I. LE R. JOHNSTON.

GAS ENGINE.

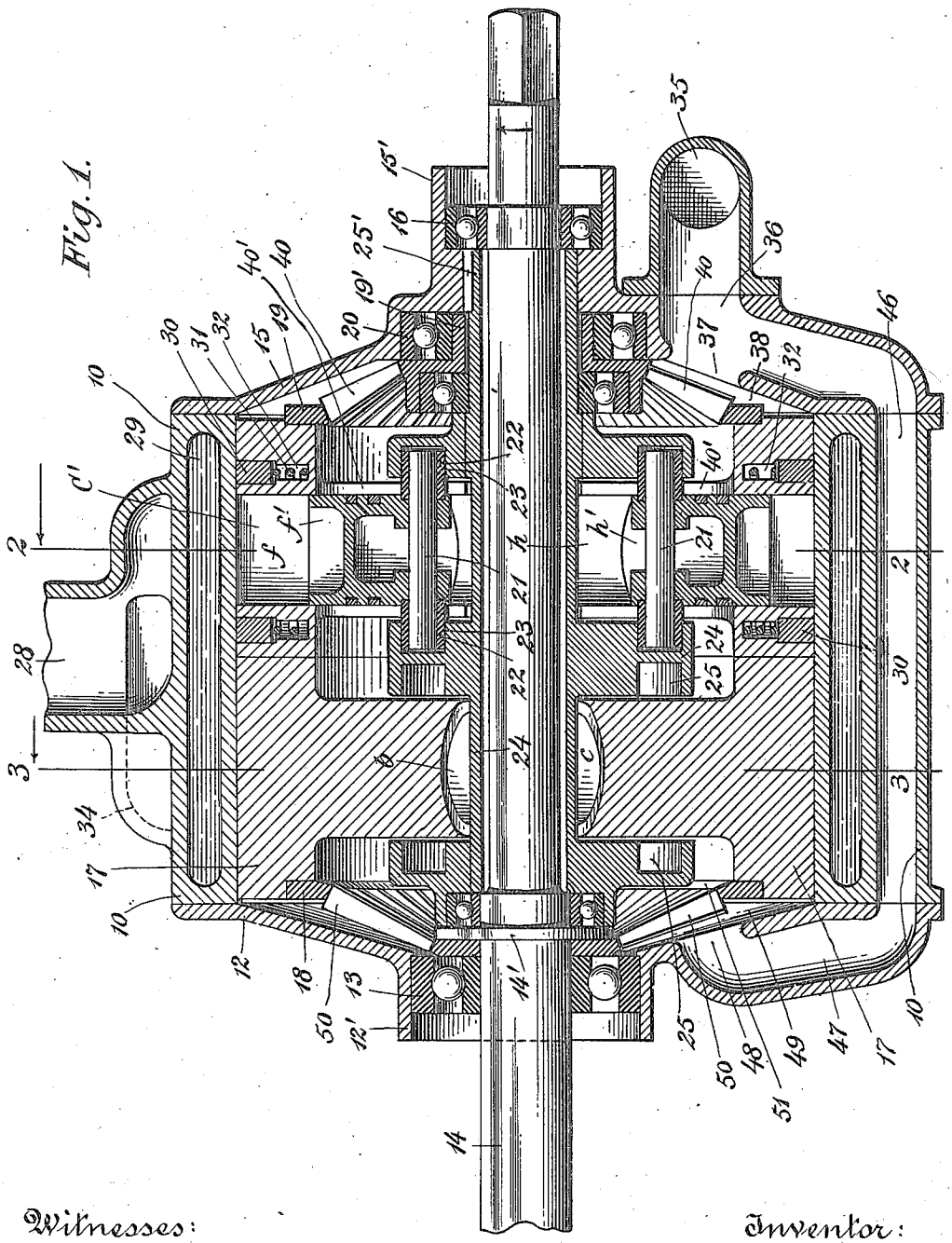
APPLICATION FILED FEB. 9, 1914.

1,184,651.

