

A. BUTSCH.

INTERNAL COMBUSTION ENGINE.

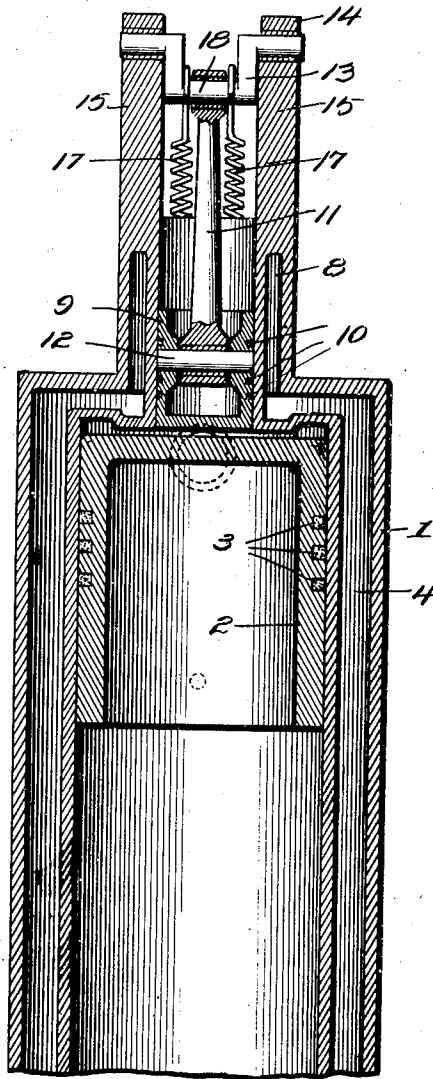
APPLICATION FILED OCT. 1, 1909. RENEWED SEPT. 27, 1912.

1,046,965.

Patented Dec. 10, 1912.

3 SHEETS—SHEET 1.

FIG. 1.



Inventor

Alphonse Butsch.

Witnesses

H. F. Kofle.
R. M. Smith.

By Victor J. Evans
Attorney.

A. BUTSCH.
INTERNAL COMBUSTION ENGINE.

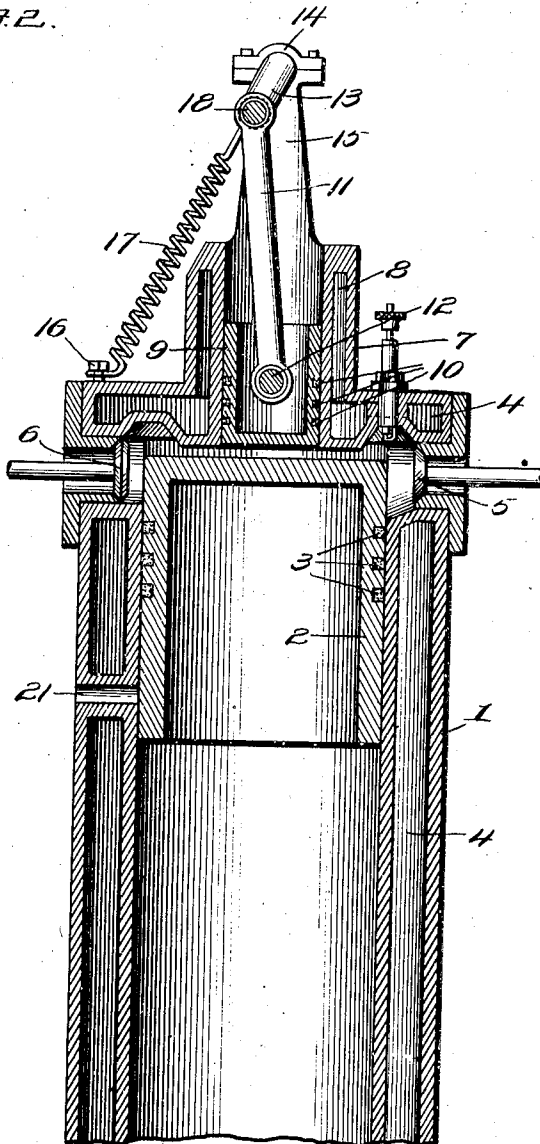
APPLICATION FILED OCT. 1, 1909. RENEWED SEPT. 27, 1912.

1,046,965.

Patented Dec. 10, 1912.

3 SHEETS—SHEET 2.

FIG. 2.



Inventor
Alphonse Butsch.

Witnesses
A. F. Kaye.
R. M. Smith.

