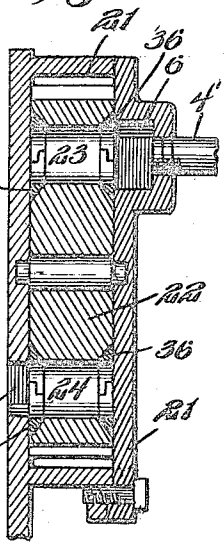
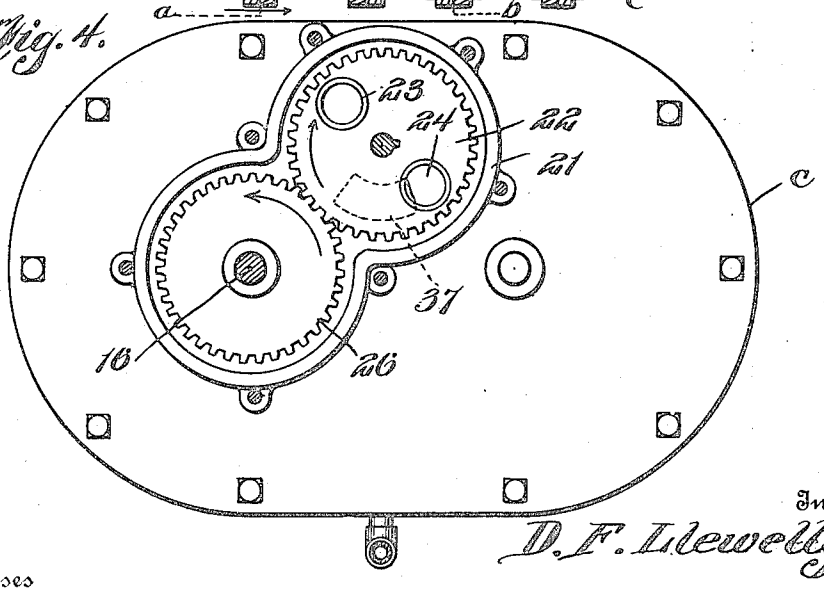


Fig. 4.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 6.

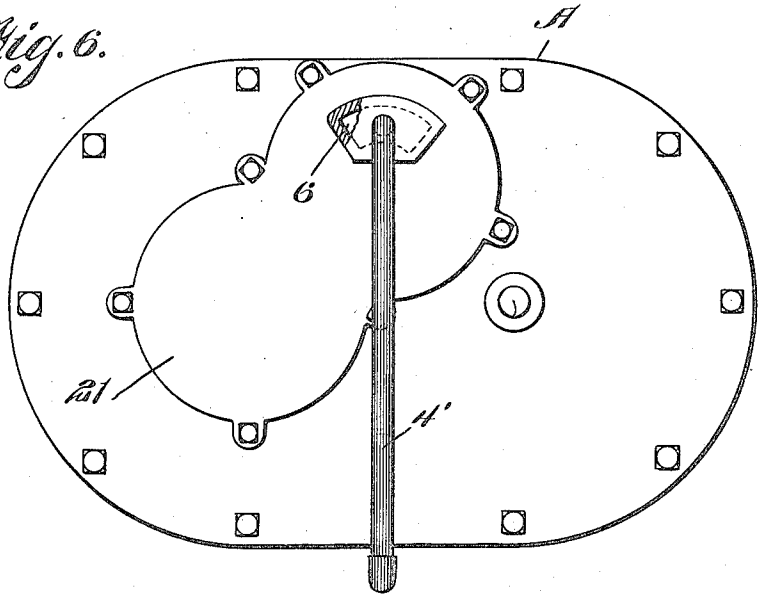
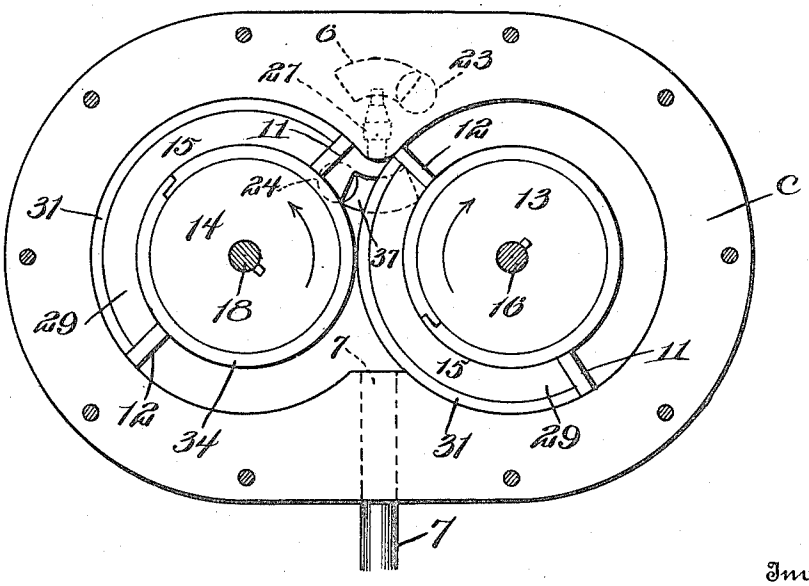


Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

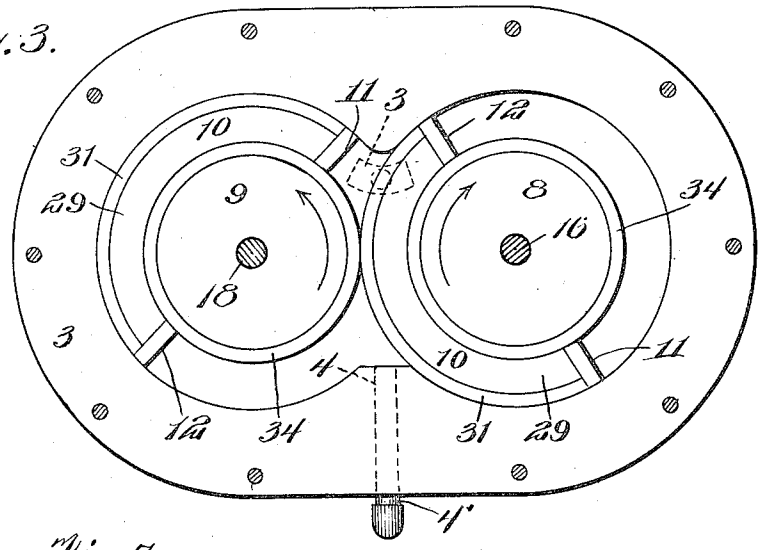


Fig. 7.

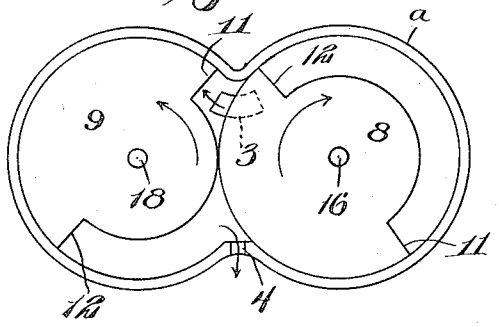


Fig. 8.

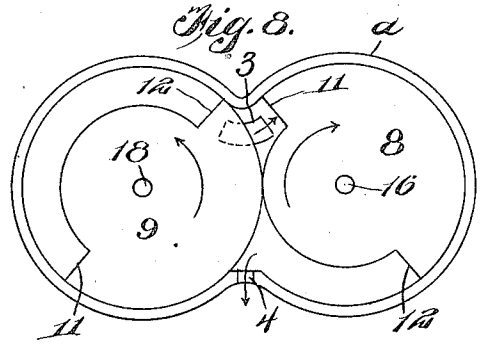


Fig. 9.

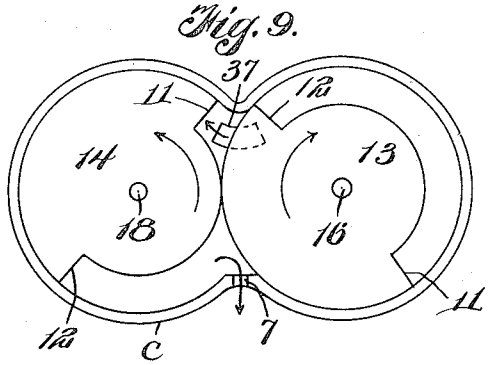
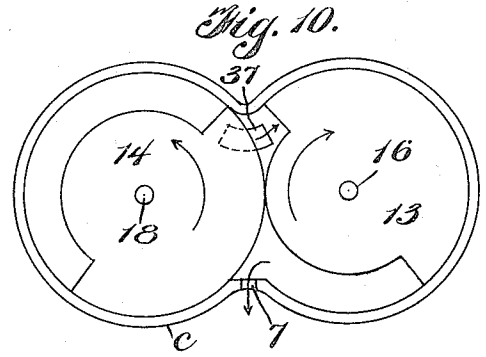


Fig. 10.



