H. G. KRESS.

ROTARY COMBUSTION ENGINE.

APPLICATION FILED SEPT. 8, 1913.

1,109,341.

Patented Sept. 1, 1914.

2 SHEETS—SHEET 1.

Fig. 1

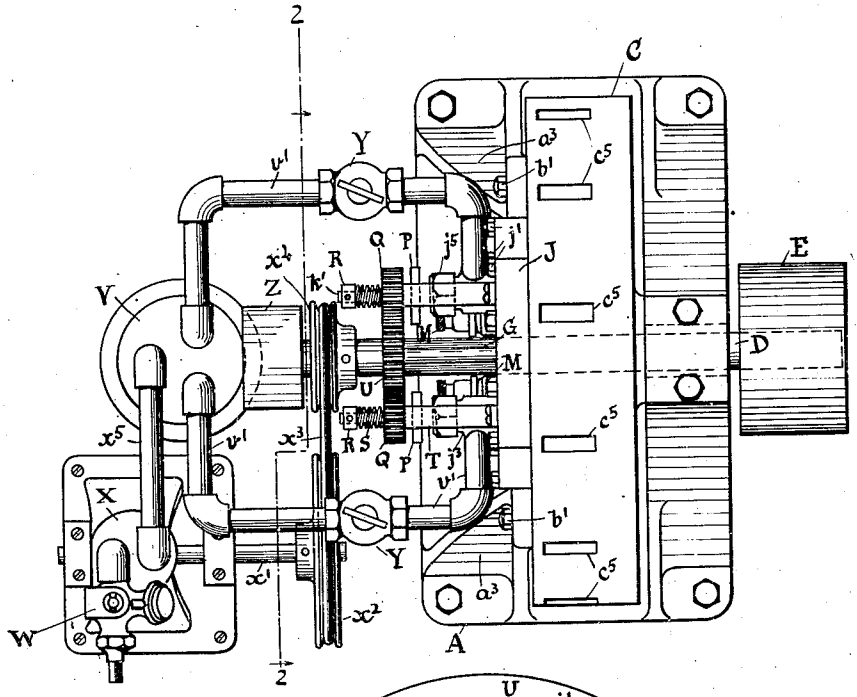
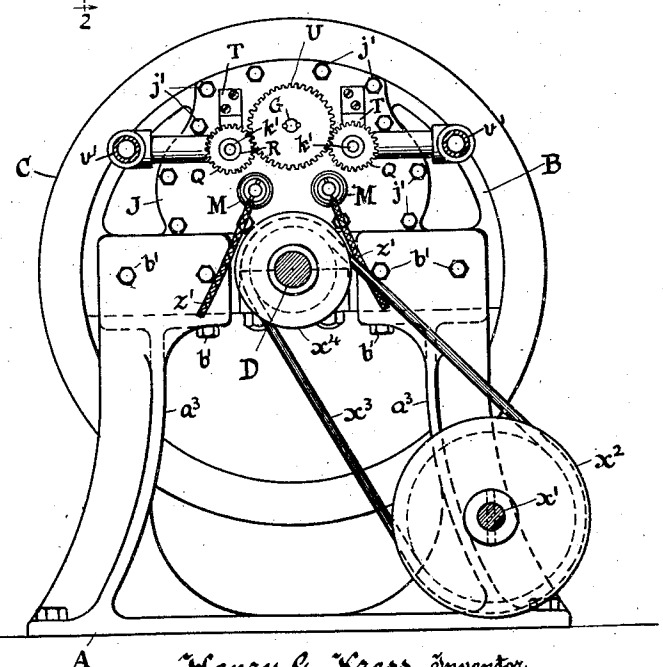


Fig. 2



Witnesses

Edw. S. Finn

Lillian Guppfer.

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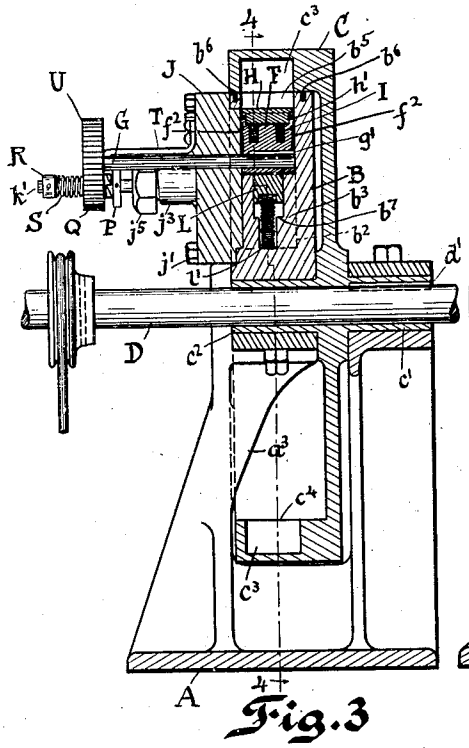


