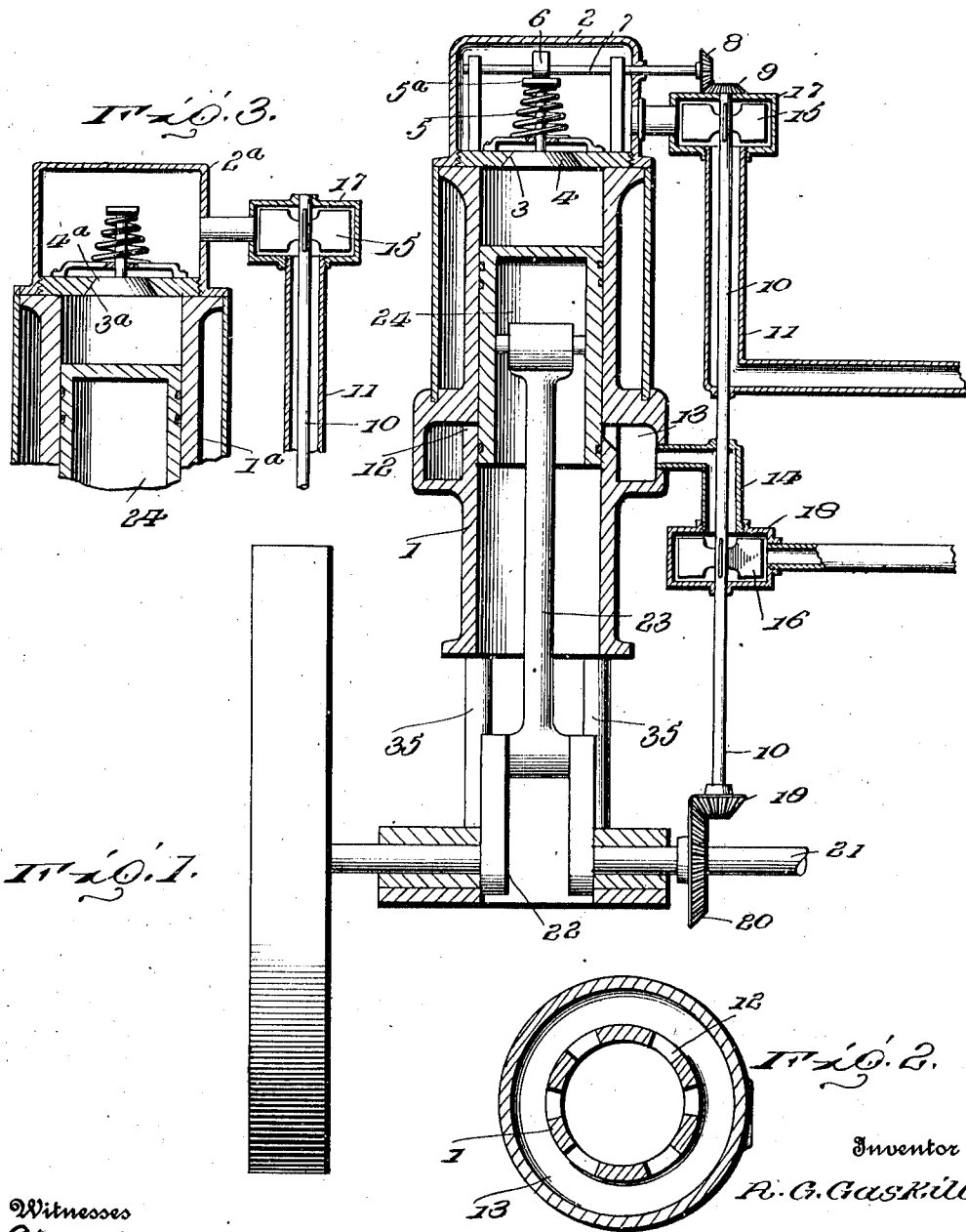


R. G. GASKILL.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED NOV. 14, 1910.

1,004,564.

Patented Oct. 3, 1911.