Patented May 23, 1916.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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H. McMillan

Inventor:

Isaac LeRoy Johnston,

By his Attorney

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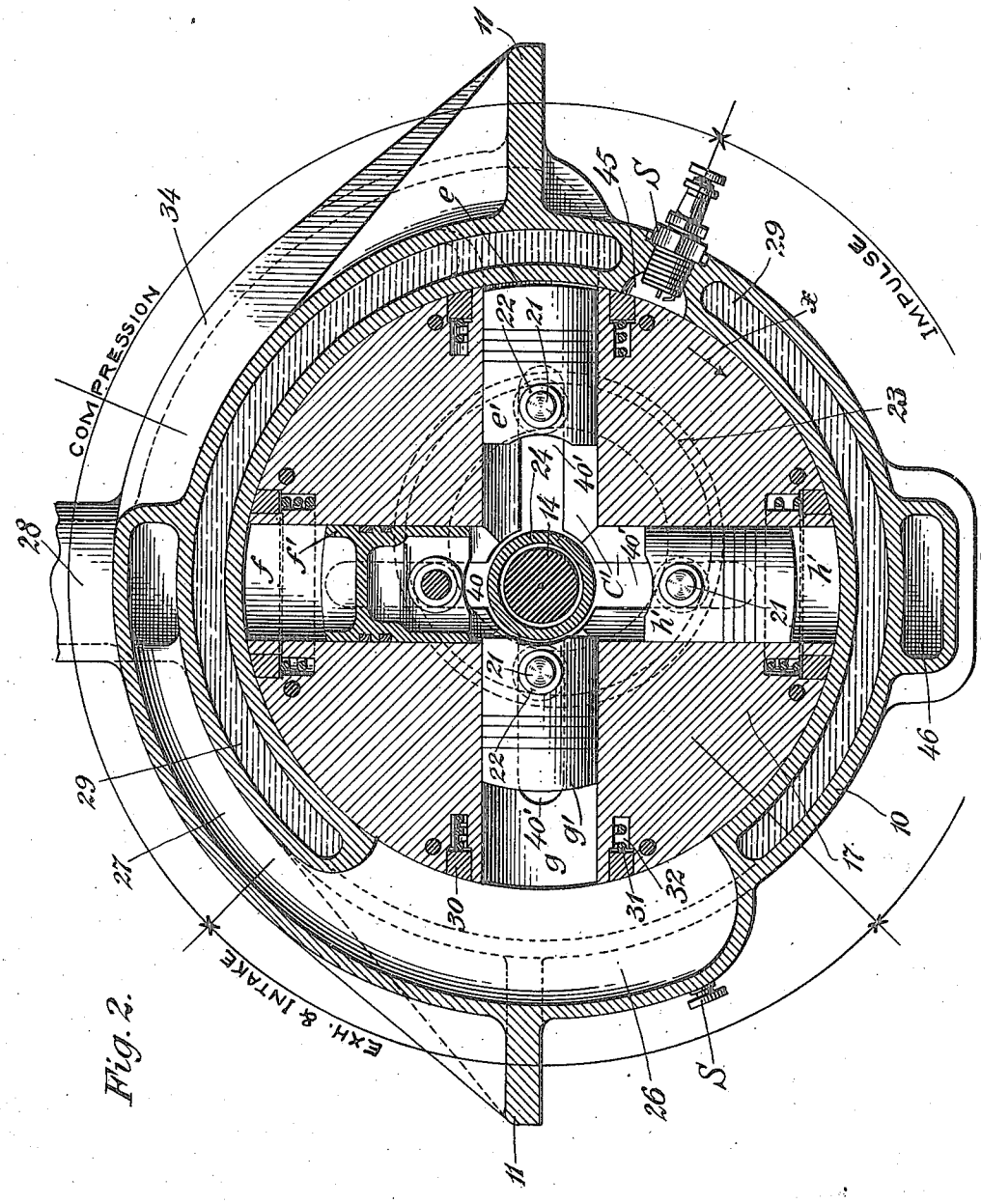


Fig. 2.

