C. W. ROESSLE & A. A. REENBERG.

TWO-CYCLE COMBUSTION ENGINE.

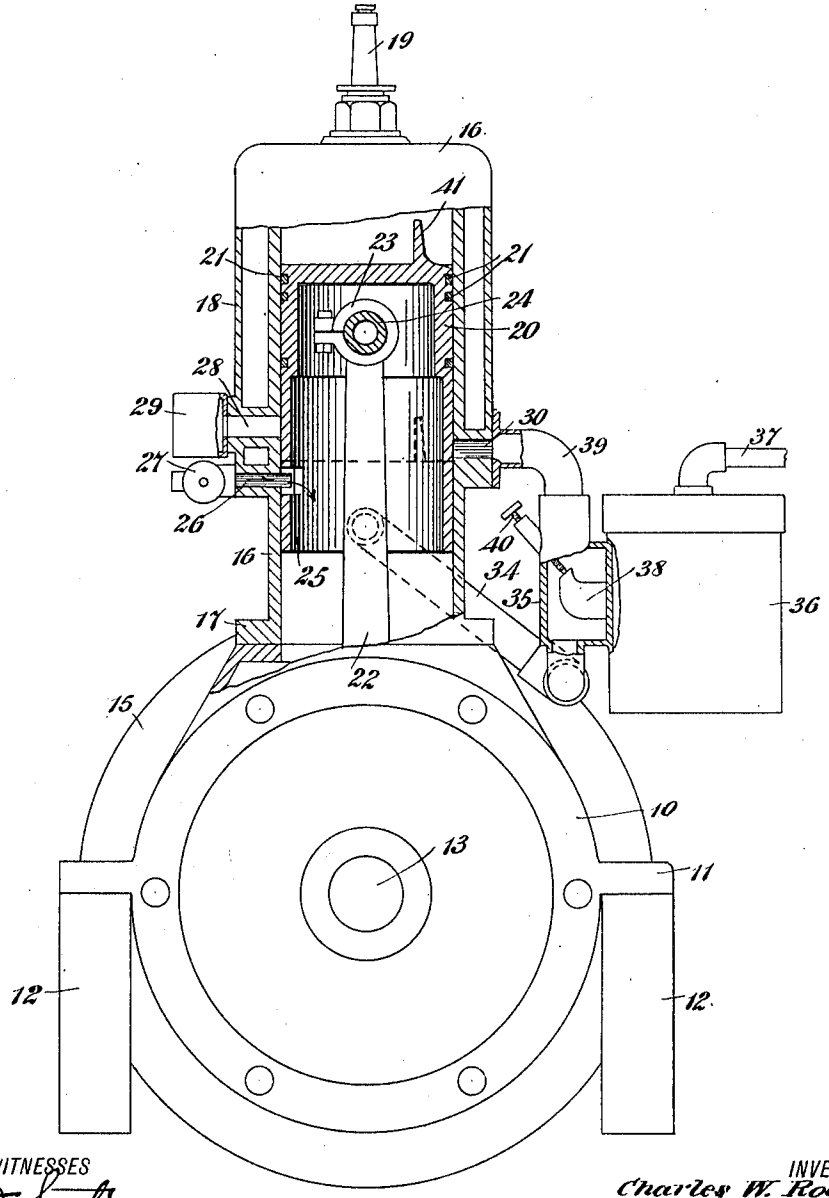
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Patented Mar. 7, 1916.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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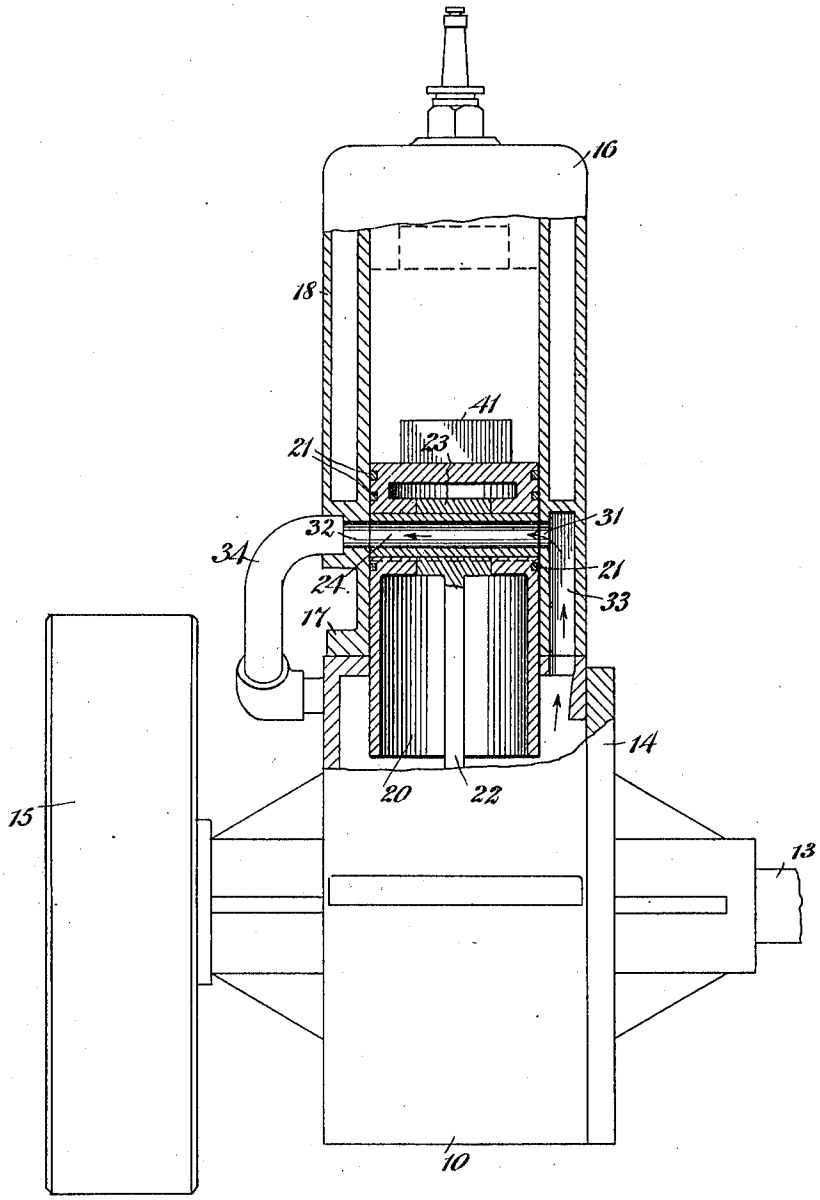
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3 SHEETS—SHEET 2.

