H. MANRODT.

INTERNAL COMBUSTION ENGINE.

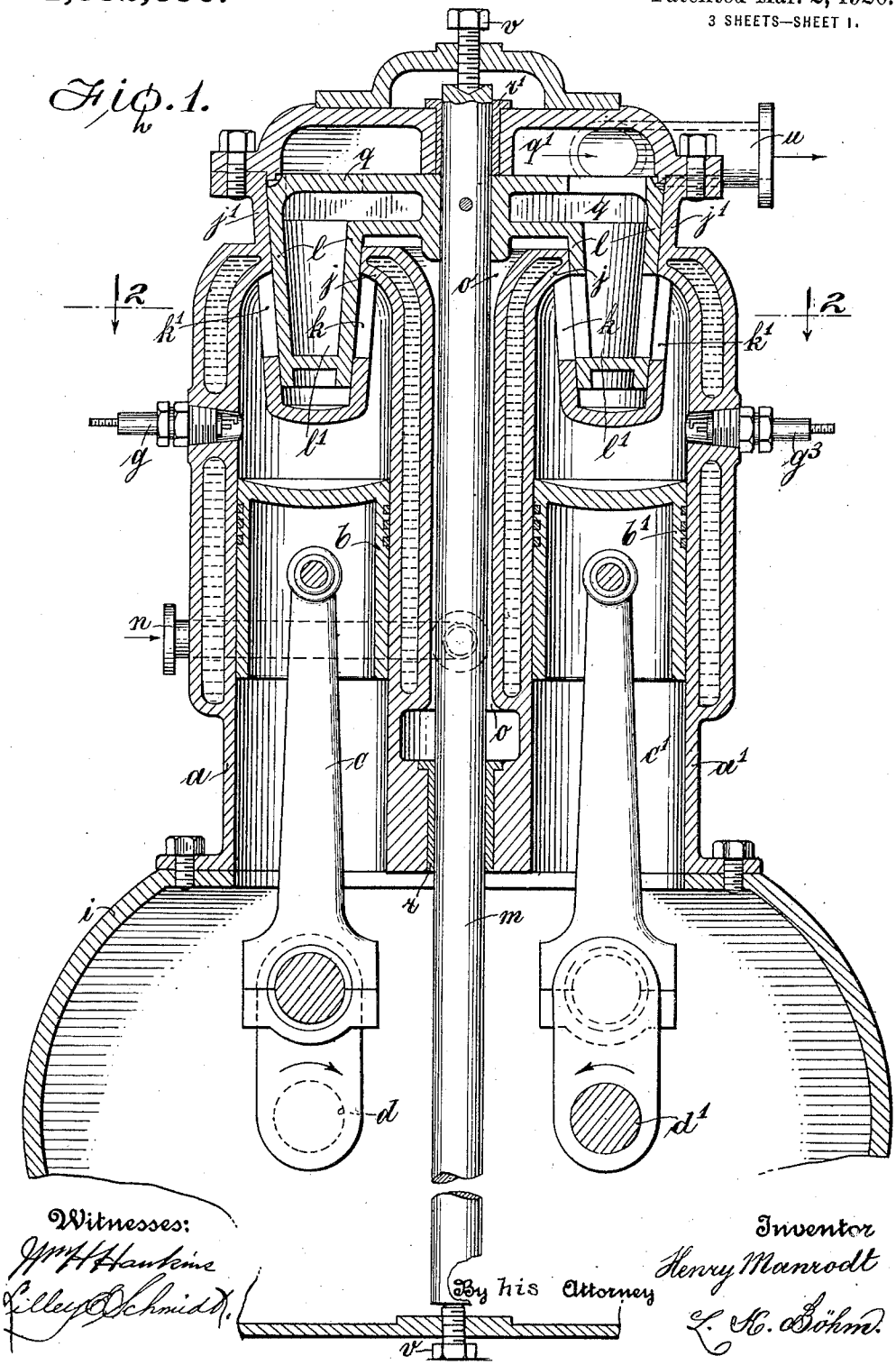
APPLICATION FILED OCT. 25, 1915.

