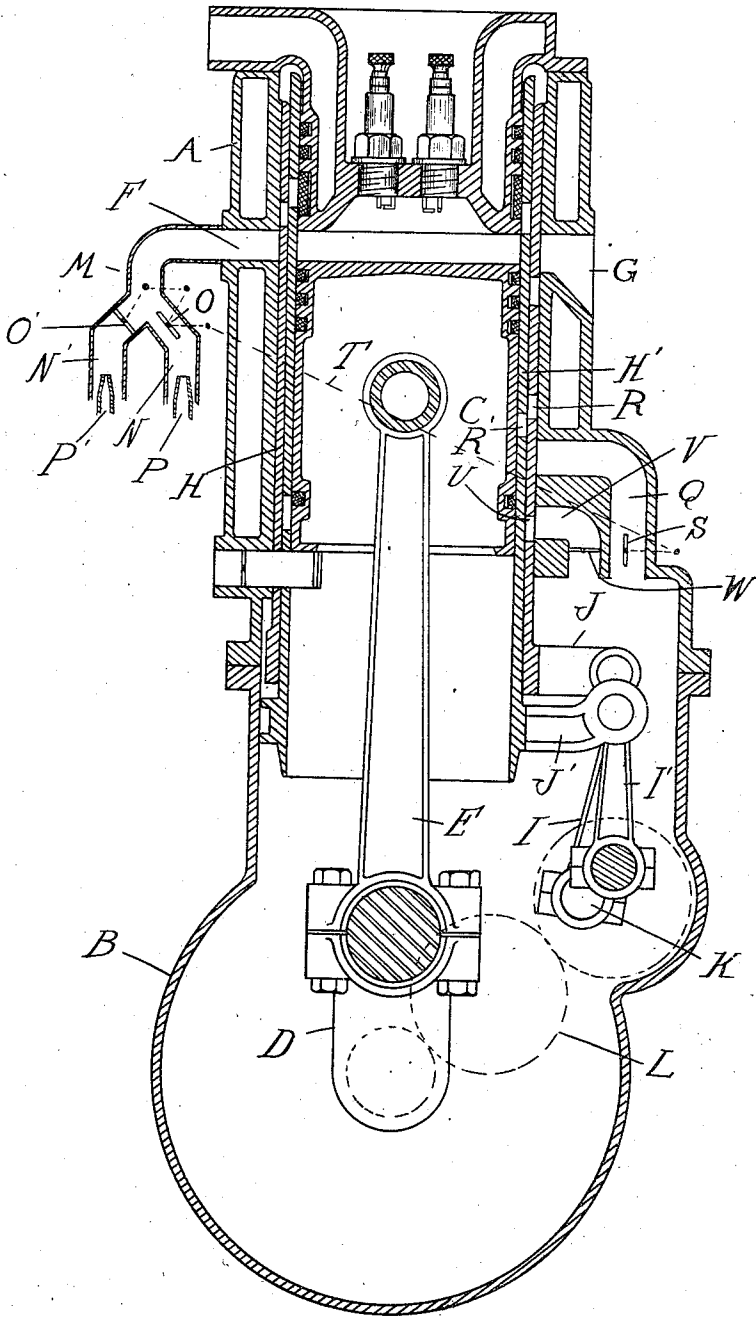


J. G. UTZ.
EXPLOSION ENGINE.
APPLICATION FILED APR. 9, 1909.

1,014,270.

Patented Jan. 9, 1912.



Witnesses
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UNITED STATES PATENT OFFICE

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EXPLOSION-ENGINE.

1,014,270.

Specification of Letters Patent.

Patented Jan. 9, 1912.

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To all whom it may concern:

Be it known that I, JOHN G. UTZ, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Explosion-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to explosion engines of that type in which an augmented charge of the explosive mixture is obtained by the introduction of air compressed in the crank case to supplement the charge admitted through the main admission port.

It is one of the objects of the invention to provide means for varying the power by the controlling of the augmenting charge; further, to automatically vary the richness of the explosive mixture admitted through the main port to correspond with variations in the augmenting charge of air; further, to provide means for introducing a volume of air in excess of the displacement of a single piston; and, further, in various features of construction as hereinafter set forth.

The drawing is a vertical central cross section through an engine embodying the invention.

A is the engine cylinder, B the crank case, C the piston, D the crank, and E the pitman rod of an engine of any suitable construction.