Fig. 2



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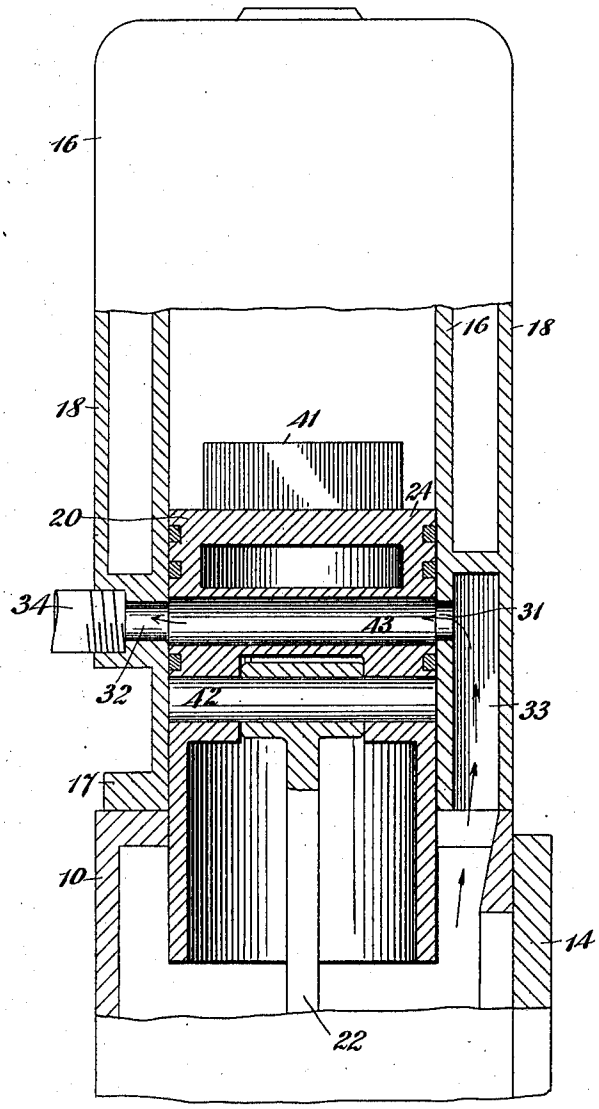
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3 SHEETS—SHEET 3.