1,332,350.

Patented Mar. 2, 1920.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

J. M. A. Hawkins

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Inventor

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3 SHEETS—SHEET 2.

Fig. 2.

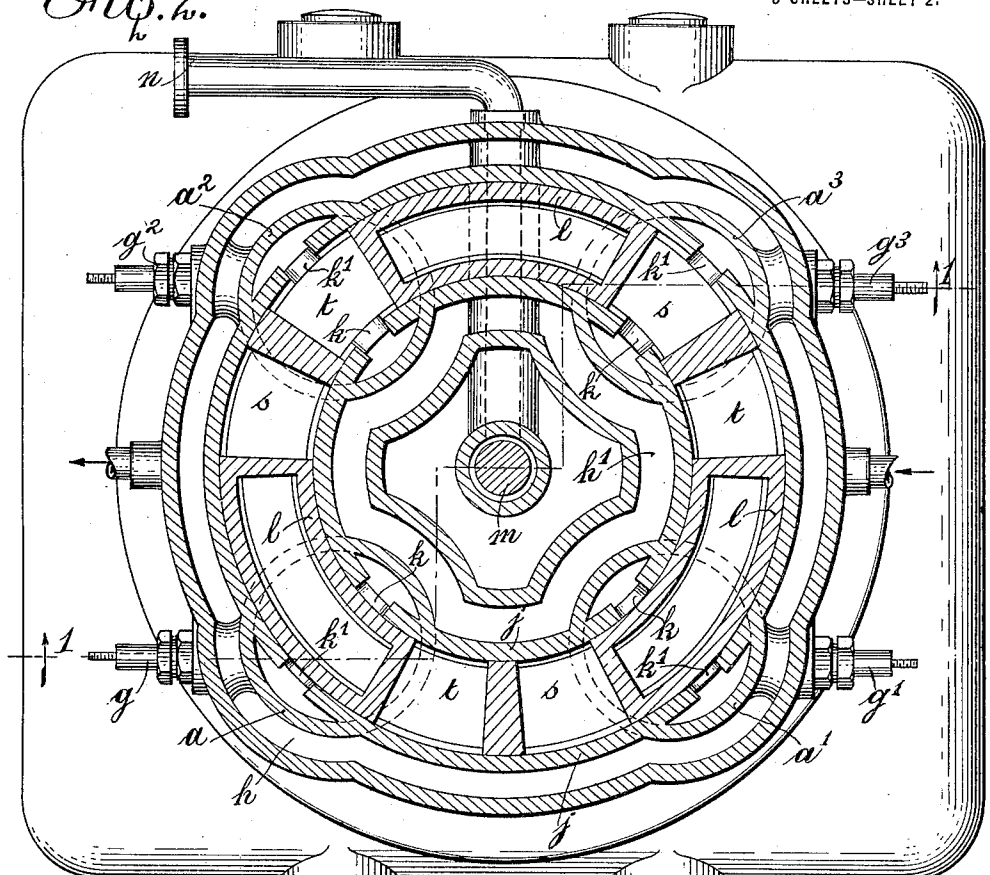
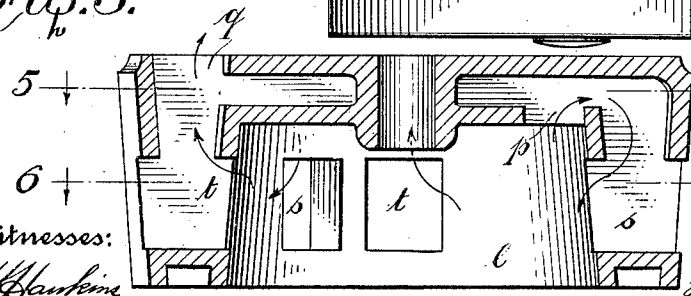


Fig. 3.



Witnesses:

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3 SHEETS—SHEET 3.

Fig. 4.

