M. C. KESSLER.

GAS ENGINE.

APPLICATION FILED FEB. 23, 1909.

1,012,652. Patented Dec. 26, 1911.

Fig. 1.

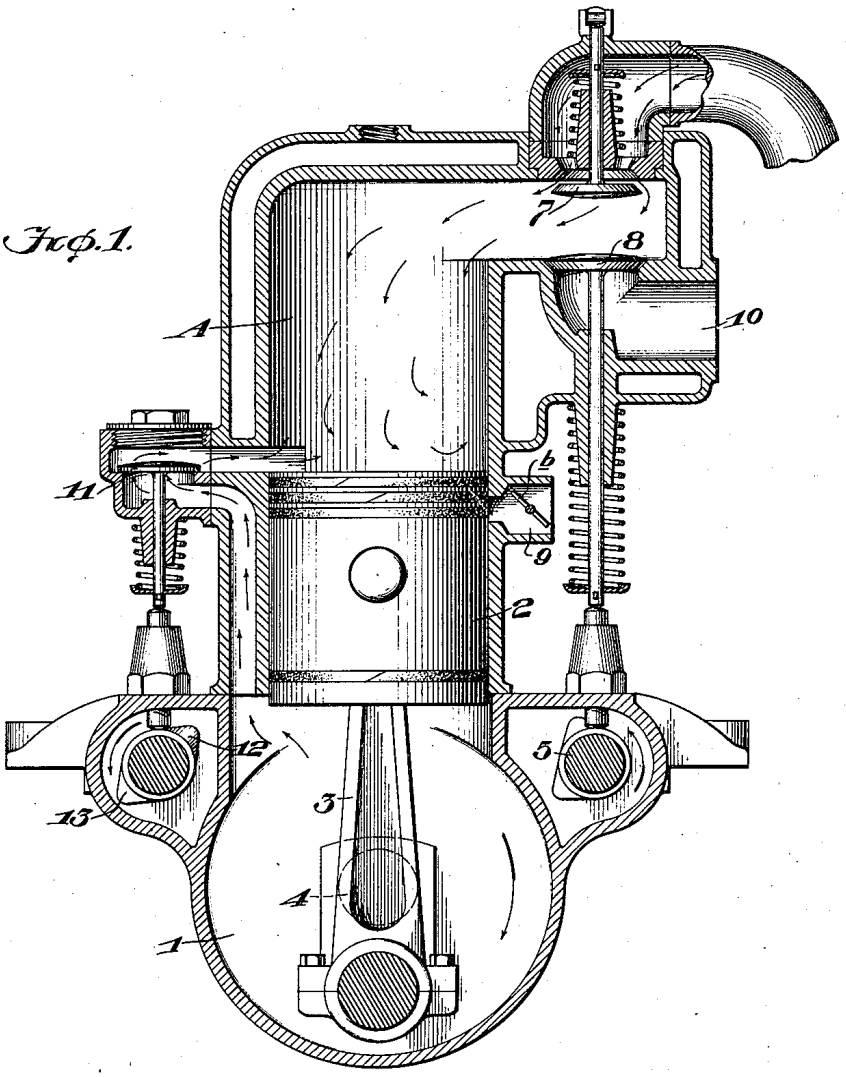


Fig. 2.

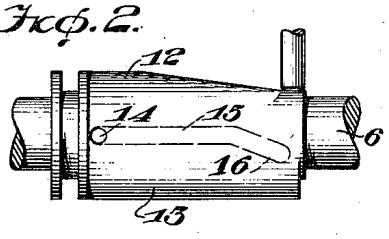
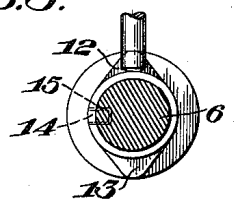


Fig. 3.



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UNITED STATES PATENT OFFICE.

MARTIN C. KESSLER, OF DENVER, COLORADO, ASSIGNOR TO THE KESSLER MOTOR COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

GAS-ENGINE.

1,012,652. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed February 23, 1909. Serial No. 479,446.

To all whom it may concern:

Be it known that I, MARTIN C. KESSLER, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

My present invention relates to improvements in that type of engines in which means are employed for introducing into the cylinder a volume of air under pressure in addition to the regular charge due to piston displacement for the purpose of augmenting or increasing said charge.

In this application, it is my desire to cover broadly, means whereby provision is made for the lapse or duration of time intervening between the admission of air under pressure, or the additional charge, and the closing of the normal intake while the engine is in operation, it being desirable to provide means for advancing and retarding the opening of the compressed air valve to meet the varying demands for speed and power, by providing the greatest possible volume of charge in the cylinder at all speeds. In other words, the augmenting of the charge is utilized to increase the power at low speeds, as well as high speeds, it being desirable to provide perfect flexibility, and at the same time, maximum power.

It will be readily seen that at a speed of say five hundred revolutions per minute, it may be possible for the engine to receive a full piston displacement of air or charge, likewise the engine will receive its full benefit from the additional air under pressure, but if the speed be increased to say one thousand revolutions per minute, which is considered moderate for this type of engine, it will be readily seen that it will be impossible to take in a full piston displacement of air or charge owing to its inertia. Also it will readily be seen that the engine will not receive its full benefit of additional air under pressure owing to the lack of time for the admission of said air; therefore, it becomes necessary to advance the time of admission of said air under pressure as the speed of the engine increases. And therefore it becomes possible to advance the time of admission of the air under pressure without filling the cylinder or causing the current of the normal intake to be reversed and blown back before the closing of the intake valve. In other words, the higher the engine speed, the more advance of admission of the air under pressure becomes possible.