Fig. 3



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UNITED STATES PATENT OFFICE.

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TWO-CYCLE COMBUSTION-ENGINE.

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To all whom it may concern:

Be it known that we, CHARLES W. ROESSLE, a citizen of the United States, and ANDREW A. REENBERG, a subject of the King of Denmark, both residents of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Two-Cycle Combustion-Engine, of which the following is a full, clear, and exact description.

This invention relates to improvements in two-cycle engines of the internal combustion type and the invention resides more particularly in an improved structure by which instead of compressing the carbureted air or gas in the crank case, the air is first drawn into the crank case and compressed so as to force it out under pressure in a highly heated condition through the carbureter to obtain the proper mixture which is fed to the combustion chamber of the cylinder and ignited or exploded to cause the operation of the engine.

A further object of the invention is to eliminate the objectionable features of a two-cycle motor in which the gas is compressed in the crank case, by compressing air alone therein and passing such air through the piston at the wrist pin connection of the pitman rod with the piston or through the piston at the point above or other than at the wrist pin to a carbureter and into the combustion chamber of the cylinder, so that the piston will operate as a valve to control the admission of air to the crank case for compression and of carbureted air to the cylinder and the discharge of the exhaust gases after the explosions and while the carbureted air is being supplied for the next compression and explosion.

With the above and other objects in view, the invention resides in the peculiar combination and arrangement of parts to be hereinafter more fully described, illustrated and claimed, it being also an object to provide a device which is simple in construction, durable and efficient in operation and not likely to get out of working order.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a side elevation partly in section of our improved two-cycle combustion engine; Fig. 2 is a similar view at right angles to Fig. 1 but showing the piston in position to cause the compressed air to be fed to the carbureter; and Fig. 3 is an enlarged vertical sectional view illustrating a modified way of passing the compressed air to the carbureter.

As shown in the drawings, the improved motor includes a crank case 10 having suitable brackets 11 adapted to rest upon supports 12 and to be secured thereto. The usual crank shaft 13 operates through the crank case, which latter is provided with a removable head 14, while a fly wheel 15 of the usual type is fixed to the shaft. The crank case tapers toward its upper end and supports a cylinder 16 which has a bottom flange 17 to be bolted to the crank case in order to hold the cylinder upright thereon and to effect interior communication between the cylinder and the crank case. The cylinder is provided with a water jacket 18 integral or otherwise formed with respect to the cylinder which latter receives a spark plug 19 through its upper end.

Movable in the cylinder 16 is a piston 20 having suitable packing rings 21 to effect a tight joint between the piston and the inner wall of the cylinder as the piston reciprocates therein, said piston being reciprocated by connection with the crank shaft through the instrumentality of a connecting rod 22 having a removable sleeve portion 23 in its upper end for connection with a hollow ground piston or wrist pin 24 which is carried at a spaced distance from the head or upper end of the piston and by inwardly extending sleeve portions thereof, and extends transversely through the same to communicate with the inner face of the combustion chamber of the cylinder, as is more clearly shown in Fig. 2 of the drawings.

The piston is of a maximum length and at its lower portion is provided with an opening 25 which communicates with an inlet passage 26 through the cylinder, there being a suitable throttle valve 27 provided at the inlet end of said passage to control the quantity of air supplied within the piston for compression beneath the same and within the crank case when the piston is reciprocated to bring the opening 25 into alinement with the intake passage or air inlet,

The exhaust passage is indicated by the numeral 28 and leads to a suitable chamber or muffler 29 attached to the cylinder, while the inlet for the carbureted air or gas is indicated by the numeral 30 and is disposed at a diametrically opposite point with respect to the location of the air inlet and exhaust ports, which latter are located in spaced relation vertically.