Fig. 3

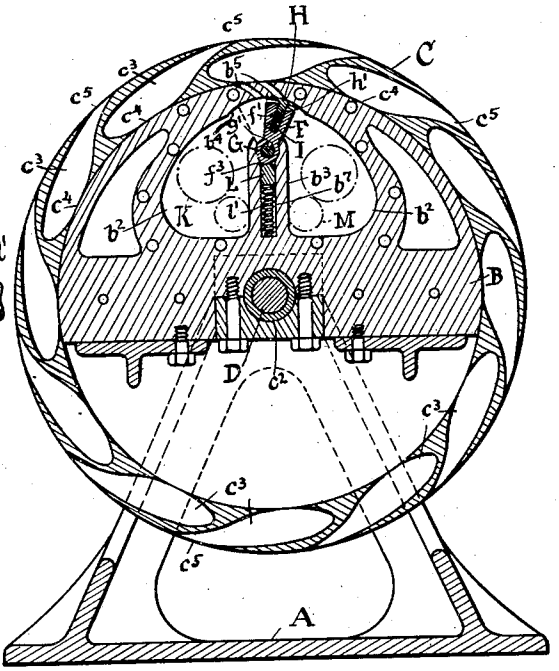


Fig. 4

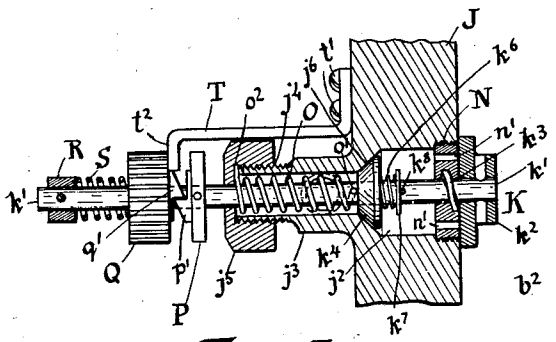


Fig. 5

Witnesses

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UNITED STATES PATENT OFFICE.

HENRY G. KRESS, OF MANITOWOC, WISCONSIN.

ROTARY COMBUSTION-ENGINE.

1,109,341. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed September 8, 1913. Serial No. 788,767.

To all whom it may concern:

Be it known that I, HENRY G. KRESS, of Manitowoc, Wisconsin, have invented a Rotary Combustion-Engine, of which the following is a specification.

This invention relates to combustion-engines or motors, and the object which I have in view is to provide a motor, the driving force of which acts directly upon a wheel or like rotary element and in a tangential direction whereby the energy of the engine is applied directly to produce rotation.

According to the present invention, I provide a two-compartment stator, the compartments of which are alternately filled with a combustible gas and ignited, each automatically connected at the moment when the gas-mixture has been fully or nearly burned with an exit-port directed immediately against a suitable receiving-element of the rotor. This leads to a sudden discharge of the burned mixture, which acts to place the other compartment in condition for refilling, and also practically removes from the cylinder any excess of burned gases, the new charge being forced in under pressure into the closed compartment at the same moment by the automatic opening of the inlet-valve thereof.

My invention consists of the constructions and combinations hereinafter described and particularly set forth in my claims.

For a full understanding of the principle of my invention, I have illustrated in the accompanying drawings the most improved form thereof, which is described in the following specification.

In these drawings Figure 1 is a plan-view of a complete plant, including my engine and certain auxiliary devices necessary for its operation; Fig. 2 is a front-view thereof, being approximately a section on plane 2 of Fig. 1; Fig. 3 is a longitudinal axial section therethrough; Fig. 4 is a transverse section taken on the stepped plane 4; and Fig. 5 is a fragmentary sectional view on a larger scale through the axis of the left-hand valve.

The reference letters refer each to the same part in each figure of the drawings.

The engine comprises in general a base or frame A supporting the stator B, which is fixed thereto by cap-screws b', and having journaled thereon the rotor C, which is of wheel form with sleeve-like extensions c' turning in the journals c', c^2 and inclosing the concentric driving-shaft D keyed to the rotor by a key d'. The driving-shaft D carries a pulley E for transmitting the power generated to the driving element, said pulley being shown merely by way of illustration, and it will be understood, of course, that the driving-shaft may be connected in any way whatever with the element to be driven.

