E. A. NELSON.

TWO CYCLE GAS ENGINE.

APPLICATION FILED MAR. 16, 1906.

898,913. Patented Sept. 15, 1908.

Fig. 1.

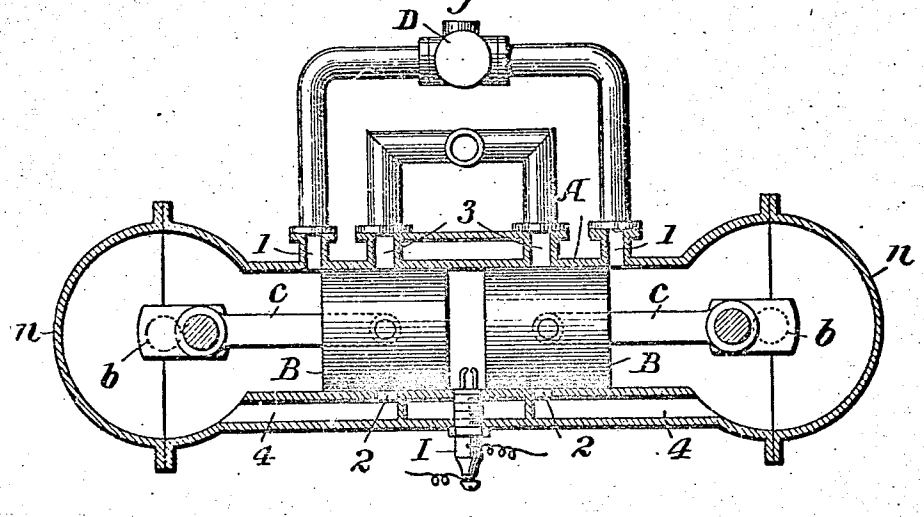
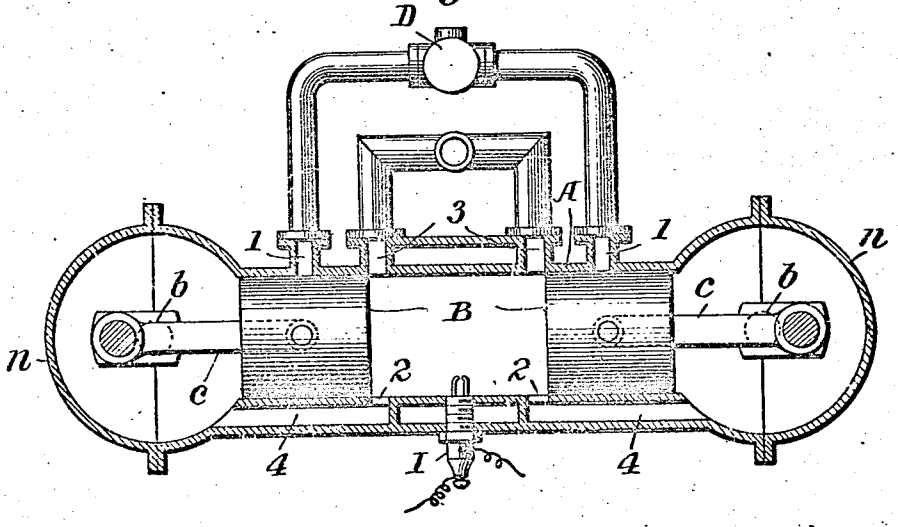


Fig. 2.



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UNITED STATES PATENT OFFICE.

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TWO-CYCLE GAS-ENGINE.

No. 898,913. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed March 16, 1906. Serial No. 306,444.

To all whom it may concern:

Be it known that I, EMIL A. NELSON, 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 Two-Cycle Gas-Engines, of which the following is a specification.

My invention relates to gas engines and consists in a gas engine having a cylinder closed at the ends and provided with pistons which alternately approach and recede, and with ports controlled by the pistons whereby to secure the introduction and compression and discharge of the gases by the action only of the pistons and without the use of valves as set forth hereinafter and as illustrated in the accompanying drawing, in which—

Figures 1 and 2 are longitudinal sections of a gas engine embodying my invention showing the parts in different positions.

The cylinder A receives the two pistons B B and is closed at the ends, and the crank shafts *b* extend transversely through the cylinder near the ends, the cranks being connected to the respective pistons by means of connecting rods *c*. As thus constructed, the ends of the cylinder constitute crank casings *n* which preferably are enlarged so as to permit of the use of longer cranks and a more extended play of the pistons. Near each end of the cylinder communicates a supply port 1 so arranged as to be closed by the piston except when the latter is in its inmost position, and with each end of the cylinder also communicates a channel 4, and each of the latter also communicates with the cylinder through an inlet port 2 so arranged as to be covered by a piston except when the latter is in its outer position. With the cylinder also communicates exhaust ports 3 each so arranged as to be covered by a piston except when the latter is in its outward position. The supply ports 1, 1 communicate with a suitable carbureter D which may be supplied with volatile oil and air in any of the usual ways, and at the center of the cylinder is an igniter I of any suitable character, an electrical igniter being shown which may be in connection with a commutator by means of which the electric circuit may properly be completed and broken. Preferably the shafts *b b* are mechanically connected as usual to secure a unison of operations of the pistons.

Assuming the pistons B, B′, Fig. 1 to be approaching each other, they will uncover the inlet ports 1 as they complete their inward movements, and the partial vacuum at the ends of the cylinder, or in the crank casings and cylinder, will cause the air to be drawn through the carbureter and the mixed gases to flow into the chambers beyond the pistons. As the pistons move outward, the mixture in each outer chamber will be slightly compressed until the piston passes the port 2 when the gases will pass through the said port into the central chamber in the cylinder between the pistons. The port 2 will be opened only momentarily and sufficiently to permit this transfer and will immediately be closed as the pistons begin to approach each other so that the mixture will then be confined between the two pistons and compressed until the two pistons are at the limit of their inward movements when the igniter will explode the charge and the pistons be driven outward. The gases will be confined and exert their pressure until each of the exhaust ports will be uncovered when they will pass outward, there being less resistance at these ports than at the ports 2 which are simultaneously uncovered and where the fresh gases will flow inward under the partial compression in the chambers at the ends of the cylinders. It will thus be seen that at each rotation there is an explosion of a charge, and the discharge of the spent gases, and an introduction and compression of a fresh charge, that is, at each rotation of the shaft, the pistons are moved outward, the fresh charge is transferred to the central chamber, compressed and exploded without the use of any valve device independently of the valve-like action of the pistons themselves. That is all of the ports and channels are opened, in other words, without valves. It will therefore be seen that the engine is of extremely simple construction, that the operations are not accompanied with any noise such as results from the closing of valves, and that the difficulties incident to improper valve action are avoided.

Without limiting myself to the construction shown or to any special arrangement of ports and passages otherwise than required to secure the different results, I claim:—

The combination in a gas engine of a cylinder, two pistons arranged to reciprocate

therein, casings communicating with the outer ends of the cylinder, and crank shafts having cranks in said casings connected to the pistons, and two inlet ports each arranged to be uncovered by one of the pistons as it completes its inner movement, two exhaust ports each arranged to be uncovered by one of the pistons as it completes its outer movement, and two other ports each in constant connection with one of the casings and arranged to be uncovered by one of the pistons as the adjacent exhaust port is uncovered.

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

EMIL A. NELSON.

Witnesses:
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