In my present invention, the time of admission of the air under pressure, may be under the control of the operator at all times to meet the requirements of varying speed and power, while the engine is in operation. The purpose of providing for an earlier or later opening of the compressed air valve, which should be entirely within the control of the operator, while the engine is running, is to insure the greatest possible volume of mixture in the cylinder, the tendency at high speed being to reduce the volume of charge taken in because the time is shortened. To offset this effect, the air valve is opened earlier, but at slow speeds, the air valve opening is retarded else the air pressure coming into the cylinder from the crank case would blow the mixture coming in through the intake valve back through the carbureter, because it would destroy the efficiency of the mixture.

In the accompanying drawings:—Figure 1 is a vertical sectional view through the engine showing the parts in the position at the end of the intake stroke, Fig. 2 is a plan view on an enlarged scale of the sliding cam, and Fig. 3 is an end view on an enlarged scale of said cam, the shaft being shown in cross-section.

The engine shown in the drawings is an example merely of a simple means of carrying out the broad idea of this invention, and I do not, therefore, wish to limit myself to any valve construction or mechanism for controlling the time of the admission of said air under pressure, nor do I wish to limit myself as to the location for the admission of said air under pressure, nor do I care to limit myself as to the compression mechanism.

The engine illustrated is of the four-cycle type, and the crank case is used as a compression chamber.

A, represents the cylinder of the engine; 1 is the crank case; 2 is the piston; 3 is the connecting rod; 4 is the crank shaft; 5 is the normal two to one cam shaft actuating the usual inlet and exhaust valves, while 6 is an auxiliary cam shaft for actuating the valve controlling the supply of air under pressure; 7 is the normal inlet valve; 8 is the exhaust valve; 9 is the inlet port to the

crank case having a butterfly valve *b* for regulating the crank case air; 10 is the outlet port; 11 is the auxiliary air valve which controls the passage of air under pressure from the crank case 1 to the engine cylinder A.

The numeral 12 indicates a taper cam for controlling the admission of the crank case air to the engine cylinder approximately at the end of the intake stroke for the purpose of augmenting or increasing the normal charge; 13 is a straight cam for the purpose of admitting the compressed air of the crank case to the engine cylinder approximately at the end of the exhaust stroke; 14 is a pin or key fixed in the cam and extending into a key-way or slot 15 which is cut in the shaft 6, on which the cam slides. This key-way or slot 15 is deflected at one end in the form of a spiral as at 16 for the purpose of advancing or retarding the time of admission of air under pressure while the engine is in operation, the position of the cam 12 on the shaft 6 being within the control of the operator.

The idea of this invention is to be able to operate at all speeds under the most favorable power producing conditions, that is to say, the greatest obtainable volume of charge, and the example of my invention illustrated is an application to a single cylinder engine, because that will cover all multiples, the difference involved being that in this case the sliding taper cam shown in detail in Fig. 2 is tapered on one side only, namely the side which operates with the intake, while the opposite side which operates with the exhaust for scavenging is straight and opens the valve invariably for sweeping out exhaust gases. In this way, I effectually prevent any of the charge from blowing back through the carbureter, while at the same time deriving the full benefit of the compressed air charge not only for scavenging but also for the effective augmenting of the charge in order to operate the engine at all speeds under the most favorable power producing conditions.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an engine, means for introducing into the cylinder a volume of air under pressure in addition to the regular charge due to piston displacement, and means actuated by the engine for controlling or varying the time of admission of the additional air while the engine is in operation.

2. In an engine in which an additional supply of air is introduced under pressure, means actuated by the engine for controlling and varying the time of admission of the additional air with relation to the final admission of the normal intake charge while the engine is in operation.

3. In an engine, the combination of a port for admitting a supply of air additional to that drawn in by the piston, and means actuated by the engine for varying the time of admission of the additional air through said port.

4. In an engine, the combination of a port for admitting a supply of air additional to that drawn in by the piston, and means actuated by the engine within the control of the operator for varying the time of admission of the additional air through said port while the engine is in operation.

5. The combination with a cylinder and piston, the cylinder having an air inlet port, of a valve for said port, actuating means for said valve, and means to adjust said actuating means to cause the valve to open at every instroke of the engine, or at every alternate instroke of the engine, and to vary the time of opening on the alternate instrokes to meet the needs as the speed of the engine varies.

6. In an engine in which compressed air is received in the cylinder for augmenting the charge, means actuated by the engine for advancing and retarding the opening of the compressed air valve in order to meet the varying demands for speed and power by providing the greatest possible volume of charge in the cylinder at all speeds.

7. In an engine in which compressed air is received in the cylinder for both scavenging and augmenting the charge, means actuated by the engine for advancing and retarding the opening of the compressed air valve in order to meet the varying demands for speed and power by providing the greatest possible volume of charge in the cylinder at all speeds.

8. In an engine, means for introducing into the cylinder a volume of air under pressure in addition to the regular charge due to piston displacement, and means adjusted by the operator for controlling or varying the time of admission of the additional air while the engine is in operation.

9. In an engine in which an additional supply of air is introduced under pressure, means adjusted by the operator for controlling and varying the time of admission of the additional air with relation to the final admission of the normal intake charge while the engine is in operation.

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

MARTIN C. KESSLER.

Witnesses:

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