A. W. COTTRELL & M. A. MOORE.

EXPLOSION ENGINE.

APPLICATION FILED AUG. 5, 1907.

900,668.

Patented Oct. 6, 1908.

2 SHEETS—SHEET 1.

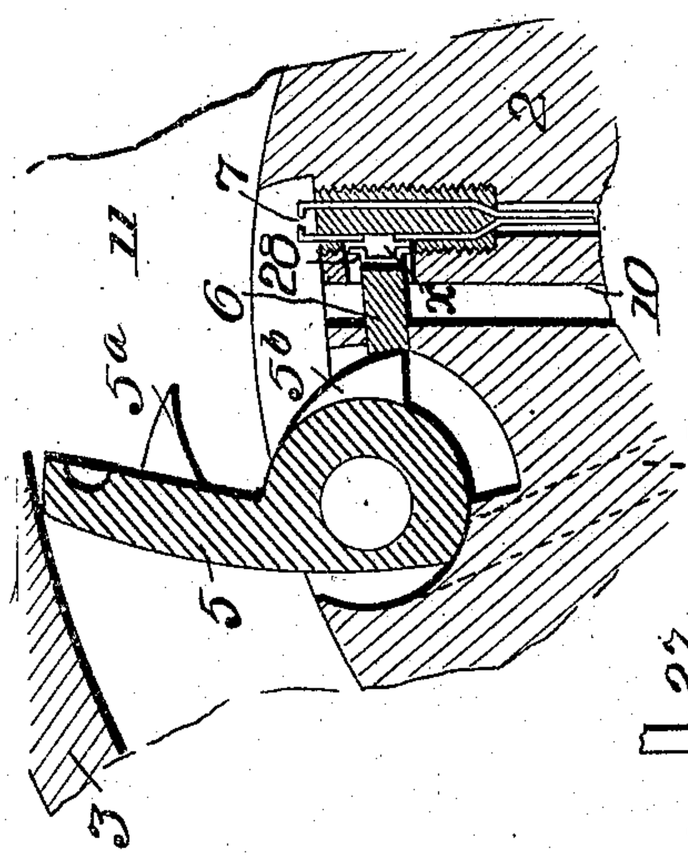

Fig. 4.