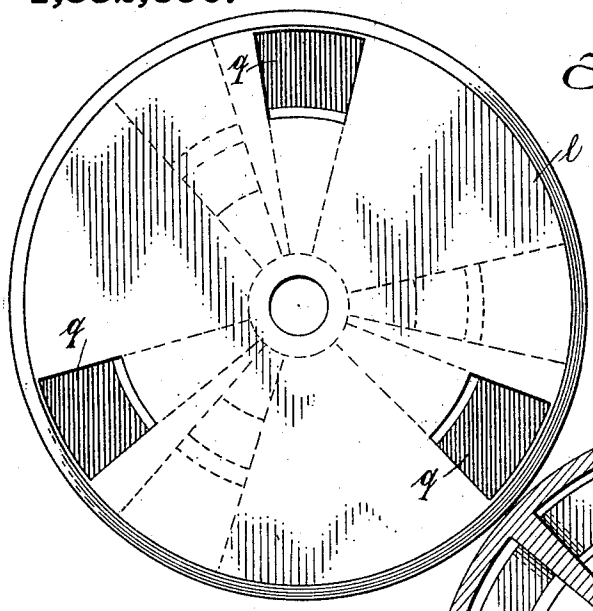
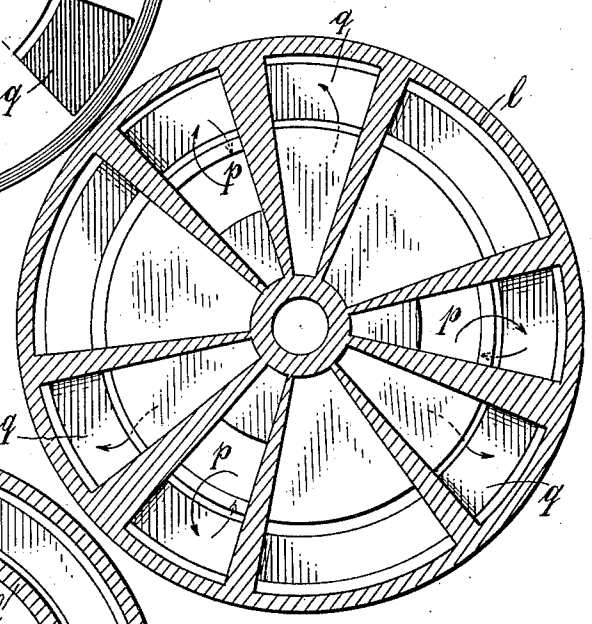


Fig. 5.



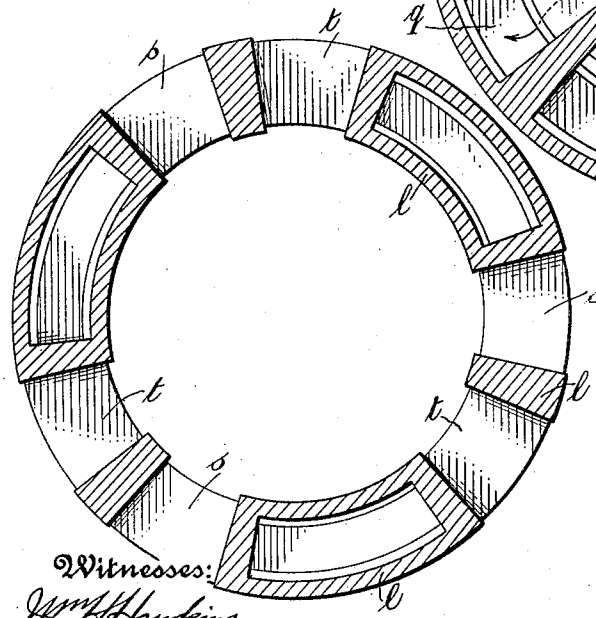


Fig. 6.

Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY MANRODT, OF BROOKLYN, NEW YORK.

INTERNAL-COMBUSTION ENGINE.