2 SHEETS-SHEET 1.



Witnesses
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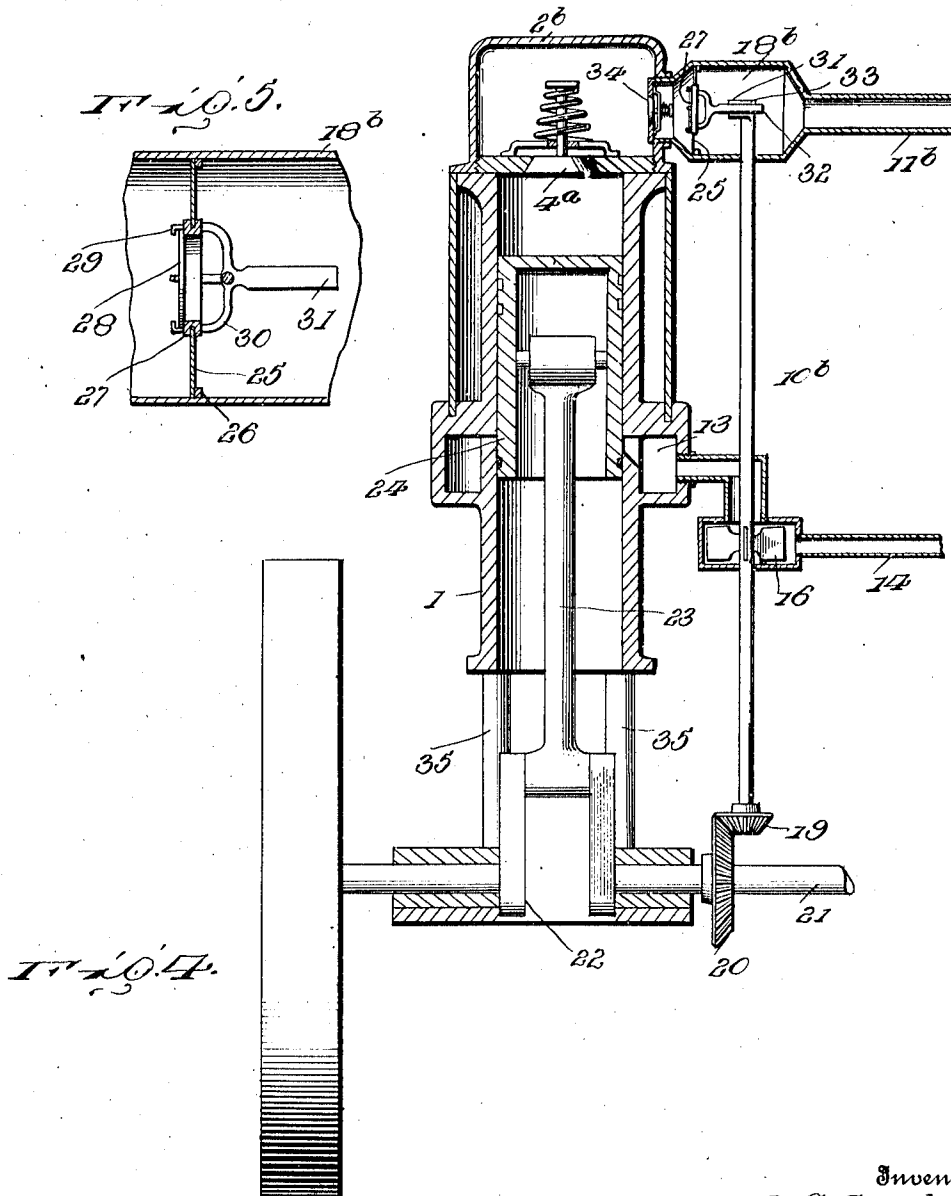
Attorneys.

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UNITED STATES PATENT OFFICE.

RAYMOND GIFFORD GASKILL, OF PORT DEPOSIT, MARYLAND.

INTERNAL-COMBUSTION ENGINE.

1,004,564.

Specification of Letters Patent.

Patented Oct. 3, 1911.

Application filed November 14, 1910. Serial No. 592,398.

To all whom it may concern:

Be it known that I, RAYMOND GIFFORD GASKILL, a citizen of the United States, residing at Port Deposit, in the county of Cecil and State of Maryland, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention comprehends certain new and useful improvements in internal combustion engines of the two-cycle type, and the invention has for its primary objects to provide novel and improved means for maintaining the charges in a thoroughly mixed, heated and highly explosive condition under initial and relatively slight pressure preparatory to their admission into the working cylinder; and to provide means for effectively eliminating compression at the base or exhaust end of the cylinder, thereby avoiding the faults and disadvantages incidental to such compression.

