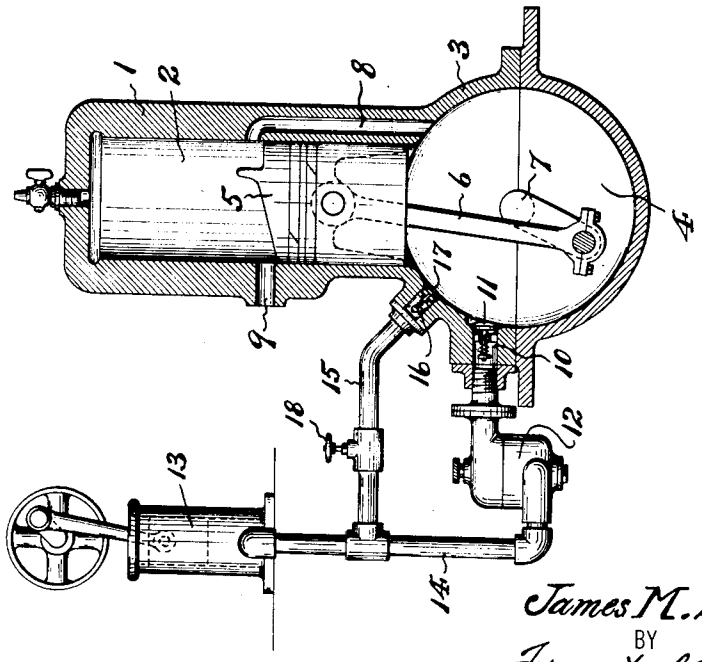
J. M. SEYMOUR.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED FEB. 4, 1920.

1,404,551. Patented Jan. 24, 1922.



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INTERNAL-COMBUSTION ENGINE.

1,404,551. Specification of Letters Patent. Patented Jan. 24, 1922.

Application filed February 4, 1920. Serial No. 356,304.

To all whom it may concern:

Be it known that I, JAMES M. SEYMOUR, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in internal combustion engines.

The invention has for its principal object to provide a novel combination of internal combustion engine with means for introducing to the cylinders thereof, in company with or to mix with the explosive fuel, a volume of air under pressure, that is, air compressed to the desired degree in excess of ordinary atmospheric pressure; and the invention also has for its object to provide a novel method of operating internal combustion engines by delivering to the cylinders with the fuel compressed air for the purpose of increasing oxygen content of each fuel charge and thereby raising the efficiency of combustion, and for further purpose of securing better compression and more complete scouring of the cylinder chambers during the engine operation.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

With the various objects of the invention in view, the same consists in the novel construction of internal combustion engine and method of operating the same hereinafter set forth; and, the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, all of which will be hereinafter more fully described, and then finally embodied in the appended claims.

The invention is clearly illustrated in the accompanying drawing, in which:—

The figure is a vertical section of an internal combustion engine, illustrating in connection therewith means for delivering to the cylinders fuel with air under initial compression above atmospheric pressure.

As generally constructed and used, all internal combustion engines take in air, under ordinary atmospheric or barometric pressure, into the cylinders by suction, and by reason of the friction incident to the operation of admission valves, whether of mechanically operated or poppet type, the air so taken in is reduced in density to a point considerably below atmospheric or barometric pressure. The resultant low density of air renders possible the presence of but a minimum of oxygen for the support of the combustion of the fuel, and also reduces the efficiency of the scouring operation in clearing the cylinders of spent or burnt gases, while also limiting the maximum of compression attainable. By the novel method involved in my present invention I seek to overcome the deficiences incident to the usual methods of internal combustion engine practice, and to such end I introduce into the engine cylinders, with the combustible fuel, air initially compressed to the desired degree beyond atmospheric pressure. When the initially compressed air and fuel is delivered to the engine cylinders, the pistons perform the usual compressing stroke preliminary to the firing of the fuel charge, and since the air is already under an initial compression, the compressing stroke of the pistons results in a much greater possible maximum compression of the mixture of fuel and air prior to ignition, while the density of the initial air being greater consequently the oxygen content is more and the combustion of the fuel is more quickly accomplished, and therefore a greater power development results from the combustion. Another advantage, particularly when supplying the initially compressed air to the engine cylinders designed for two-cycle operation, is that the initial compression of the air, when the same is introduced into the engine cylinders, results in a more rapid expansion and movement thereof through the cylinder prior to compression by the pistons, so that the scouring out of the previously burnt fuel charge is much more quickly, completely and efficiently carried out. This is important since the more complete the ejection or scouring out of spent gases from the cylinders the more perfect

is the combustion of the next fuel charge, and consequently the greater its efficiency in power development.

