No. 753,086. PATENTED FEB. 23, 1904.

C. P. MAINS.

ROTARY ENGINE.

APPLICATION FILED SEPT. 3, 1901.

NO MODEL.

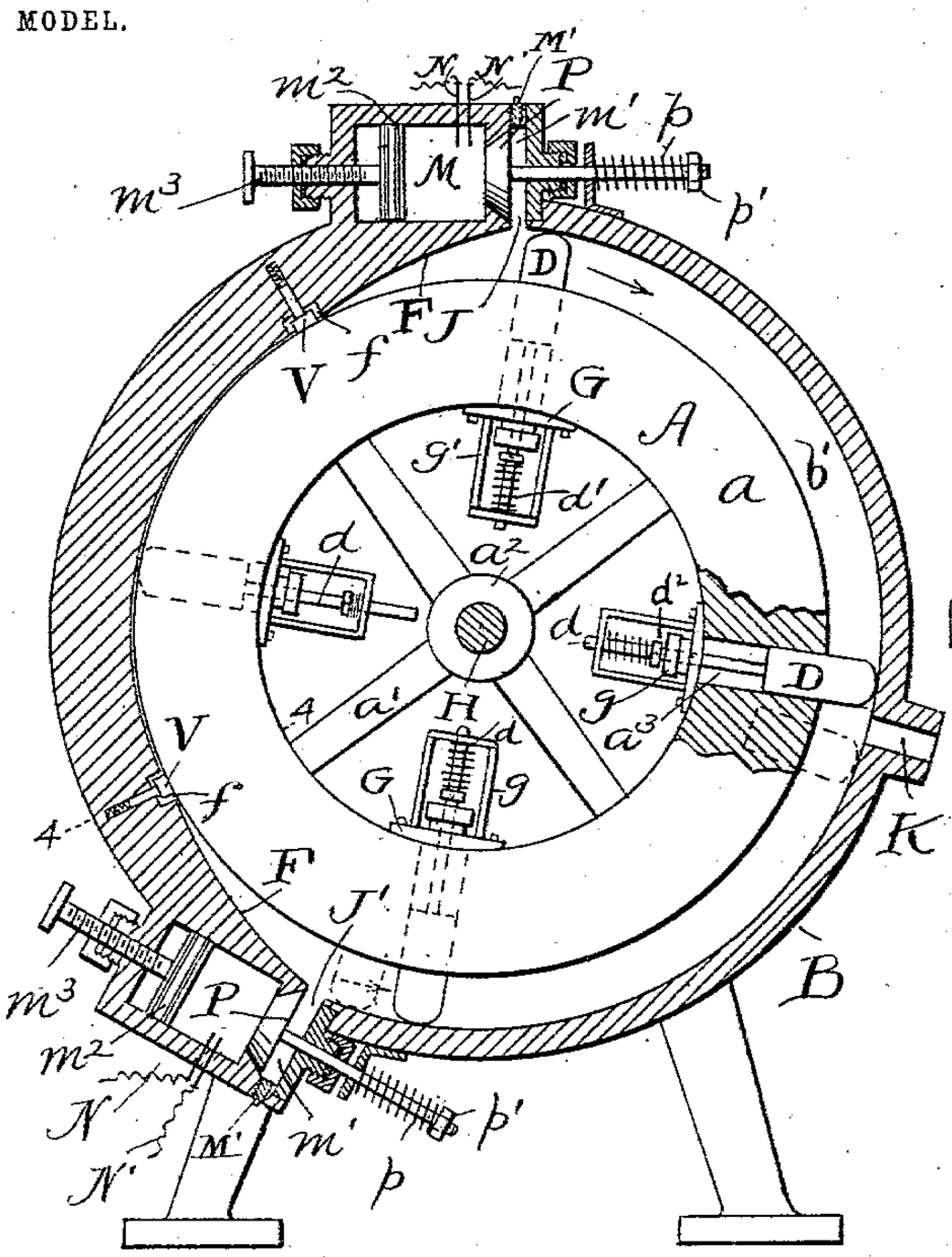

Fig. 1.