Fig. 1.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

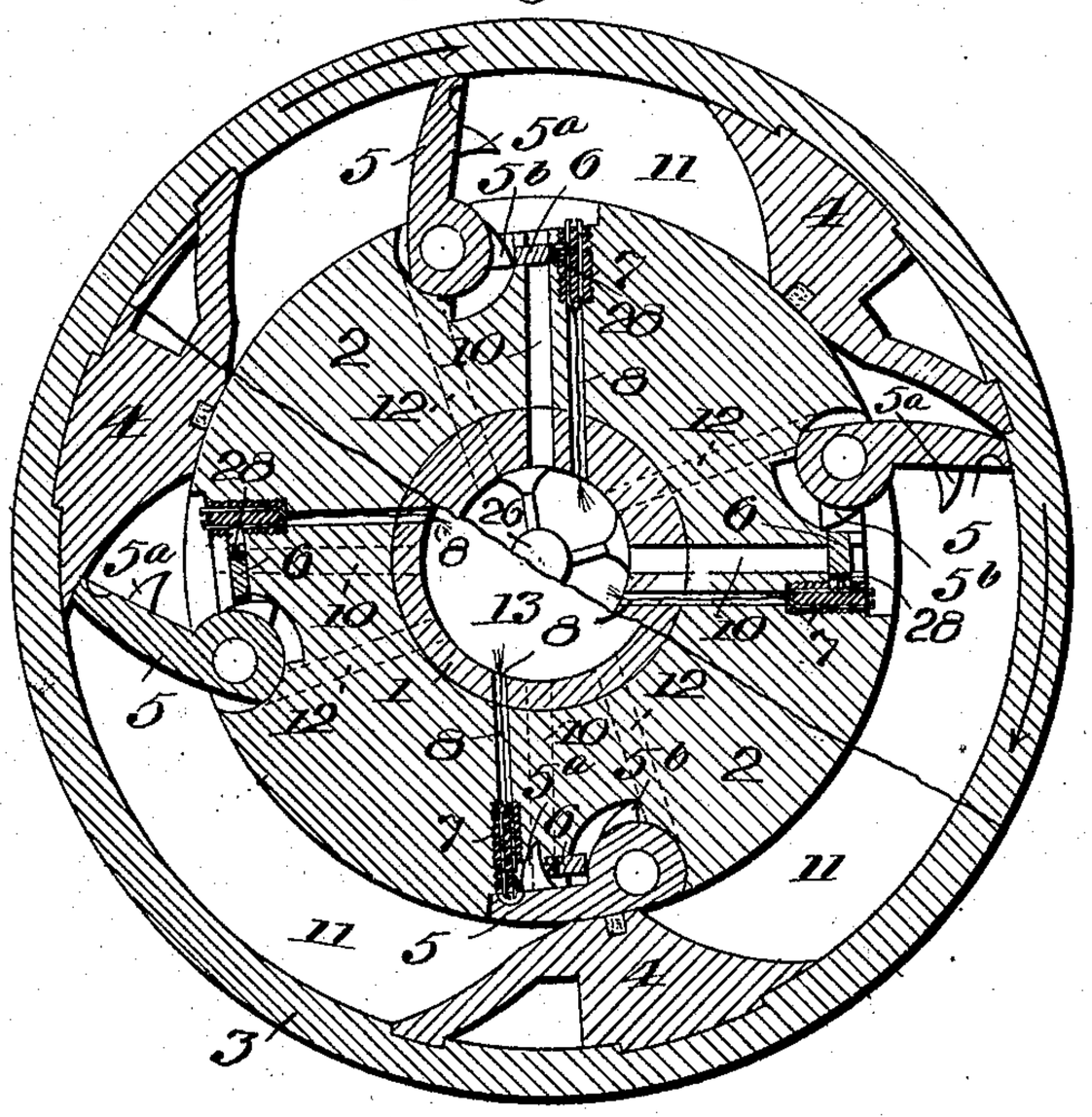
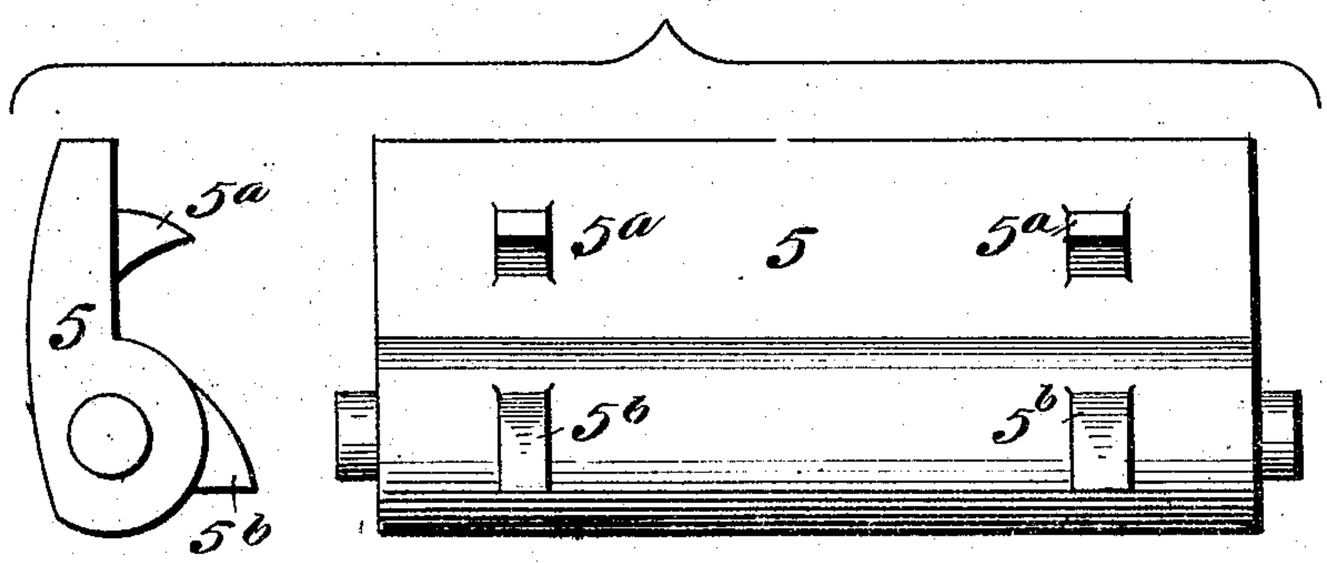


Fig. 3.



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UNITED STATES PATENT OFFICE.

ALBERT W. COTTRELL AND MILTON A. MOORE, OF DOUGLAS, ARIZONA TERRITORY.

EXPLOSION-ENGINE.

No. 900,668. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed August 5, 1907. Serial No. 387,139.

To all whom it may concern:

Be it known that we, ALBERT W. COTTRELL and MILTON A. MOORE, citizens of the United States, residing at Douglas, in the county of Cochise and Territory of Arizona, have invented certain new and useful Improvements in Explosion-Engines, of which the following is a specification.