As will be seen from the drawings, the rotor presents an annular form, within and in close contact with which is the stator B, which is nearly semicircular in general form, being mounted upon the pillars or pedestals a^3 of the base. Its essential elements comprise the double combustion-chamber b^2, which is centrally divided into two combustion-compartments by an upright partition wall b^3 and by an oscillating valve F which is mounted upon the shaft G, to which it is keyed by a key g', and is adapted to oscillate about the axis of the latter between the limiting positions shown in full and dotted lines respectively. The wall of the chamber b^2 at the top is as shown at b^4 formed concentric with the shaft G and to insure close contact with the oscillating valve F, and to prevent leakage around same, it is provided on its top-face with the spring-pressed packing-plate H, said packing-plate being provided with a central lug h' projecting into a recess f' on the upper face of the valve; and below said recess are further recesses which receive the coiled compression-springs I, which are under compression and therefore maintain close contact between the face of the packing-plate H and the face b^4. On the sides said valve may be grooved to receive packing-strips f^2. On the bottom or pivotal margin, the valve is partly surrounded by the partition b^3, which also acts as an abutment to limit its travel in both directions. In the center of the upper wall b^4 of the chamber are formed two ports b^5, which, as shown, are more or less oblique or tangential, and it is through these that the burned gas-mixture issues; these ports being in such position that one of them will be covered by the wear-plate H when the valve F is at one end of its travel and the other when it is at the other end of its travel.

The chamber b^2 is closed at the front by a detachable head or plate J, in which is pivoted the shaft G, and which carries also the

two admission-valves K (one of which is illustrated separately in Fig. 5) and the two spark-plugs M destined for admitting the gaseous mixture and for igniting the same respectively in the respective compartments of the combustion-chamber b^2. Said plate J is secured in place by cap-screws j'.

Considering first the admission-valve mechanism (see Fig. 5) there is formed in the plate J an inlet passageway j^2, which is partially surrounded by the concentric boss j^3 having a screw-thread j^4 on its front end, upon which is mounted the closure-cap j^5. At the other end the passageway j^2 is closed by a plate N perforated with a number of holes n'. The cap j^5 and plate N are centrally bored to receive the concentric valve-spindle k', for which they serve as bearings; said valve-spindle carrying on its inner end the head k^2, which covers the holes n' and plate N. When the valve is in normal position, as illustrated, the valve has a rotary and concomitant longitudinal movement, in other words, a helical movement, to which it is confined by the helical fin or cam-projection k^3 engaging in a corresponding recess in the plate N; so that when the spindle k' is rotated (in a right-hand direction as shown in Fig. 5) the valve-head k^2 will rise from its seat, opening connection between the passage j^2 and the interior of the combustion-chamber b^2 through the holes n'; in which position the combustible gaseous mixture will pass through said holes n' into the combustion-chamber. The valve is kept normally closed, however, by means of a coiled torsion-spring O, one end of which o' passes through a diametral hole in the spindle, and the other o^2 engages a notch in the edge of the boss j^3 in which it is confined by the cap j^5. The effort of this spring is therefore left-handed as shown. As a supplementary or safety closure the stem k' can also be provided with a conical valve-plug k^4, which in the closed position of the valve rests against the conical seat j^6. This prevents any possible back-draft of the gases through the admission-valve on the ignition of the contents of the combustion-chamber. To assure the simultaneous sealing of the plug k^4 and the head k^2, the former may be loose on the spindle k' and confined between the end o' of the spring O and the coiled compression-spring k^6 which abuts upon a washer k^7 resting against a pin k^8 on the spindle.

On its outer end the spindle k' carries a cam-plate P, a pinion Q and an abutment-block R for the coiled compression-spring S which rests against the pinion Q. The cam-plate P and block R are fixed to the spindle, but the pinion Q is loose thereon. The pinion Q is supported against the longitudinal pressure of the spring S by a bracket-arm T screwed to the plate J by screws t' and having a nose t^2 which abuts against the inner face of the pinion. Thus it will be seen that under normal circumstances, the effort of the spring S is added to that of the spring O to hold the valve closed, although one acts in a tangential, the other in an axial direction.

The cam-plate P and pinion Q carry two interengaging lugs p', q', whose opposing faces are vertical to the direction of movement and whose opposite faces are oblique. The pinion Q meshes with the gear U which is carried on the shaft G so as to partake of the movement of the latter and to perform a partial revolution, first in one direction and then in the other, according to the direction of movement of the oscillating-valve F.