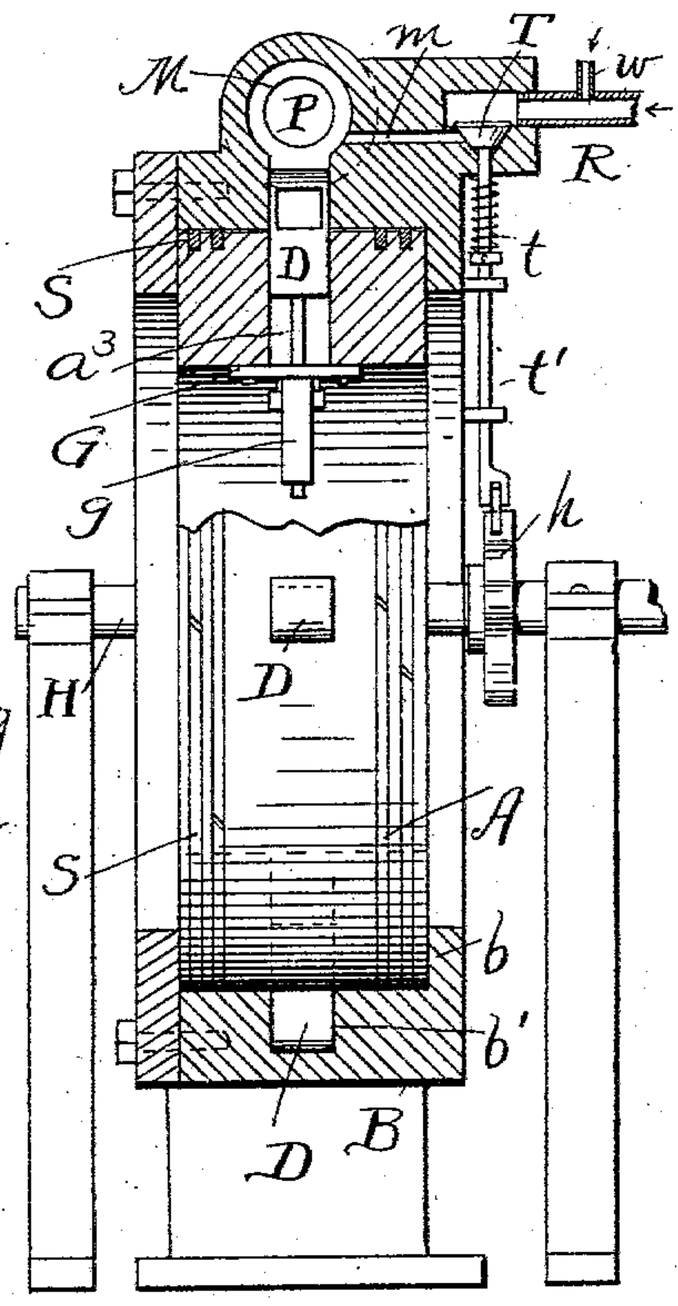

Fig. 2.

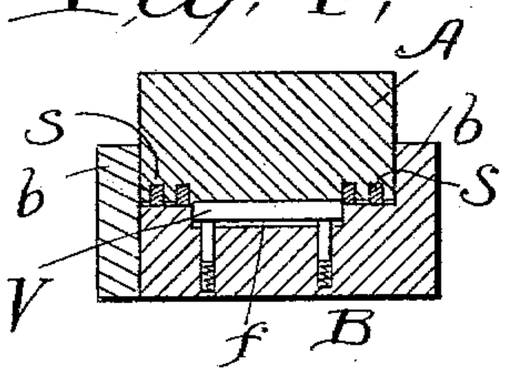

Fig. 4.