Our invention is in the nature of a new explosion engine of the rotary type designed to secure from the successive explosions of the charge a continuous rotary motion in one direction.

It belongs to that class of rotary engines in which the shaft bearing a rigid hub portion remains stationary while the cylinder or casing revolves thereon; and it consists in the novel construction and arrangement of parts as hereinafter described with reference to the drawing, in which

Figure 1 is a central longitudinal section. Fig. 2 is a transverse section in two planes, Fig. 3 are details, in end and side views, of one of the movable abutments, and Fig. 4 is a detail of the circuit closer.

In the drawing the numeral 1 represents a hollow shaft provided in the middle with a partition *p* separating the hollow space in said shaft into two parts, the one on the right hand side of Fig. 1 being the intake and the one on the left hand side being the exhaust.

2 is a stationary hub rigidly attached to the shaft 1, and 3 is the rotating cylinder or casing having opposite ends or heads 15 turning together on said hollow shaft. Rigidly attached to the interior of the revolving casing are three (more or less) inwardly projecting lugs, 4, see Fig. 2, extending to and having a packed bearing against the stationary hub 2, and forming piston heads which revolve with the cylinder.

5 are swinging abutments pivoted in bearings on the outer periphery of the stationary hub with axes parallel to the main shaft, which abutments are adapted to turn into recesses in the periphery of the hub in passing by the piston heads 4 and after passing said piston heads the abutments swing outwardly to the inner periphery of the revolving cylinder to form explosion chambers.

5[a] are cam lugs secured to the inner side of the abutments 5 at some distance from their axes and arranged to act upon and to open slide valves 6. When the abutment is closed as at the bottom of Fig. 2 the said lugs 5[a] press the slide valve toward the axis of the abutment to uncover port 10. 5[b] are similar lugs located near the centers of said abutments and designed to act upon and to close the slide valves 6 by pressing against the opposite side of the valve 6 and forcing it across the port 10 as at the top of Fig. 2. These valves 6 thus control the ports 10 and separate the explosion chambers of the cylinder from the carbureter which is contained within the hollow shaft.

7 are sparking terminals which are arranged in suitable insulating plugs located within the recesses of the central hub and over which swinging abutments 5 close, said abutments being formed each with a small recess to close over the spark terminals. 8 are electric wires from the battery to said sparking terminals.

9 represents the inlet end of the shaft forming the carbureter which is in communication with the ports 10 forming the gas passages and through which the gas is admitted to the explosion chambers 11.

12 are radial exhaust ports through the solid hub.

12[a] are exhaust ports through a disk ring 24.

13 is the exhaust end of the shaft, 14 an exhaust chamber surrounding the same and arranged between the end plate 25 and ring 24 on one side and the cylinder head 15, on the other.

16 is the inlet air pipe.

17 is the mixing chamber, 18 an air passage to the gasolene tank 20, and 19 the gasolene pipe controlled by the valve 19[a] and extending into the mixing chamber 17 to a spraying device 23.

21 is an inwardly opening spring seated valve arranged in the air pipe 16 located between the air passage 18 and the gasolene pipe 19, and 22 is a similar spring seated valve arranged between the mixing chamber and the carbureter end of the hollow shaft.

24 is a ring forming one end of the explosion chamber and lying in the same plane with a plate 25 on the end of the stationary central hub 2.

26 is a central rotary balanced throttle valve controlling the ports 10 and having a longitudinal stem arranged in the hollow shaft and operated by a rod 27.

28, Figs. 2 and 4, is a small spring fastened to each valve 6 and insulated from the same and arranged to close the circuit

through the sparking terminals 7, by bridging across a gap x in the spark terminal circuit whenever a valve 6 is forced across port 10 to close it.

29 is a safety valve arranged in the intake end of the hollow shaft.

The operation of our rotary explosive engine is as follows: Air, under a suitable degree of compression taken from a compressor or receiver, enters the pipe 16, passing through the valve 21 and the small pipe 18 into the gasolene tank 20 whereby the air pressure is given to the gasolene. The spring on the valve 21 is made stronger than the spring on valve 22 which makes the pressure on the gasolene greater than in the mixing chamber 17, and which is regulated by the valve 19ª. The gasolene coming in contact with the spraying device 23 and meeting the air current in the mixing chamber 17, is thoroughly broken up so as to be in a perfect gaseous state, as it passes through the valve 22 into the carbureter 9. Then the gas passes through the radial inlet ports 10, past the valve 6 into the explosion chambers 11, at the same time by its pressure raising the swinging abutments 5 which act as cylinder heads. At the same time that any abutment is fully opened its cams or lugs 5ᵇ close its valve 6 over its port 10 and the circuit closing spring 28, fastened to said valve but insulated from it, comes in contact with the two terminals of the wire of the spark plug, thus closing the circuit in the same and firing the charge of gas in the explosion chamber. This explosion causes pressure to be exerted on the revolving pistons 4, thereby turning the outer cylinder or casing. When any piston 4 reaches the next abutment 5 it causes said abutment to close down into its recess in the hub. The burned gases on the exhaust side of the abutments escape through the exhaust ports 12, 12ª into the hollow end 13 of the shaft and thence from the engine. The ports 12 are open behind the abutments when the abutments are open and are closed when the abutments are closed. When an abutment 5 closes down, the cams or lugs 5ª acting upon the valve 6, cause it to be reopened in the next chamber, where the same action of explosion is repeated.