Another main object of the invention is an engine of this character embodying improved means for forming a partial vacuum in the exhaust chamber of the cylinder during a portion of the piston stroke, whereby when the exhaust ports are open, the cylinder will be instantly and effectively scavenged and the exhaust muffled, the course of the burned gases being followed by a clean new mixture until the piston has again closed the exhaust ports on its compression stroke, and the intake valve has again closed. And the invention also has for its object, more specifically considered, a simple and effective construction and correlated arrangement of initial-compression blower and exhaust suction blower, the same serving to thoroughly mix the gas and muffle the exhaust, and insuring the prompt filling of the cylinder with new gas and the speedy removal of the burned or spent gases, thereby developing the maximum horse power and increasing the general efficiency of the engine.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a vertical longitudinal sectional view of one form or embodiment of my invention; Fig. 2 is a horizontal sectional view, the section being taken through the series of exhaust ports and through the exhaust chamber; Fig. 3 is a vertical sectional view of another form of the invention; Fig. 4 is a vertical longitudinal section illustrating another form; and, Fig. 5 is an enlarged detail sectional view of a part of that form of the invention which is illustrated in Fig. 4.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In the accompanying drawings, the engine is illustrated as of the vertical type (although it is to be understood that the invention is not limited thereto) 1 designating the working cylinder, and 2 an air-tight gas chamber which is secured to the cylinder 1 at the intake end of the latter. The intake port 3 which admits the charges and which establishes communication between the gas chamber 2 and the cylinder 1, is controlled by an intake valve 4 which, in that embodiment of the invention illustrated in Fig. 1 is provided with a stem encircling spring 5 arranged to close the valve, as shown, and a head 5^a which is designed for intermittent engagement by a cam 6 on a transversely extending shaft 7 journaled in suitable supports in the gas chamber 2. The shaft 7 extends outwardly from the chamber 2, its protruding end carrying a bevel pinion 8 which meshes with a corresponding pinion 9 on a blower shaft 10. The shaft 10 extends through the intake pipe 11 which preferably leads from a carbureter, (not shown). The cylinder 1 is formed on a line which defines one end of the piston stroke, with a circumferentially extending series of exhaust ports 12, the same leading out into an annular exhaust chamber 13 which surrounds the cylinder and which is preferably an integral part thereof. The chamber 13 communicates with an exhaust pipe 14 through which the blower shaft 10 also extends, as clearly illustrated in the drawings. Blowers 15 and 16 are connected to the shaft 10, the blower 15 being mounted in a chamber 17 with which the intake pipe 11 is provided, and the blower 16 being correspondingly accommodated in an enlarged portion or

chamber 10 formed in the exhaust pipe 14. The blower shaft 10 may be driven in any desired way, as by a relatively small bevel pinion 19 secured to the lower end of the shaft and meshing with a corresponding but relatively large pinion 20 secured to the main driven shaft 21 of the engine. 22 designates the cranks of said shaft that are connected to the pitman or piston rod 23 of the working piston 24 that is mounted to reciprocate in the cylinder 1.

From as much of the description as has preceded, together with the related views of the accompanying drawings, it will be understood that in the practical operation of my improved internal combustion engine, the rotation of the drive shaft 21 will impart a rotary movement to the blower shaft 10 and at a relatively high speed, the blower 15 serving to fill the gas chamber 2 with a thoroughly mixed, heated and highly explosive charge under initial and slight compression, and the blower 16 serving to produce a partial vacuum in the exhaust chamber 13. As the piston 24 moves down on its working stroke, it will finally uncover the exhaust ports 12, whereupon the partial vacuum in the exhaust chamber 13 will tend to instantly and effectively draw out and expel the burned gases, while at the same time the intake valve will be opened and the course of the spent gases will be followed by the charge in the gas chamber 2. Upon the return and compression stroke of the piston 24, the exhaust ports 12 will be closed and the intake valve 4 will be permitted to close, the fans 15 and 16 at once again acting to fill the gas chamber 2 and to create the partial vacuum in the exhaust chamber 13. While I prefer that the fan shaft 10 rotate continuously, it is to be understood that my invention is not limited in this regard.

It is also to be understood that the invention is not limited to any specific details of construction and arrangement and combination of the parts, except as defined by the scope of the appended claims. For instance, as illustrated in Fig. 3, where 1^a designates the cylinder, 2^a the gas chamber and 3^a the intake port, the intake valve designated 4^a, while spring pressed to closed position, may be automatically opened by the sole action of the piston, without any mechanical accessory to accomplish this result. Again, as illustrated in Fig. 4, I may employ, instead of the intake fan 15, a vibratory fan mechanism which includes a diaphragm 25 of sheep-skin or the like, secured in the chamber 18^b of the intake pipe 11^b in any desired way, as by a gasket or ring 26, the diaphragm being formed with a preferably centrally disposed opening, the wall of which is defined by a ring 27 constituting a valve seat for a vibrating

valve 28. The valve 28 is freely movable to a limited extent toward and away from the valve seat 27 and is retained in operative relation to the seat by means of hooked lugs 29 secured to the valve seat, as clearly illustrated in Fig. 4. A spider 30 connects the valve seat 27 with a connecting rod 31, the latter being provided at one end with an eccentric collar 32 mounted on an eccentric 33 secured to the adjoining end of the blower shaft 10^b. The direct communication between the intake pipe and the gas chamber 2^b is controlled by a spring closed inlet valve 34. It will thus be seen that as the blower shaft 10^b rotates, the vibratory movement imparted thereby to the diaphragm 25 will be transmitted from the diaphragm to the valve 28, and there will be set up a rapidly recurring series of gusts or beats which will act to force gas from the intake pipe into the chamber 2^b, the gas being thoroughly mixed and maintained in a highly explosive condition under relatively low compression.