At diametrically opposite points the cylinder is provided with passages 31 and 32 which are brought into alinement and into communication by the piston or wrist pin 24, and communication is established between the crank case and the passage 31 by a vertical passage 33 preferably formed by an integral part of the cylinder, between walls contiguous with the cylinder and water jacket walls. Leading from the passage 32 is a conduit 34 which communicates with a well 35 of a carbureter 36 which is supplied with gasolene or other combustion fluid constantly through a supply pipe 37. The carbureter has a nozzle 38 positioned in the well so that as air is forced therethrough the gasolene is drawn by suction through the nozzle and the inlet pipe 39 which communicates with the gas inlet 30 to supply gas or carbureted air to the combustion chamber of the engine. A valve 40 coöperates with the nozzle 38 to regulate the quantity of fuel which is fed to the well or mixing chamber for the purpose of carbureting the air which passes therethrough.

In the operation of the device as above described, when the piston is reciprocated to bring the opening 25 in alinement with the air intake 26, air is admitted to the cylinder beneath the piston, and as the engine is turned over on the down stroke of the piston such air is compressed in the crank case and escapes in a highly heated condition through the passage 33. By this time the piston or wrist pin 24 is brought into alinement with the passages 31 and 32 so that the air escapes through the wrist pin and through the conduit 34 and is discharged through the carbureter, the passage 30 and into the combustion chamber and by striking a baffle wall 41 is deflected upwardly, and on the return or upward stroke of the piston such gas is compressed and ignited to reciprocate the piston. As the piston recedes from the position shown in Fig. 1 to the position shown in Fig. 2 the air which is similarly supplied beneath it is compressed and fed to the combustion chamber in the same manner, the piston serving to close the passages or ports 31 and 32 as it is moved on its upward stroke as distinguished from the downward stroke when these passages are brought into alinement. As the gas or carbureted air is supplied to the combustion chamber and is deflected upwardly by the baffle wall 41, exit of the burnt gases takes place through the passage 28, the baffle wall serving to prevent the escape of the gas with the exhaust gases and products of combustion.

In Fig. 3 of the drawings, a modified construction is illustrated in which the piston 20 instead of having a hollow ground wrist or piston pin has a hollow or solid piston pin 42 connected with the rod 22, and in addition the piston is provided with a transverse passage 43 adapted to be brought into alinement with the ports 31 and 32 for the purpose of conveying the air compressed in the crank case in a highly heated condition to the carbureter for carburation and supply to the combustion chamber. In either form of the invention the piston operates as a valve and is accurately regulated and timed with respect to the sparking system or vice versa, to bring the passages 31 and 32 into alinement at the proper time and to close said passages or ports at the proper time. Much advantage is derived by a structure of this type due to the fact that, instead of admitting carbureted air or gas into the crank case and compressing the same air alone is admitted to the crank case and passed in a highly heated condition through the carbureter in a manner to produce a better mixture by reason of the thorough intermingling of the air and gas and permit a nicety of regulation of the richness of such mixture. The former is objectionable owing to the fact that the crank case is kept relatively cool and in addition contains lubricating oil for use in the common splash system of lubrication, and thus when the carbureted air or gas enters the crank case, the gasolene is condensed, or a large portion thereof, in such a manner that the mixture which subsequently enters the combustion chamber is of little or no real value in providing for a combustion sufficient to give the desired degree of efficiency to the engine or motor. By our invention these objectionable features are avoided, the deposit of carbon due to the collection of the lubricating oil with the air and gas or carbureted air is considerably lessened, and by causing the air to enter the carbureter in a highly heated condition a better and more readily combustible mixture is obtained, even allowing for such slight expansion as might take place.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. In a two-cycle combustion engine, the combination with a cylinder and a piston reciprocating therein, a crank case communicating with the cylinder beneath the piston and having an air inlet, said piston having an opening therein adapted to register with the air inlet for supplying air beneath

the piston to be compressed in the crank case, said cylinder having horizontally alined passages therein at diametrically opposite sides, said piston having a rectilinear passage horizontally therethrough for alinement with the passages of the cylinder and being spaced from the head of the piston and a carbureter, said passages in the cylinder communicating with the carbureter and crank case respectively whereby air compressed in the crank case will be forced through the carbureter to enter the cylinder as a mixture.