Witnesses:

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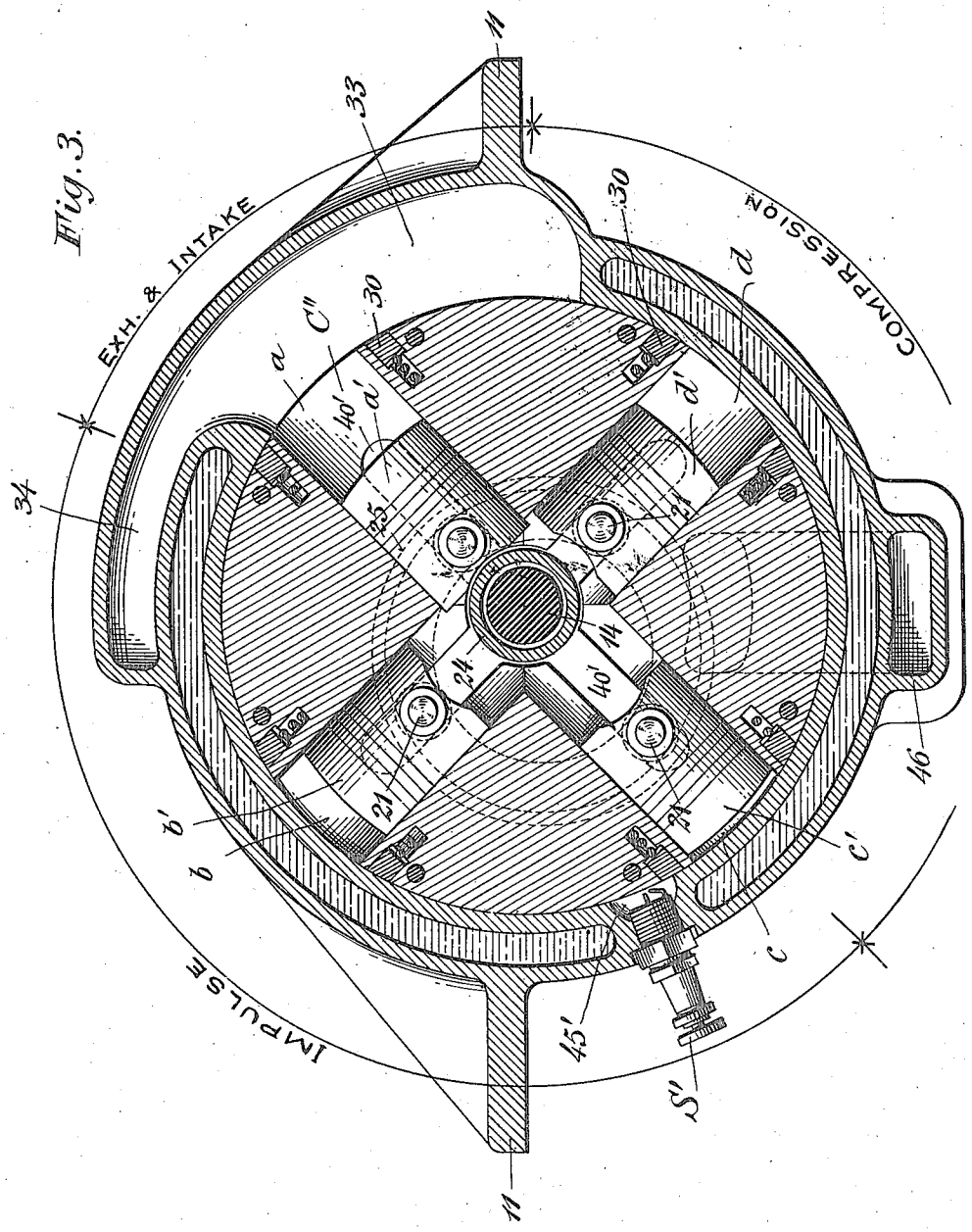
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3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

ISAAC LE ROY JOHNSTON, OF DETROIT, MICHIGAN, ASSIGNOR TO HIMSELF, JOHN O. JOHNSON, JOSEPH A. SCOTT, AND WALTER E. STUART, ALL OF DETROIT, MICHIGAN.

GAS-ENGINE.

1,184,651. Specification of Letters Patent. Patented May 23, 1916.

Application filed February 9, 1914. Serial No. 817,521.

To all whom it may concern:

Be it known that I, ISAAC LE ROY JOHNSTON, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Gas-Engines, or which the following is a specification.

This invention relates to internal combustion engines, and more particularly to that class thereof which are generally known as "rotary-type", and it has for one of its objects the provision of an engine of this class comprising a multi-cylinder head rotatable within a stationary casing which contains the gas inlet and exhaust passages and chambers.