The mode of operation of this device is as follows: When the valve F performs a movement in one direction, say, to the left, as seen in Fig. 4, this closes one of the compartments, in this case the left-hand compartment of the combustion-chamber b^2, and at the same time gives a right-hand turn to the two pinions Q belonging to the respective admission-valves K. The valve illustrated in Fig. 5 represents the left-hand valve, and the effect of this turn will be that the spindle K is rotated with the pinion by means of the engagement of the two trips q', p'. As, however, the valve-stem k' is rotated it is carried inwardly by the cam-fin k^3, until finally the trip-lug p' is drawn out of engagement with the trip-lug q' by passing over the end of the latter, and the two springs O, S (more particularly the former) return the valve to its closed position, while the remainder of the movement of the pinion Q is lost. This lets the correct quantity of combustible gas into the left-hand compartment of the combustion-chamber, and such gas is ignited by the spark-plug acting at the proper time, thus throwing the valve F to the right. During this latter movement the left-hand pinion Q will of course be given a turn to the left, and in this case the movement will be lost upon the valve-spindle, because the oblique faces of the lugs p', q' are now in contact and the pinion Q simply yields backwardly against the spring S until the lug q' has passed over the lug p', without opening the valve. This operation will thus be repeated with each double movement of the valve F; it being understood of course that the right-hand valve will be formed oppositely with the left-hand valve so that it opens upon the right-hand movement of the valve F and stays closed upon its left-hand movement.

The lugs j^3 are perforated and bored to receive pipes v' which lead from a reservoir V adapted to contain an already mixed volume of the combustible gaseous mixture used in the engine. This mixture is produced in a mixer, carbureter or vaporizer W, of any preferred or suitable pattern, which

forms no part of my invention. The combustible mixture produced in the mixer W is brought to the engine by means of a pump X, which pump has a shaft x' on which is a driving-pulley x^2 connecting by a belt x^3 with a pulley x^4 on the main shaft D thereby driving the pump from the engine, and the mixture is pumped from said mixer through the pump X and delivery-pipe x^5 into the reservoir V whence it passes through the pipes v' to the admission-valves in the manner already described. Cut-off valves Y may be placed in the pipes v' whereby either of the combustion-compartments of the engine may be separately excluded from action if desired.

On the end of the shaft D may be mounted a suitable timer Z, to which are connected the wires z' of the ignition-devices M; and it will be understood, of course, that such timer, which may be of any of numerous constructions well-known to the art, is adapted to pass a spark across the respective spark-plugs at the proper intervals, and as such arrangement is well within the already known art it is not separately illustrated herein.

The rotor C, which operates upon and around the stator B and covers the ports b^5 in the latter, is provided with tangential passages c^3 each of which has an opening c^4 on the inner face and a second opening c^5 on the outer face. The shape of the passages c^3 may be variously modified, and should be best adapted to take up the power of the gases escaping through the ports b^5 and transform them into the kinetic energy of the rotation of the rotor, and the apertures c^5 are intended for means of escape for the gases after they have entered the several chambers c^3. Instead of the apertures c^5 other relief-outlet may be provided for the gases discharged, it being understood that I do not claim any special form of impact-wheels as a part of my invention.

While the form of rotor shown is deemed preferable, there are many forms with which my motor will operate and which lie within the scope of my invention.

In order to prevent gases from escaping laterally in passing from the ports b^5 to the chambers c^3, packing-strips b^6 are provided flanking the ports, and any other packing strips which may be found desirable for like purpose may be provided.

An important feature of my invention is that which I have herein illustrated for confining the gases in the combustion-compartments until they are fully burned. It will be understood that if the valve F moves with great facility, it will be pushed over immediately when the gases start to burn and a large part of the latter will be blown out of the ports b^5 before being burned, thus greatly reducing the efficiency of the engine. To provide against this, there is formed on the hub of the valve F a lug f^3 whose side-faces are oblique, said lug being acted on by a block L adapted to reciprocate in a recess b^7 in the partition b^3, and yieldingly presses against the lug f^3 by a spring l'. It will be seen that the pressure of the block L upon the side of the lug f^3 makes considerable force necessary to start the valve F and this force can be adjusted by varying the strength of the spring to counterbalance the force developed by the gases, so that the valve shall not be started until the combustion of the gases is nearly complete. The valve F then is thrown over suddenly because there is no resistance to its movement after it has once started, and the spring-block L engages the opposite side of the lug f^3.

I have herein not further illustrated the auxiliary devices V, W and X than by a single general plan-view of each, because the present invention does not include these auxiliary devices as such within its scope and they may form the subjects of one or more separate applications.