In our rotary explosion engine, it will be seen that we have three explosion chambers and four feed valves which are capable of causing twelve explosions at every revolution and the explosion chambers being long admit of the exploded gases expanding to atmospheric pressure before leaving the engine, thus giving more power from a given amount of fuel and reducing the noise of exhaust to a minimum and at the same time acting as a cooling agent to the engine. The air being compressed and cooled before being mixed with the gasolene, lessens the danger of premature explosion and aids in keeping the engine cool, and our explosion engine can be stopped and started and the speed regulated with the throttle. An important feature of our invention also resides in the fact that the inlet and exhaust ports in the hub open into the peripheral recess into which the hinged abutments shut down and the spark terminals in like manner are also located in these recesses, so that when a hinged abutment is closed over the same, the outer side of the hinged abutment furnishes a smooth circular surface that completes the periphery of the hub for the revolving pistons to slide on, and houses and protects the outer edges of the ports and the spark terminals.

We claim—

1. A rotary explosion engine, comprising a stationary hub having on its periphery one or more hinged abutments, with a recess into which each may be turned, and an inlet port opening into each recess, a valve controlling the inlet ports, spark terminals arranged inside each recess of the stationary hub and a revolving cylinder having a plurality of inwardly projecting piston heads arranged to strike the abutments and turn the same inwardly.

2. A rotary explosion engine comprising a stationary hub having on its periphery one or more hinged abutments, a recess into which the same may be turned, and an inlet port opening into said recess, spark terminals also arranged in said recess, and a valve controlling the port and operated by the swinging movement of the abutment.

3. A rotary explosion engine comprising a stationary hub having on its periphery one or more hinged abutments, a recess into which the same may be turned, an inlet port opening into the recess, a valve controlling said inlet port, and operated by the hinged abutment, spark terminals also located in the recess of the hub, said hub being also formed with an exhaust port on the opposite side of the abutment from the inlet port, and which is opened and closed by the abutment.

4. A rotary explosion engine, comprising a stationary hub having on its periphery four hinged abutments with a corresponding number of ports, feed valves operated by the abutments, and spark terminals all arranged inside the periphery of the hub, and a revolving cylinder having three inwardly projecting piston heads arranged to strike the abutments and turn them inwardly to successively feed each explosion chamber, and arranged to produce twelve successive explosions for each revolution.

5. In a rotary explosion engine the combination with a fixed hub having radial ports, of a slide valve for each port, a hinged abutment with two cams arranged to operate respectively on opposite sides of the slide

valve and spark terminals with circuit closer operated by the slide valve.

6. In a rotary explosion engine, the combination of a stationary shaft having inlet and exhaust passages in opposite ends, a hub thereon having inlet and exhaust ports communicating respectively with said passages, swinging abutments mounted in the hub and controlling said ports, spark terminals arranged in the hub, valves controlling the ports and carrying a circuit closer, and a rotary cylinder mounted on the shaft and surrounding said hub and having piston heads arranged to strike said abutments and swing the same inwardly.

7. A rotary explosion engine having a stationary hub with central axial intake and exhaust at opposite ends, and ports extending from the same to the periphery, hinged abutments on the periphery with recesses beside them into which they may be turned, a valve for each abutment controlling the inlet port and operated by the abutment, spark terminals arranged in the abutment recesses, and a revolving cylinder with piston heads operating upon the abutments.

8. In a rotary explosion engine, a stationary hub having a recess in its periphery, a hinged abutment beside it arranged to turn into the said recess, and an inlet port and pair of spark terminals both leading into said recess.

9. A rotary explosion engine having a stationary hub recessed peripherally and provided with hinged abutments fitting and turning into the recesses, and curved on their external surfaces to complete the periphery of the hub, and spark terminals arranged within such recesses.

10. A rotary explosion engine having a stationary hub recessed peripherally and provided with hinged abutments fitting and turning into the recesses and curved on their external surfaces to complete the periphery of the hub, spark terminals arranged within each recess, and ports opening into each recess.

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