The base of the engine is preferably entirely open, the cylinder being supported on the base in any desired way, as by the vertical rods 35.

It will be seen that I have provided a simple and efficient internal combustion engine in which the construction and arrangement of parts hereinbefore described insure the complete withdrawal of the spent gases from the working cylinder, accompanied by a thorough muffling of the exhaust, the introduction into the cylinder of clean new mixtures for explosion therein, the complete separation of the burned charges from the incoming charges, and an effective conservation of the heat units, the parts being rendered extremely accessible, it being only necessary to disconnect the piston rod from the crank shaft, in order to withdraw the piston from the cylinder through the open base end of the latter.

The blowers 15 and 16 are centrifugally acting. It will be noted that the connection from the carbureter enters at the axis of the centrifugal intake blower 15, and that the connection from the exhaust ports enters at the axis of the centrifugally acting exhaust blower 16, the discharge in each instance extending from the circumference. In one case, the suction is exerted on the new gas from the carbureter, and in the other, the suction force is exerted on the exhaust gases.

Relative to the vibrating blower, it will be apparent that as the spider 30 is moved toward the valve 34, the valve 28 will be held against its seat and thereby force a blast of gas toward the valve 34 which will pass into the chamber 2^b. In the outward movement of the spider, the valve 28 will be permitted to open, and consequently the charge will pass freely between the valve

and its seat and no appreciable blast in the opposite direction will be produced. Hence, as this valve 28 is rapidly vibrated, a rapid succession of gusts will be directed toward the valve 34 and passed into the chamber 2^b.

Having thus described the invention, what is claimed as new is:—

1. In an internal combustion engine, a cylinder provided at its intake end with a gas chamber and at its outlet end with an exhaust chamber, the cylinder being formed with an intake opening leading from the gas chamber and with an exhaust port leading to the exhaust chamber, intake and exhaust pipes leading respectively, into and from the gas and exhaust chambers, a blower shaft extending through both of said pipes, blowers secured to said shaft and mounted in the respective pipes, means for rotating said blower shaft, a piston mounted in the cylinder and adapted to uncover the exhaust port, and an intake valve controlling the intake opening.

2. In an internal combustion engine, a cylinder provided with a gas chamber, and an intake valve providing communication between the cylinder and said chamber, the cylinder being formed with a circumferentially extending series of exhaust ports and with an annular exhaust chamber surrounding and communicating with said ports, an intake pipe connected to the gas chamber, an exhaust pipe connected to the exhaust chamber, said pipes being respectively provided with chambers, blowers mounted in the respective chambers, a blower shaft extending through both of said pipes and connected to the fans, means for rotating said blower shaft, and a piston mounted in the cylinder and adapted to uncover the exhaust ports.

3. In an internal combustion engine, a cylinder provided with a gas chamber, and an intake valve providing communication between the cylinder and said chamber, the cylinder being formed with a circumferentially extending series of exhaust ports and with an annular exhaust chamber surrounding and communicating with said ports, an intake pipe connected to the gas chamber, an

exhaust pipe connected to the exhaust chamber, said pipes being respectively provided with chambers, blowers mounted in the respective chambers, a blower shaft extending through both of said pipes and connected to the blowers, a bevel pinion connected to said blower shaft, a piston mounted in the cylinder and adapted to uncover the exhaust ports, a drive shaft connected to said piston, and a bevel pinion secured to the drive shaft and meshing with the pinion on the blower shaft.

4. In an internal combustion engine, a cylinder provided with a gas chamber and an intake opening leading into the cylinder from said chamber, a valve controlling said opening, an intake pipe leading to the gas chamber, a blower shaft extending into said pipe, and a blower mounted in said pipe, said blower embodying a diaphragm formed with a valve seat, a vibratory valve carried by the diaphragm and adapted to open and close said seat, and an eccentric connection between the valve seat and blower shaft.

5. In an internal combustion engine, a cylinder, an intake pipe adapted to supply said cylinder with gas, a blower shaft extending into said pipe and provided therein with an eccentric, a flexible diaphragm secured in said pipe and provided with a valve seat, a vibratory valve carried by said diaphragm and adapted to open and close said seat, the valve seat being provided with hooked lugs arranged to retain the valve, a spider connected to the valve, and a connecting rod secured to the spider and provided with a collar mounted on said eccentric.

6. In an internal combustion engine, a cylinder, an intake pipe adapted to supply the cylinder with gas, an intake valve, a vibratory blower valve independent of the intake valve, mounted in said pipe, and means for vibrating said blower valve.

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

RAYMOND GIFFORD GASKILL. [L. s.]

Witnesses:

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