1,332,350. Specification of Letters Patent. Patented Mar. 2, 1920.

Application filed October 25, 1915. Serial No. 57,658.

To all whom it may concern:

Be it known that I, HENRY MANRODT, a citizen of the United States, and a resident of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention has reference to improvements in internal combustion engines and pertains particularly to the type of rotary motors which operate without the common valves.

According to the present invention one or more cylinders are used; if a plurality of cylinders is employed they are preferably arranged in a circle. Centrally between the cylinders a rotary valve is provided by means of which the supply of combustible fuel is successively introduced into the explosive zone of each cylinder. This rotary valve preferably is conical and also serves for expelling the exhaust gases in a perfect manner. The rotary conical valve is rigidly secured to the valve shaft.

The conical center valve reaches into the heads of the cylinders and has its fuel inlet and exhaust channels at both sides of the valve body whereby inside and outside pressure is eliminated or rather equalized. This is one of the essential features of the present invention. By virtue of the present construction the conical center valve rotates with a reduced speed. Other improvements and novel features are attained by this invention to be described hereinafter with reference to the accompanying drawings in which:

Figure 1 represents in vertical central section on line 1—1 of Fig. 2, an internal combustion engine embodying in desirable form the present invention.

Fig. 2 is a horizontal section of the engine on line 2—2 of Fig. 1.

Fig. 3 is a vertical section of the conical valve taken on a line through one of the exhaust and inlet ports.

Fig. 4 is a top plan view of the conical valve.

Fig. 5 is a cross section on line 5—5 of Fig. 3.

Fig. 6 is a cross section on line 6—6 of Fig. 3.

Similar characters of reference denote like parts in all the figures.

The conical center valve reaches into an annular chamber formed in the top of the cylinders and is rotatable therein.

Four cylinders are illustrated in the drawings. Accordingly there are eight inlet and eight exhaust ports, two of each in each cylinder. During a suction stroke the inlet ports coincide with the cylinders and upon further rotation the cylinders coincide with the exhaust ports. There are three inlet and three exhaust ports in the conical center valve, therefore this valve rotates with but $\frac{1}{6}$ of the speed otherwise required which is a practical advantage.

In the drawings four cylinders, a, a^1, a^2, a^3, are illustrated. These cylinders are vertically arranged as shown in Fig. 1. In each cylinder a piston is provided of which the pistons b, b^1, are shown. The pistons are provided with the usual piston rods c, c^1. These rods are connected to two crank shafts d, d^1. The crank shafts are connected by chains or gears e, e^1, and the shaft d^1 carries a fly wheel f. This shaft is the principal crank shaft and if a larger number than four cylinders say six or more are arranged in a circle the provision of a corresponding number of crank shafts is required, for instance six cylinders require two auxiliary crank shafts. The pistons, piston rods and crank shafts are of usual form and operate in known manner. Each cylinder is provided with a spark plug g, g^1, g^2, g^3, and other accessories required. The cylinders may have cooling ribs or may be provided with a water cooling device h, h^1. The shafts and gears are located below the cylinders in a splash case i where they run in oil, as usual, any approved construction of a splash case arrangement may be employed. In fact these described parts are all of known approved construction.

The present invention consists essentially in the following:

In the upper portion of the engine an annular chamber having walls j, j^1, is formed which passes through the upper portions of the cylinders. This chamber is circular in shape and may be conical or cylindrical. In the drawings it is shown to be conical. Incisions k are formed in the inner