The invention has, furthermore, for its object the improved construction and organization of the gas supplying mechanism which in the present instance comprises means for establishing a supply of gas under a slight pressure, regardless of the suction established by the movement of the piston within each cylinder.

Further objects of the invention will hereinafter appear and be particularly defined in the claims.

The invention has been clearly illustrated in the accompanying drawings, in which similar characters denote similar parts, and in which:—

Figure 1 represents a central longitudinal section of an internal combustion engine embodying my invention. Fig. 2 is a cross section on line 2—2 of Fig. 1. Fig. 3 is a similar section on line 3—3 of Fig. 1, the several views mentioned thus far illustrating an engine of the 2-cycle type.

Referring to the drawings, 10 denotes a cylindrical casing or shell provided with laterally-extending flanges 11 whereby the same may be secured upon any suitable frame. This shell is closed at one end by a cover or head 12 (see Fig. 1), the hub portion 12′ of which is provided with a ball-bearing 13 for rotatably supporting the main shaft 14 of the engine at that point. Similiarly, the other end of the casing 10 is provided with a head or cover 15, the hub portion 15′ of which has a ball-bearing 16 for supporting the shaft 14 at that end. From the foregoing it will be understood that the casing, together with its covers 12 and 15, are stationary members.

Mounted for rotation within the casing 10 and closely fitting within the same, is a cylinder head 17, one end of which is provided with a cover member 18 having its central portion secured to a flange 14′ of the main shaft 14, while its opposite end carries a cover-member 19, the hub 19′ of which is supported within the hub extension of the casing cover 15 through the intervention of a ball-bearing 20, thus holding the several parts in true central relation relatively to each other.

In Figs. 1 to 3, the head 17 comprises two sets of cylinders, designated in a general way by C′ and C″, each set comprising four cylinders designated by *a*, *b*, *c*, *d*, and *e*, *f*, *g*, *h*, respectively, the particular cylinders of each set being preferably so disposed as to have their axes intersecting each other at right angles, and furthermore so arranged that the axes of the cylinders of one set are located angularly half way between the axes of the second set. Inasmuch as the engine thus far described is of the two-cycle type, it follows that during each rotation of the main shaft and the cylinder head eight impulses will be imparted to the same at equally spaced intervals. Mounted for radial reciprocation in the several cylinders above mentioned are pistons *a*′, *b*′, *c*′, *d*′, *e*′, *f*′, *g*′, *h*′, respectively, each piston having a spindle 21 extending therethrough and provided at its outer ends with anti-friction rollers 22, one set traveling within grooves 23 of an eccentrically disposed resistance member 24 which is stationary and keyed to the hub 15′ of the cover 15, by a key or spline 25′ (see Fig. 1). In order to obtain uniformity of movement, the grooves 23 are preferably of "true eccentric" shape, and the resistance member 24 is provided with two sets of such grooves 23, 25 respectively for the pairs of sets of the pistons of the engine respectively, the organization being such that the "high and low" points of one groove will be disposed half way, or at an angle of forty-five degrees (or an uneven multiple thereof) relatively to the high and low points of the other set.

Referring to Fig. 2, the cylinder head rotates in the direction of arrow *x*, and the exhaust port 26 is so disposed in the casing that each cylinder will have a full communication therewith when its piston has arrived at the innermost end of its stroke, or in other words, the exhaust will commence

approximately 22½ degrees before the end of the full piston stroke. The exhaust port 26 is connected with a conduit 27 which communicates with an exhaust pipe 28, the latter being common to both sets of cylinders C′, C″ as clearly seen in Fig. 1. A water space 29 is provided to preserve the moving parts at proper temperature. In order to prevent leakage in the outer ends of the cylinders during the compression stroke of the pistons, each cylinder is surrounded by a packing ring 30 seated within a corresponding recess in the cylinder and maintained in contact with the inner bore of the casing by a spring 31 seated within an annular recess 32. This spring may be very light, because the centrifugal force exerted upon the ring 30 during the rotation of the cylinder head will be amply sufficient to maintain the ring 30 in close contact to prevent leakage. The same construction applies to the cylinders of the second set C″ which exhaust through a port 33 communicating with the exhaust pipe 28 through a conduit 34. In order to support the left-hand end of the resistance member in proper relation to the shaft 14, a ball-bearing is interposed between these two members at that point. Gas is supplied to the several cylinders through a pipe 35, coming from any suitable carbureter and communicating with a conduit 36 provided on the cover 15 and having an aperture 37 through which the gas may pass into the space 38 which constitutes a gas chamber from which the gas is not only permitted to enter into the inner chamber 39 of the cylinder head, but is drawn thereinto by fan-blades 40 provided on the member 19 above mentioned, so that the rotation of the latter will tend to slightly compress the gas within the chamber 39 from which the gases may enter the several cylinders through slots 40′, which not only act as ports but are furthermore utilized as guides for the anti-friction rollers 22 above described.