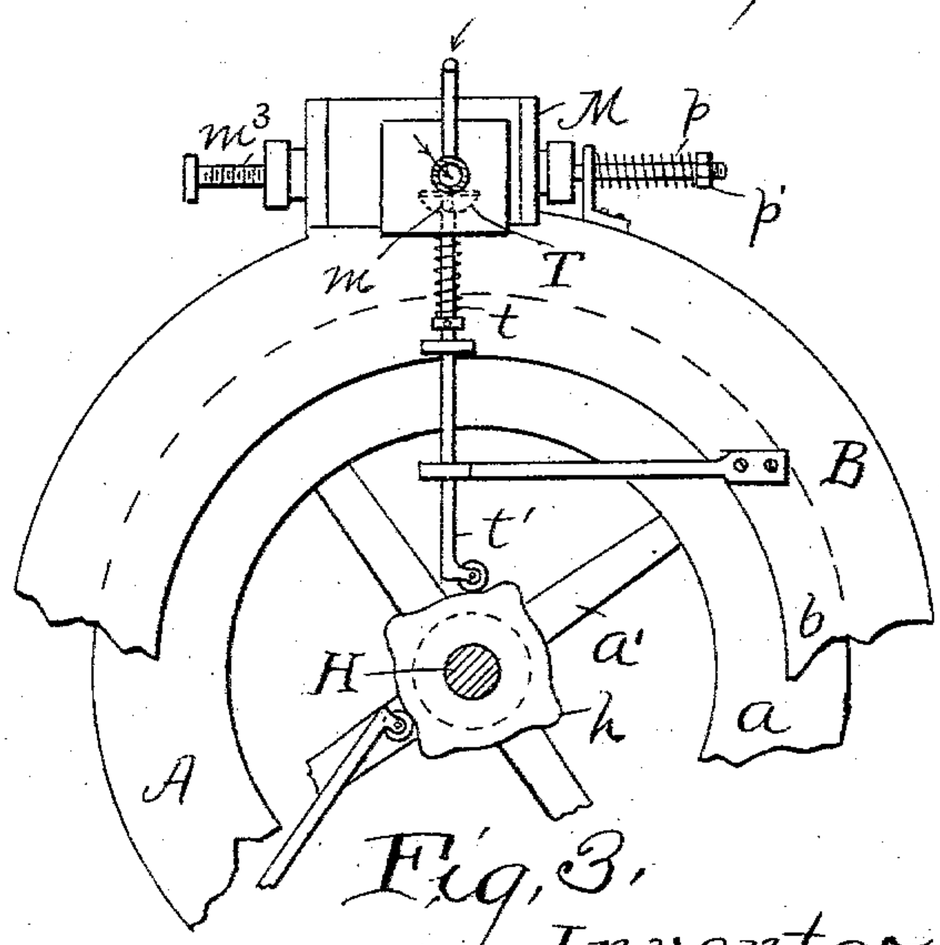

Fig. 3.

Witnesses.
E. B. Gilchrist
Flora Brennan.

Inventor.
Claude P. Mains
By his attorneys
Thurston & Bates

No. 753,086. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

CLAUDE P. MAINS, OF LAKEWOOD, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 753,086, dated February 23, 1904.

Application filed September 3, 1901. Serial No. 74,074. (No model.)

To all whom it may concern:

Be it known that I, CLAUDE P. MAINS, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of the invention is to provide a cheap but efficient rotary engine capable of being used as an explosion-engine or with steam or any other fluid under pressure as the motive force.

The engine illustrated in the drawings is especially adapted for use as an explosion-engine.

The invention consists in the construction and combination of parts hereinafter described, and pointed out definitely in the claims.

In the drawings, Figure 1 is a transverse central sectional view of the engine. Fig. 2 is a front view of the engine with the casing and the upper part of the piston-carrier in vertical section. Fig. 3 is an end view of a part of the engine, intended to show certain valve-operating mechanism. Fig. 4 is a sectional view through the casing and rim of the piston-carrier in the plane indicated by line 4 4 of Fig. 1.

Referring to the parts by letters, A represents a rotary piston-carrier which is attached to a suitably-mounted driving-shaft H. This piston-carrier is in the form of a wheel comprising a hub a^2, spoke a', and a cylindrical rim a. This rim is fitted into a cylindrical casing B, which has the inwardly-projecting side flanges b, which engage with the opposite faces of said rim for some distance in from the outer periphery thereof. In the cylindrical part of the casing is an internal annular groove b', which serves as the piston-chamber.

The piston-carrier is provided with a plurality of pistons D, which are radially movable in recesses a^3, extending entirely through the rim. Each piston is provided with a stem d, which extends radially inward through a stuffing-box g, forming part of a plate G, which is secured to the inner periphery of the rim a, so as to close the inner end of the associated recess a^3. Embracing each piston-stem is a coiled spring d', which is compressed between a shoulder d^2, secured to the stem, and a yoke g', secured to the cap-plate G, and this spring exerts its force to move the piston outward until its outer end engages with the inner cylindrical periphery of the casing. When it is in this position, it entirely fills the piston-chamber at that point and forms a movable partition therein.

F represents an abutment which is secured to the inner periphery of the casing B or is formed as a part of it and which extends into and across the piston-chamber into substantial contact with the periphery of the piston-carrier, entirely filling said piston-chamber for a greater or less distance. The ends of this abutment are beveled—that is to say, they recede gradually from the periphery of the piston-carrier and are merged into the inner periphery of the cylindrical casing. When the piston-carrier is rotating and one of the pistons comes to the beveled end of this abutment, it is pushed back into its recess a^3; but it is again pushed by its spring out of said recess and across the piston-chamber when the end of this abutment is reached.

The casing B is provided with two inlet-openings J J′, which communicate with the annular piston-chamber and are located close to the ends of the said abutment. Whatever fluid under pressure is admitted to the piston-chamber through one of these openings will exert its force between said abutment and that piston which has just passed the abutment, and thereby the piston-carrier will be rotated in one direction. Whatever fluid under pressure is admitted to the piston-chamber through the other inlet-opening will act similarly upon the adjacent piston, but will drive the piston-carrier in the opposite direction. Obviously when such fluid is being permitted to enter the piston-chamber periodically through one of these openings it should be prevented from entering said chamber through the other opening. Between these two inlet-openings is the exhaust or outlet opening K.