wall of this chamber and incisions k^1 opposite the incisions k are formed in the outer wall of the same located in and communicating with the cylinder portions of said chamber. The conical center valve l rotates within the chamber. It is ground in and fits tightly and runs in oil. The conical center valve is mounted upon the valve shaft m. It is evident from the described construction that the engine does not require the common valves. The fuel gases are introduced and the exhaust gases expelled by means of the conical center valve. The fuel gases are introduced through the inlet n which communicates with an annular channel o around the shaft m and inlet ports p which are open to the said inlet channel o all the time. The fuel inlet n communicates with the carbureter. The conical center valve l has in its top or cover exhaust ports q through which the combustion gases are expelled. The shaft m to which the conical center valve is attached is guided in bearings r, r^1. The lower bearing r closes off the shaft completely air-tight. Accordingly the fresh fuel gases pass through the inlet port n into the channel o which surrounds the shaft m from all sides. From the channel o the fresh fuel gases pass through the ports p into the inner chamber l^1 of the conical center valve l. From the conical center valve the fresh fuel gases pass through the ports s when said ports s coincide with the ports k, k^1, into the cylinders where they are ignited and combusted and move the pistons during the rotation of the said conical center valve. Upon further rotation of this valve communication is established with the exhaust ports t, coinciding then with the ports k, k^1, through which the combustion gases are expelled, passing the port q into the channel q^1 and finally issue through the outlet u.

The conical center valve may be provided with means for introducing and expelling the gases once or several times. In the drawings this arrangement is shown to be 3 times applied to the rotatable center valve. This presents the advantage that the parts exposed to the explosion are not constantly subjected to the heat produced by the explosion but may cool off again before they come again in contact with the explosion zone. Further the conical center valve may rotate, under the described circumstances, relatively slowly. If the inlet and exhaust devices are provided 3 times, as shown, then the valve rotates at a ratio of 1 to 6 relative to the crank shaft d^1.

The operation of the present internal combustion engine is substantially as follows:

The engine is started or primed in the usual manner, the pistons move up and down and the conical center valve rotates. During the rotation the openings k of each cylinder coincide successively with the exhaust ports while the pistons perform the upward stroke. Upon further rotation of the conical center valve the inlet ports communicate with the cylinders and permit of the introduction of new fuel gases. During this period of time the pistons perform the downward or suction stroke. Now follows the compression of the fuel charge and its explosion. During this period of time the openings k of the chamber formed on top of the cylinders are completely closed by the surrounding walls of the conical center valve rotating therein. Thus the essential novel features of the invention consist in the form and arrangement of the center valve which passes through the top portions of the cylinders within the chamber formed in that section. In the chamber there are uniformly large openings. When the explosion takes place the pressure created is exerted upon the walls of the center valve that is upon those parts of the said valve which, at this moment close off the openings k on both sides. Accordingly the same pressure exists on both sides of the valve inside and outside and therefore the valve is perfectly balanced, the pressure is exerted in the direction toward the shaft and the same pressure is exerted in the direction from this shaft.

In the described manner any undue vibration and one sided load or pressure upon the shaft m is avoided. This is of great importance for a uniform running of the engine and a perfectly tight closure of all parts, at all times, is assured. The described construction solves this important question in the simplest manner.

The shaft m upon which the center valve is mounted may be rotated by any approved means, by chains, gears and the like. In order to hold the shaft m in the desired position screws v are provided at the ends of the shaft or other approved means may be used to keep the shaft in position.

I claim as my invention:

1. In an internal combustion engine, a series of cylinders and a rotatable single valve for said cylinders, said valve being in form with a hollow annular projection arranged parallel to its axis of rotation and capable of revolving through the entire series of cylinders.

2. In an internal combustion engine, a plurality of cylinders formed at their upper portion with an annular chamber and a single valve therefor formed with a hollow annular projection arranged parallel to its axis of rotation and extending into and revolving in said chamber.

3. An internal combustion engine comprising a conical rotatable hollow center valve with shaft, cylinders arranged in a circle

around the valve shaft, a conical annular chamber partly formed with the top portions of the cylinders in which the center valve rotates, ports in both sides of said center valve and cylinders coinciding successively during rotation, and exhaust ports in the top portions of the center valve, so arranged that during explosion equal pressure is exerted toward the and from the valve shaft.

4. An internal combustion engine comprising a rotatable center valve with shaft and fuel inlet ports at both sides of the valve body, cylinders arranged in a circle around the valve, an annular chamber partly formed with the top portions of the cylinders, an annular fuel channel formed around the shaft, and means for introducing fuel successively into the cylinders from both sides of said rotatable center valve, so that during the explosion equal pressure is exerted toward the and from the valve shaft.