From the above description it will be readily seen that my invention may assume a variety of forms all embodying the same principles and that a great number of changes and modifications are possible in the nonessentials without departing from the spirit of my invention, the scope of which is particularly defined in my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture, a port leading from said combustion-chamber and adapted to deliver gas therefrom to said rotor, a valve for closing said port, said valve being adapted to be shifted by the increasing pressure of the burning gas on one explosion so as to open said port, and means for bringing the pressure of a following explosion to bear against said valve in the opposite direction to return said valve to its position closing said port after the gas from the first explosion has escaped.

2. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture, a port leading from said combustion-chamber and adapted to deliver gas therefrom to said rotor, a valve for closing said port, said valve being adapted

to be shifted by the increasing pressure of the burning gas so as to open said port, means for returning said valve to its position closing said port after the gas has escaped, and means actuated by said valve in its returning movement for admitting gas to said chamber.

3. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture, a port leading from said combustion-chamber and adapted to deliver gas therefrom to said rotor, a valve for closing said port, said valve being adapted to be shifted by the increasing pressure of the burning gas so as to open said port, means for returning said valve to its position closing said port after the gas has escaped, an admission-valve adapted to admit gas to said chamber and normally closed, and means actuated by said first-named valve in its returning movement for opening said admission-valve.

4. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture, a port leading from said combustion-chamber and adapted to deliver gas therefrom to said rotor, a valve for closing said port, said valve being adapted to be shifted by the increasing pressure of the burning gas so as to open said port, means for returning said valve to its position closing said port after the gas has escaped, an admission-valve adapted to admit gas to said chamber and normally closed, means actuated by said first-named valve in its returning movement for opening said admission-valve, and means for forcing the combustible mixture through said admission-valve under pressure.

5. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture, and divided into two compartments separated from one another, there being one or more ports leading from said compartments adapted to discharge the gases therefrom, an oscillating valve separating said two compartments and adapted in one of its extreme positions to close the exit of one compartment and open that of the other, and in the other extreme position to close that of the second compartment and open that of the first, means for alternately charging the two compartments with the combustible gaseous mixture, and means for igniting said mixture alternately in the respective compartments.

6. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture and divided into two compartments separated from one another, there being one or more ports leading from said compartments adapted to discharge the gases therefrom, an oscillating valve separating said two compartments and adapted in one of its extreme positions to close the exit of one compartment and open that of the other, and in the other extreme position to close that of the second compartment and open that of the first, means for alternately charging the two compartments with the combustible gaseous mixture, and means for igniting said mixture alternately in the respective compartments; said oscillating valve being driven from one side to the other by the excess pressure of the gases in one compartment, and having means for restraining its movement.

7. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture and divided into two compartments separated from one another, there being one or more ports leading from said compartments adapted to discharge the gases therefrom, an oscillating valve separating said two compartments and adapted in one of its extreme positions to close the exit of one compartment and open that of the other, and in the other extreme position to close that of the second compartment and open that of the first, a pair of admission-valves operated by said oscillating valve, one to open when it moves to one side and the other to the other side, said valves being normally maintained closed at other times, and means for igniting the charges in the respective compartments.

8. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture and divided into two compartments separated from one another, there being one or more ports leading from said compartments adapted to discharge the gases therein, an oscillating valve separating said two compartments and adapted in one of its extreme positions to close the exit of one compartment and open that of the

other, and in the other extreme position to close that of the second compartment and open that of the first, a pair of admission-valves operated by said oscillating valve, one to open when it moves to one side and the other to the other side, said valves being normally maintained closed at other times, igniting devices in the respective compartments, and a timing device turning with said rotor and adapted to ignite the respective charges at suitable intervals in the rotation of said rotor.

9. A motor of the class described comprising a rotor adapted to tangentially receive gases escaping under pressure and transform their energy into rotary energy of the rotor, a stator comprising a combustion-chamber adapted to receive a combustible gas-mixture and divided into two compartments separated from one another, there being one or more ports leading from said compartments adapted to discharge the gases therein, an oscillating valve separating said two compartments and adapted in one of its extreme positions to close the exit of one compartment and open that of the other, and in the other extreme position to close that of the second compartment and open that of the first, a pair of admission-valves operated by said oscillating valve one to open when it moves to one side and the other to the other side, said valves being normally maintained closed at other times, means for igniting the charges in the respective compartments, and means driven by said rotor adapted to provide a supply of combustible gas-mixture to the respective compartments and to force it into the respective compartments whenever the respective admission-valves are open.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

HENRY G. KRESS.

Witnesses:
GEORGE SANDERSON,
ALFRED W. BEHRINGER.