Broadly my novel method of supplying initially compressed air with the fuel to the engine cylinders may be applied to engines of the four cycle type or two cycle type, and the mechanical means employed for the purpose may be subject to considerable variation both as to structure and relative association with the engine itself.

Referring now to the drawing I have illustrated the application of the principles of my invention to an internal combustion engine of the two cycle type. In this view the reference-character 1 indicates an engine cylinder provided in its head with the usual combustion chamber 2, and connected with the lower end of which is the crank-case 3 providing an air tight crank-case chamber 4. The piston 5 reciprocates in the combustion chamber 2, and is connected by the connecting rod 6 with the crank-shaft 7 to which the power is transmitted. A by-pass duct 8, preferably formed in the wall of the cylinder 1, affords communication between the crank-case chamber 4 and the combustion chamber 2. Said cylinder 1 is further provided with a suitably located exhaust port 9. Connected with said crank-case 3 is an intake port 10 provided with a poppet-valve 11 closing the same against back pressure. Connected in communication with said intake port 10 is a carbureter or fuel mixer 12 of suitable construction. The reference-character 13 indicates any suitable construction of air compressor, the form illustrated being that of the reciprocating plunger or piston type. Said air compressor 13 is connected by a suitable conduit or pipe 14, with the air intake of said carbureter 12 so as to deliver air under pressure, in excess of atmospheric pressure, to the carbureter, and thence through the same for intermixture with the fuel to the crank case chamber 4. It is also desirable in some instances to provide a branch conduit or pipe line 15 leading directly from the main conduit or pipe 14, from a point intermediate the air compressor and carbureter, to an auxiliary air intake port 16 provided in said crank-case 3, said port 16 having a check or poppet valve 17 closing the same against back pressure. Said branch conduit or pipe 15 is provided with a regulating valve 18 to regulate the quantity of air permitted to flow therethrough.

In operation the air compressor delivers compressed air to the carbureter 12, which intermixes with the fuel to form an initially compressed explosive mixture, which enters the crank-case chamber 4. The piston 5 on its downward stroke uncovers the outlet mouth of said by-pass duct 8 so that the initially compressed fuel mixture is driven through the by-pass duct 8 into the combustion chamber 2. Since the fuel mixture is under initial compression as it enters the combustion chamber, it tends to very rapid expansion therein amounting to a blast which quickly and thoroughly sweeps out through the exhaust port 9 the burnt gases remaining in the combustion chamber after the preceding explosion. As the piston 5 rises in the combustion chamber 2, the initially compressed fuel mixture is additionally compressed in the combustion chamber to a much greater degree than would be possible with a fuel mixture in which the air was under merely atmospheric pressure, and consequently the efficiency of the combustion or explosion of the fuel mixture is increased. Furthermore, since the air is under an initial compression greater than the atmosphere, its density is greater and therefore its oxygen content is greater, consequently providing a more rapid and complete oxidization of the fuel when the latter is ignited. Instead of passing all the compressed air delivered by the air compressor 13 to and through the carbureter, it is sometimes advisable to permit a proportion of the same to pass directly into the crank-case chamber 4, in which case the valve 18 is opened to admit the direct flow of air to said crank-case chamber in desired proportional quantity.

I claim:—

1. The combination with an internal combustion engine having a combustion chamber, a piston, an air tight crank-case chamber, and a by-pass duct leading from the latter to the former, of an air compressor, a communicating means between said crank-case chamber and said air compressor, and a carburetor having its air passages connected in the line of said communicating means.

2. The combination with an internal combustion engine having a combustion chamber, a piston, an air tight crank-case chamber, and a by-pass duct leading from the latter to the former, of an air compressor, a communicating means between said crank-case chamber and said air compressor, a carburetor having its air passages connected in the line of said communicating means, and an auxiliary compressed air delivery means between said crank-case chamber and said air compressor adapted to by-pass around said carburetor a part of the air delivered by the latter directly into the former.

In testimony that I claim the invention set forth above I have hereunto set my hand this 2nd day of February, 1920.

JAMES M. SEYMOUR.

Witnesses:

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