By referring to Fig. 2 it will be seen that the operation is as follows: The piston g' is near the end of its inward stroke and cylinder g is, and has been, in communication with the exhaust port 26. In this position of the piston the greater part of the exhaust gases have already left the cylinder and the gas-inlet slots 40 are on the point of being uncovered, and will thus remain uncovered during the next succeeding movement of forty-five degrees of the cylinder head movement. The charge of gas accumulated in the cylinder will then be compressed until the highest point of the eccentric path of the grooves 22 has been reached, whereupon the charge is fired by an electrical spark, due to the spark-plug S as usual in machines of this class, the spark-plug having its inner end disposed within a recess 45 provided for that purpose and into which the compressed gas will enter as soon as the compression chamber formed in the piston will be in register therewith. The same operation just described in connection with the piston g' and its cylinder g, prevails for each of the other cylinders and pistons of this particular set.

The other set, and the operation pertaining thereto, are clearly shown in Fig. 3, the spark-plug S′ seated within the recess 45′ exploding the charge in the same manner as mentioned above, it being understood that the several pistons a', b', c', d', are controlled by the grooves 25 of the resistance member 24 above referred to. While the gas of the carbureter pipe 35 enters into the gas chamber 38 through the port 37, gas is also carried to the opposite end of the machine through a conduit 46 opening into the conduit 36 and communicating at the other end with a conduit 47 constituting a part of the cover 12 and opening through a port 48 into the gas chamber 49 from which the gas is taken by fan-blades 50 into the inner chamber 51 for distribution for the second set of cylinders.

I claim:

1. A gas engine comprising a casing having an exhaust port and a gas inlet chamber, a head mounted for rotation in said casing and having a series of consecutively-operative radial cylinders, pistons movable in said cylinders respectively, a stationary resistance member having a cam groove, a device carried by each piston and extending through the cylinder wall into said cam groove, means carried by said head for carrying gas under pressure into said gas chamber, and a conduit connecting said gas chamber with each cylinder at a predetermined point of the piston movement.

2. A gas engine comprising a casing having an exhaust port and a gas inlet chamber, a head mounted for rotation in said casing and having a series of cylinders open at their outer ends and adapted to register with said exhaust port, pistons movable in said cylinders respectively, a stationary resistance member having a cam groove, devices carried by each piston and extending through the cylinder walls into said groove, means controlled by the movement of said head for carrying gas under pressure into said gas chamber, and a port in each cylinder for connecting the same with said gas chamber at a predetermined point of the piston movement.

3. A gas engine comprising a casing having an exhaust port and a gas inlet chamber, a head mounted for rotation in said casing and having a series of cylinders open at their outer ends and adapted to register with said exhaust port, pistons movable in said cylinders respectively, a stationary re-

sistance member having a cam groove, devices carried by each piston and extending through the cylinder walls into said groove, a series of fan blades carried by said head for carrying gas under pressure into said gas chamber, and a port in each cylinder for connecting the same with said gas chamber at a predetermined point of the piston movement.

4. The gas engine comprising a casing, a head rotatable therein and having a series of cylinders, pistons movable in said cylinders, a pair of cams, a sleeve extending through the head and rigidly connecting said cams, a stationary resistance member secured at one end of the casing, spindles carried by said pistons respectively, and extending through the walls of the respective cylinders, and engaging said cams, a shaft, and a cover attached to one end of said head and secured to said shaft.

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

ISAAC LE ROY JOHNSTON.

Witnesses:
CHAS. F. SCHMELZ,
H. D. MACDONALD.