Near each of the inlet-openings is a chamber M, in which when the device is used as an

explosion-engine the explosive mixture is exploded by an electric spark which jumps between the two electrodes N N′, projecting into this chamber. Each of these chambers is in the form shown, a cylinder having near one end the inlet-opening *m* and the outlet-opening *m′*, which communicates with one of the inlet-openings J J′. This outlet-opening *m′* is closed by a valve P, which is moved inwardly to its seat by a spring *p*, whose force may be varied by the nut *p′*. Adjacent to the puppet-valves P each of the explosive-chambers is provided with a plug M′, which when removed will permit communication between the explosion-chamber and the outside air. The object of these plugs is to relieve the back pressure caused by the compression of the air between the piston as it moves from the exhaust K toward one of the explosion-chambers and that chamber. For example, when a piston-blade is traveling from said exhaust-port K toward the lower explosion-chamber the air in the space between said chamber and said exhaust-port would be compressed until, if not relieved, it would be sufficient to prevent the further operation of the engine; but the opening left by the removal of the lower plug M′ allows this compressed air to pass out. The force of an explosion within the chamber overcomes the force of this spring and opens the valve P and permits the exploded gas to pass through the openings *m′* and J into the piston-chamber, there to do its allotted work. In the other end of this cylindrical chamber M is a piston m^2, whose position may be adjusted by a screw m^3, whereby the size of the explosion-chamber, and consequently the force of the explosions therein, may be varied. The inlet-opening *m* is a duct which is placed in communication with a carbureter R by the opening of a valve T. Any specific carbureter may be employed, the carbureter which is shown being merely a conventional representation of such a device. The valve T is drawn to its seat by a spring *t* and is periodically opened by a multiple cam *h*, attached to the driving-shaft and engaging with the valve-stem *t′*.

The foregoing description applies equally well to the explosion-chamber and coöperating parts which are associated with either of the inlet-openings J J′.

Annular packing-rings S are interposed between the adjacent cylindrical surface of the casing and piston-carrier, respectively, on opposite sides of the annular piston-chamber. Transverse packing-strips V are located in recesses *f* in the abutment, and they are forced by springs against the periphery of the piston-carrier, and particularly that part thereof which is in line with the annular piston-chamber.

To use the described engine for steam or other analogous fluid under pressure, the valve P might be removed and any ordinary cut-off valve substituted therefor, in which case the chamber M would serve as a steam-chest and would be connected with the steam-generator in the usual manner.

I claim—

1. In a rotary engine, the combination of a cylindrical casing having first an internal annular groove forming a piston-chamber, second an abutment with inclined ends projecting into said piston-chamber, third two inwardly-projecting side flanges, fourth an inlet-opening to the piston-chamber located near one end of said abutment, and fifth an outlet-opening, an explosion-chamber adjacent to said inlet-opening, means for periodically filling said chamber with an explosive gas and then exploding the same, an outwardly-opening spring-closed valve between said explosion-chamber and inlet-opening, adapted to be blown open by the force of the charge with a rotary piston-carrier comprising a hub, spokes and a rim with annular recesses through it, pistons movable in said recesses and having piston-stems projecting inward beyond said rim, cap-plates secured to the inner periphery of said rim over the inner ends of said recesses and having stuffing-boxes through which said piston-stems pass, and springs acting on said stems to force said pistons outward, substantially as and for the purpose specified.

2. In an explosion-engine, the combination of an explosion-chamber communicating with the piston-chamber through a valve-controlled opening, and a piston in said explosion-chamber, with means for adjusting the position of said piston for the purpose of varying the size of said explosion-chamber, substantially as and for the purpose specified.

3. In an explosion-engine, in combination, a casing having a piston-chamber and an explosion-chamber, and a port therebetween, a valve adapted to normally close said port, means whereby an explosion within said explosion-chamber may open said valve, and means for changing the capacity of said explosion-chamber, substantially as described.

4. In an explosion-engine, in combination, a main shaft, a piston-chamber, a piston mounted therein and adapted to rotate said shaft, an explosion-chamber having a port communicating with said piston-chamber, a puppet-valve adapted to close said port and opening outwardly from said explosion-chamber, a spring normally maintaining said valve upon its seat, a piston mounted in said explosion-chamber, and means for maintaining said last-named piston in different positions within said explosion-chamber.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CLAUDE P. MAINS.

Witnesses:
E. B. GILCHRIST,
E. L. THURSTON.