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UNITED STATES PATENT OFFICE.

DAVID FRANKLIN LLEWELLYN, OF GIRARDVILLE, PENNSYLVANIA.

ENGINE.

1,242,826. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed July 11, 1916. Serial No. 108,658.

To all whom it may concern:

Be it known that I, DAVID F. LLEWELLYN, a citizen of the United States, residing at Girardville, in the county of Schuylkill and State of Pennsylvania, have invented new and useful Improvements in Engines, of which the following is a specification.

This invention relates to engines of the class involving the use of rotors, the main object of the present invention being to provide an engine embodying a plurality of rotors separately housed in casings, in one of which the mixture is drawn in and compressed and in another of which the mixture is exploded and exhausted, the mixture after being drawn in and compressed being transferred to the rotor chamber in which the firing and exhausting cycles are performed, each of the rotors revolving continuously in its proper direction and the timing of the rotors being positively regulated.

With the above and other objects in view, the invention consists in the novel construction, combination and arrangement of parts, as herein described, illustrated and claimed.

In the accompanying drawings:—

Figure 1 is a diametrical section through an engine embodying the present invention.

Fig. 2 is a longitudinal section taken through the rotor chamber in which the power and exhaust operations take place, said view being taken on the line *b*—*b* of Fig. 1.

Fig. 3 is a similar section through the casing in which the intake and compression operation take place, said view being taken on the line *a*—*a* of Fig. 1.

Fig. 4 is a section on the line *c*—*c* of Fig. 1.

Fig. 5 is a section taken through the valve chamber.

Fig. 6 is a side elevation of the engine looking toward the valve side thereof.

Figs. 7 and 8 are diagrammatic views illustrating the intake and compression operations.

Figs. 9 and 10 are similar views illustrating the firing and exhausting operations.

Referring to the drawings A generally designates the entire casing of the engine. In the preferred embodiment of the invention, said casing is divided into three sections *a*, *b* and *c*, said sections being provided with flanges to enable them to be firmly secured together by bolts 1 or the equivalent thereof. The casings *a* and *c* are the rotor casings and each of said casings is shown as water jacketed at 2 for the usual purpose. The casing *a* in which the intake and compression operations take place is provided with an inlet port 3 and an outlet port 4, 5 designating a carbureter or mixer from which an explosive charge is drawn into the casing *a*. The casing *a* is connected with the casing *c* by means of a transfer pipe or connection 4′ which leads from the outlet port 4 of the casing *a* to the inlet port 6 of the valve casing, the exhaust from the casing *c* passing outward through an exhaust port 7.

In the casing *a* there are mounted two rotors 8 and 9, each of which is journaled in the side walls of the casings and formed with a substantially semi-cylindrical abutment 10 terminating in abutment faces 11 and 12 as clearly shown in Fig. 3.

The casing *c* also contains two rotors 13 and 14 formed with similar semi-cylindrical abutments 15 corresponding in all respects with the abutments 10 in the casing *a*.

The rotors 8 and 13 are mounted on a shaft 16 which is shown as provided with a fly wheel 17 and which forms the power shaft of the engine. The other rotors 9 and 14 are mounted on a shaft 18 parallel to the shaft 16. These shafts 16 and 18 are journaled in suitable bearings in the sectional casing hereinabove described and as shown in Fig. 1.

In the intermediate casing *b*, there are arranged two spur gears 19 and 20 fast respectively on the shafts 16 and 18, said gears 19 and 20 intermeshing and thereby causing the rotors to operate with accuracy while performing their functions. Upon the outer side of the casing *c* there is arranged a housing 21 in which is located a rotary valve body 22 having two ports 23 and 24 extending transversely through the same. The valve body 22 has a peripheral gear face 25 which meshes with and is driven by a gear 26 fast on the shaft 16. The gear 26 and the gear face 25 are so proportioned that the rotary valve revolves once to every revolution of the rotors in the casing *c*. 27 represents a spark plug for igniting the charges in the casing *c* at the proper intervals.