2. In a two-cycle combustion engine, the combination with a cylinder and a piston reciprocating therein, a crank case communicating with the cylinder beneath the piston and having an air inlet, said piston having an opening therein adapted to register with the air inlet for supplying air beneath the piston to be compressed in the crank case, said cylinder having horizontally alined passages therein at diametrically opposite sides, said piston having a rectilinear passage horizontally therethrough for alinement with the passages of the cylinder and being spaced from the head of the piston, said cylinder also having an exhaust port above said inlet passage for air with both located at right angles to the alined passages in the cylinder and the passage in the piston, and a carbureter, said passages in the cylinder communicating with the carbureter and crank case respectively whereby air compressed in the crank case will be forced through the carbureter to enter the cylinder as a mixture, said piston serving to cut off the air inlet passage at the time that the mixture is discharged into the cylinder while the exhaust takes place at the diametrically opposite side thereof through the port named.

3. In a two-cycle combustion engine, the combination with the usual cylinder and crank case communicating therewith and having a crank shaft; of a piston reciprocating in the cylinder and having a hollow wrist pin having operative connection with the crank shaft, the bore of the wrist pin serving as a transverse passage through the piston communicating with the inner face of the cylinder, an air inlet for the cylinder beneath the piston, whereby said air is compressed in the crank case upon reciprocation of the piston in one direction, a carbureter, means including the transverse passage through the piston for establishing communication between the crank case and the carbureter, whereby the air compressed in the latter will be forced through the carbureter to mix with the fuel therein, a conduit between the carbureter and cylinder for supplying a combustible mixture to the combustion chamber of the cylinder, and means for controlling the supply of fuel to mix with the air, said communicating passage between the carbureter and combustion chamber of the cylinder passing through the wall of the cylinder, an exhaust port being provided at the opposite side of the cylinder, said piston having a deflector whereby upon the compression of the air in the crank case said air will be forced through the carbureter and the mixture thus produced caused to enter the combustion chamber while the exhaust takes place at the opposite side thereof.

4. An internal combustion motor embodying the combination with the usual crank case, cylinder and piston moving in the cylinder; of a valved inlet for air to the crank case, said piston having an opening to line therewith for admitting air and provided with inwardly extending sleeve portions, a hollow wrist pin the bore of which forms a passage transversely through the piston and communicating with the peripheral face thereof, a crank shaft journaled in the crank case, a connecting rod having a sleeve portion for connection with said wrist pin between the sleeve portions of the piston and connected at its opposite end with the crank shaft, a passage communicating between the crank case and said first-named passage established when the piston is on its power stroke, a carbureter having a well, a nozzle projecting into the well, means for regulating the supply of fuel through the nozzle, connections adapted to establish communication between the passage through the piston, the carbureter and the interior of the cylinder when said piston is in the position afore-mentioned, said cylinder having a water jacket and a sparking device communicating with the combustion chamber thereof, the compressed air in the crank case mixing with the gasolene fuel of the carbureter and passing into the combustion chamber for compression upon the opposite stroke of the piston to be ignited, and an exhaust passage for the cylinder through which the spent gases escape on the power stroke during the time that the fuel is being supplied to the chamber.

5. A two-cycle combustion engine comprising, a cylinder having a fuel inlet and an exhaust, a piston therein having a hollow wrist-pin, a crank casing communicating with the cylinder and having an air inlet, said piston having an opening adapted to register with the said air inlet whereby upon the compression stroke of the piston air will be drawn into the crank case for compression therein on the power stroke of the piston, and a carbureter in communication with the fuel inlet, said cylinder having passages at opposite sides adapted to aline with the bore of the wrist-pin, one of said passages leading to the crank case, the other to the

carbureter, whereby when the bore of the wrist-pin alines with the opposite passages of the cylinder communication is established between the crank case and the fuel inlet through the carbureter and the compressed air from the crank case flows through the carbureter to the inlet.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES W. ROESSLE.
ANDREW ANTON REENBERG.

Witnesses:
ADRIAN M. WILLIAMSON,
WALTER J. JONES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."