5. An internal combustion engine comprising a rotatable center valve with shaft and fuel inlet ports at both sides of the valve body, cylinders arranged in a circle around the valve, an annual fuel channel formed around the shaft, exhaust ports in the cover of the valve, and means for introducing fuel successively into the cylinders from both sides of said rotatable center valve, so that during the explosion equal pressure is exerted toward the and from the valve shaft.

6. An internal combustion engine comprising a plurality of cylinders, inlet and exhaust ports therein, one rotary balanced center valve for all the cylinders having an annular circumferential extension, fuel inlet and exhaust ports in said valve, and walls of the said valve adapted to close the inlet and exhaust ports of the cylinders during the compression and explosion stroke, so arranged that the pressure is exerted in opposite directions against the valve which thereby is perfectly balanced.

7. In an internal combustion engine, a plurality of open topped cylinders formed at their upper portion with an annular chamber, a single central valve for said cylinders formed with a hollow marginal annular projection arranged parallel to its axis of rotation and borne in said annular chamber.

8. In an internal combustion engine, a plurality of open topped cylinders formed at their upper portion with an annular chamber extending circumferentially partly outside and partly inside of said cylinders and a single valve for said cylinders formed with a hollow annular projection arranged parallel to its axis of rotation and revolubly borne in said annular chamber.

9. In combination with cylinders of an engine or the like, having ports, a rotatable valve for said cylinders centrally supported and having an annular marginal projection and ports, said projection being arranged parallel to its axis of rotation and an annular chamber connected with said cylinders, said marginal projection extending into and capable of revolving in said annular chamber and the ports of said cylinder being adapted to successively coincide with the ports of said valve and to be alternately closed off by the walls of said valve.

10. In an internal combustion engine, a plurality of open topped cylinders formed at their upper portion with an annular chamber and a single valve for said cylinders formed with a hollow annular projection arranged parallel to its axis of rotation and extending into the said chamber and capable of revolving therein to control the admission of fuel into the cylinders and the discharge of the combustion gases therefrom.

11. An internal combustion engine comprising a plurality of cylinders, a single rotary central valve for said cylinders having an annular hollow projection, an annular chamber connected with said cylinders, said hollow projection extending into and capable of revolving in said chamber, said chamber having ports on both sides whereby pressure is exerted in opposite direction against said valve projection.

12. In an internal combustion engine, a plurality of cylinders, a rotatable central valve for said cylinders having a marginal annular hollow projection, an annular chamber connected with said cylinders and having ports in its inner and outer walls, said hollow projection also having ports and extending into and capable of revolving in said annular chamber, the ports of said chamber being adapted, during the operation, to alternately coincide with the ports in the said valve projection and to be closed off by the walls of the said projection whereby pressure is exerted in opposite directions against the said valve projection.

13. A single valve for a series of cylinders comprising an annular chamber connected with the entire series of cylinders, a rotary body formed with an annular marginal projection arranged parallel to its axis of rotation and extending into and capable of revolving in said chamber.

14. A single valve for a series of cylinders comprising an annular chamber connected with the entire series of cylinders and having ports in its inner and outer walls, a rotary body having a marginal annular projection arranged parallel to its axis of rotation and extending into and capable of revolving in said annular chamber and having ports adapted, during the operation, to alternately coincide with those of the said annular chamber.

15. In an internal combustion engine, a series of open topped cylinders arranged in a

circle, an annular chamber connected with the entire series of said cylinders and a single valve for said cylinders formed with a hollow annular projection arranged parallel to its axis of rotation and extending into and capable of revolving in said annular chamber, and adapted to control the successive admission of fuel into the different cylinders and the successive discharge of the combustion charges therefrom.

Signed at New York, N. Y., this 22nd day of October, 1915.

HENRY MANRODT.

Witnesses:

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LILLEY E. SCHMIDT.