In order to provide against leakage and in order to retain compression in both the casings *a* and *c*, each rotor is formed in each side thereof with an annular seat or groove 28 in which is arranged an annular packing

ring 29, springs 30 being interposed between the rings 29 to force said rings laterally into contact with the inside walls of the respective casings. Each rotor also embodies an encircling packing band 31 having inclined faces 32 against which the inclined outer edges 33 of the packing rings 29 operate so that as the rings 29 are spread apart by the action of the springs 30, the band 31 which is of the split variety is also forced outwardly against the inner peripheral wall of the casing in which it operates. In addition to the packing rings 29, other packing rings 34 are set into grooves in opposite sides of the body of each rotor, each of said rings being split and substantially V-shaped in cross section as shown, thus forming an additional safeguard against loss of compression.

From the foregoing description, taken in connection with the accompanying drawings, the operation of the engine will now be understood. In the operation of the rotors 8 and 9, explosive mixture is drawn into the casing *a* by the suction of the rotor 8 moving in the direction of the arrow in Figs. 3 and 7 and during the complete revolution of the rotors 8 and 9 the charge of mixture is compressed and forced through the outlet 4 from which it is transferred by the pipe 5 to the intake port 6 of the valve casing 21. As shown in Figs. 4 and 5, the valve is provided with two pockets 23 and 24 having packing rings 36 at opposite sides thereof which are carried by the valve and which bear against the adjacent walls of the valve casing 21. In each rotation of the valve 22, each of the pockets 23 and 24 thereof is filled with compressed mixture, and as the valve revolves, the pockets 23 and 24 are successively brought into registry with the intake port 37 of the casing *c* when the rotors 13 and 14 are in the position shown in Figs. 2 and 9 and also when in the position shown in Fig. 10. In such positions, the charges are ignited by a suitable plug or igniter thereby driving the rotors 13 and 14 in the direction indicated by the arrows in Figs. 9 and 10, the exhaust being liberated through the port 7. In every half revolution of the rotors 13 and 14, the compressed mixture is prevented from entering the casing 21 by means of the rotary valve 22 caused by the ports 23 and 24 being at such time out of registry with the intake port 6 of the casing 21. The ports 23 and 24 are of sufficient size and capacity to hold sufficient charges of mixture under compression to charge the explosion chamber of the casing *c*.

I claim:—

1. In an engine of the class described, a rotor casing having an inlet port and an outlet port both in the outer side wall thereof, rotors working in said casing and adapted to draw in a charge of explosive mixture, compress the same and expel it through said outlet port, a second rotor casing at the inner side of the first named casing having an intake port and an exhaust port both in the outer side wall thereof, rotors mounted in the last named casing and adapted to be driven by the charge of compressed mixture in the last named casing and also adapted to force the burned gases outwardly through the exhaust port thereof, means for supplying explosive mixture to the first named casing, a conduit connecting the outlet port of the first named casing with the inlet port of the second casing, a valve controlling the intake port to the second casing and actuated by the engine shaft, shafts on which said rotors are mounted, and intermeshing twin gears on said shafts between the rotor casings whereby the rotors are simultaneously driven in opposite directions at the same speed.

2. In an engine of the class described, a rotor casing having an inlet port and an outlet port in its outer side wall, rotors working in said casing and adapted to draw in a charge of explosive mixture, compress the same and expel it through the outlet port, a second rotor casing having an intake port and an exhaust port in its outer side wall, rotors mounted in the last named casing and adapted to be driven by the charge of compressed mixture in the last named casing and also adapted to force the burned gases outwardly through the exhaust port thereof, means for supplying explosive mixture to the first named casing, a valve controlling the intake port of the second casing, said valve being actuated by the engine shaft, a transfer pipe connecting the outlet port of the first casing with the inlet port of the second casing and extending around both casings, and a shaft driven valve arranged on the outer side of the second casing and adapted to receive the compressed mixture from said transfer connection carry said charge and release the same into the intake port of the second casing.

In testimony whereof I affix my signature.

DAVID FRANKLIN LLEWELLYN.