F is the admission port for the explosive mixture, and G the exhaust port for the products of combustion. In addition to these ports, the engine is provided with means for admitting air into the crank chamber, where it is compressed, and for transferring the compressed air to the cylinder above the piston where it augments the explosive charge. Various constructions may be employed for accomplishing this purpose, but, as shown, both the transfer port and the air admission port into the crank case, as well as the main inlet port F and exhaust port G, are controlled by a pair of cylindrical valve sleeves H H' surrounding the piston. These sleeves are reciprocated by pitmen I I' connected to laterally-projecting arms J J' on the sleeves and engaging cranks or eccentrics K on a rotary shaft driven from the main crank shaft by a suitable gear train L. Thus the sleeves are operated in timed relation to the move-

ment of the piston, and the arrangement is such that all of the various ports are opened and closed in the desired order.

The explosive mixture is formed by a carbureter or other suitable device, which is connected by the conduit M with the main admission port F. It is, however, necessary to vary the richness of this mixture to correspond with the amount of air transferred from the crank case. Thus if the volume of air transferred is varied, it is essential that the richness of the carbureted air should be correspondingly varied. I have therefore provided a controlling device by which the richness of the mixture entering through the port F is automatically varied in accordance with the volume of compressed air transferred, the construction being as follows: N and N' are two branches of the conduit M leading to the port F, and O O' are butterfly valves in the respective branches. Each of these branch conduits is provided with a nozzle for admitting the fuel, and these nozzles P P' are of different capacity, and are adjusted so as to discharge different quantities of the fuel in the same interval of time. The compressed air for augmenting the charge is transferred through a conduit Q, which is opened by the registration therewith of ports R R' in the sleeves H H' when the piston is at the lower end of its stroke. This will permit the compressed air in the crank case to pass through the conduit Q and ports R R' into the cylinder above the piston, where it will be commingled with the mixture introduced through the conduit M and port F. The conduit Q is provided with a valve preferably a butterfly valve S, and this is connected by suitable mechanism—such as the rod T indicated in dotted lines—with the valves O O' in the branch conduits N N'. The arrangement is such that whenever the valve S is closed the valve O will also be closed, and the fuel introduced into the air current is restricted to that discharged from the nozzle P', which is of lesser capacity than the nozzle P. On the other hand, if the rod T is adjusted to open the valve S the valve O will be simultaneously opened, and the valve O' closed, which will throw into action the nozzle P having the greater capacity. Thus the richness of the mixture will be altered to correspond to the volume of air passing through the conduit Q.

The air compressed in the crank case may be employed for the double purpose of augmenting the explosive charge and for scavenging the cylinder to clean out the remnant of the burned gases after the scavenging stroke of the piston. The air for augmenting the charge is transferred through the ports R R' in the sleeves H H', as has been described, but the movement of these sleeves is such that these ports only come into registration once in each cycle. Another port U is arranged in the sleeve H which is adapted to register with the port R' and conduit V, also connecting with the crank case and having the controlling valve W therein which is adjustable independently of the valves S, O and O'. The ports R R', U R' register with their respective conduits alternately, and are 360° apart in the cycle, so that the air transferred through the conduit V and ports U R' will be admitted to the cylinder at the proper time to scavenge the burnt gases the amount of air admitted depending upon the adjustment of the valve W. Variations in the control may be obtained by alteration in the relative adjustment of the valves W and S, so that a larger portion of the air compressed in the crank case will be used at one time for augmenting the explosive charge, or at another time may be used for scavenging. Also the valves W and S may be adjusted to completely close the passages V and Q.

What I claim as my invention is:

1. In an explosion engine, the combination with means for introducing an explosive charge into the explosion chamber, and means for introducing a variable volume of compressed air to augment said explosive charge; of means automatically operating, upon the variation of the volume of said

augmenting air, for proportionately varying the richness of the explosive mixture.

2. In an explosion engine, the combination with a cylinder and a piston, of a crank case forming a compression chamber, means for admitting an explosive mixture into said cylinder; means for transferring a variable volume of air compressed in said crank case to said cylinder to augment the explosive charge, and means operating automatically, upon a variation of the volume of air transferred, for proportionately varying the richness of the explosive mixture.

3. In an explosion engine of the four-cylinder type, the combination of a cylinder, a crank case in which air is compressed twice in each cycle, means for transferring the compressed air from the crank case to the engine cylinder, and a selective control for said transfer means adjustable to admit air to the cylinder either for scavenging or augmenting the explosive charge, said means being also adapted to completely cut-off communication between the transfer means and the engine cylinder.

4. In an explosion engine, the combination of means for introducing an explosive charge into the explosion chamber, means for introducing a volume of compressed air to augment said explosive charge, a valve controlling each of said means, and a connection between said valves whereby upon the adjustment of one of said valves the other is automatically and correspondingly adjusted.

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

JOHN G. UTZ.

Witnesses:

J. H. NORRINGTON,
H. L. BILL.