By Victor J. Evans
Attorney

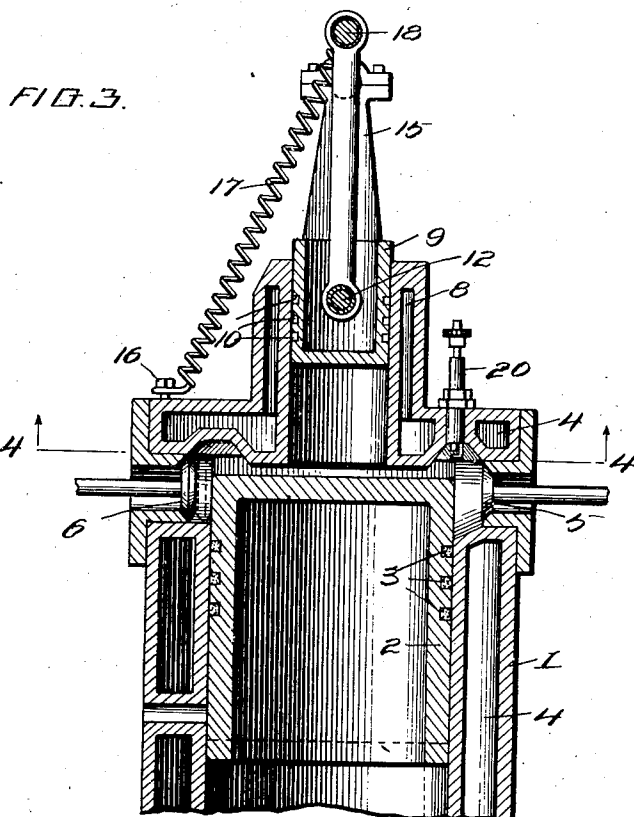
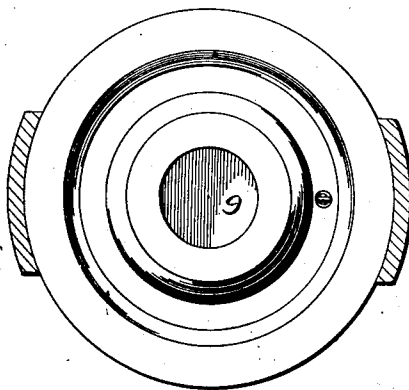


FIG. 4.



Witnesses
W. F. Kaylor.
R. M. Smith.

Inventor.
Alphonse Butsch.

By Victor J. Evans
Attorney

UNITED STATES PATENT OFFICE.

ALPHONSE BUTSCH, OF ST. LUCIA, BRITISH WEST INDIES.

INTERNAL-COMBUSTION ENGINE.

1,046,965.

Specification of Letters Patent.

Patented Dec. 10, 1912.

Application filed October 1, 1909, Serial No. 520,472: Renewed September 27, 1912. Serial No. 722,759.

To all whom it may concern:

Be it known that I, ALPHONSE BUTSCH, a subject of the King of Great Britain, residing at St. Lucia, British West Indies, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines, the main object of the invention being to provide for a complete scavenging operation or exhaust of the burnt gases from the cylinder preparatory to the introduction of a fresh charge of gases, resulting in a purer mixture or charge, a more powerful explosion and greater efficiency and driving power without any increase in the consumption of fuel.

By means of the construction hereinafter described, the new charges of gas do not come in contact with the hot sides of the combustion chamber thus enabling the charge to be compressed to a higher degree than is possible with the ordinary construction of internal combustion engine at present in use. The charge being both purer and denser, the explosion will be more certain and the performance of the engine more regular. There will also be a reduction in the loss of heat during the explosions.

With the above and other objects in view the invention consists in the novel construction, combination and arrangement herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a longitudinal section through a single cylinder engine of the four-cycle type embodying the present invention. Fig. 2 is a similar section taken at right angles to Fig. 1. Fig. 3 is a longitudinal section through the head of the cylinder taken on the same line as Fig. 2. Fig. 4 is a cross section taken on the line 4—4 of Fig. 3.

Referring to the drawings 1 designates the main cylinder of the engine and 2 the main piston thereof which is provided with the usual packing means while the cylinder is water-jacketed in the ordinary manner as shown at 4.

5 designates the intake valve leading to the combustion chamber and 6 designates the exhaust valve, said valves 5 and 6 being preferably arranged at opposite points close to the head of the cylinder and being operated in any usual or preferred manner.

In carrying out the present invention, the head of the cylinder is constructed to em-

body an auxiliary cylinder 7 which is water-jacketed as shown at 8 while within said auxiliary cylinder is mounted a reciprocated cylinder or movable cylinder head section 9 the same being provided with piston rings 10.

11 designates a connecting rod one end of which connects with a wrist pin 12 extending diametrically of the auxiliary piston 9 while the other end of said connecting rod is attached to an oscillating crank 13 mounted in bearings 14 on oppositely located arms 15 extending outward from the main cylinder head as best illustrated in Fig. 1. Interposed between the crank 13 and one or more fixed points 16 on the main cylinder head are one or more contractile springs 17 which serve to hold the crank 13 normally in a position illustrated in Fig. 2 in which it will be observed that the point of connection 18 between the connecting rod 11 and the crank 13 is out of alinement with the point of connection between the connecting rod and the wrist pin 12 and the bearing 14 for the body of the oscillatory crank 15, thus avoiding a dead center. The spring or springs 17 expand to allow the crank 13 to swing from the position illustrated in Figs. 1 and 2 to the position illustrated in Fig. 3, said two positions defining the limits of movement in opposite directions of the auxiliary pistons or movable cylinder head sections 9.

Under the arrangement hereinabove described no compression space exists between the main piston and the head of the cylinder when the main piston is at the upper limit of its movement, the object of this being to insure the complete exhaust of all the burnt gases after a charge has been exploded in the main cylinder. In the compression stroke of the main piston the first charge of mixture which has been drawn into the main cylinder by the previous down stroke of the main piston, is forced against the auxiliary piston or movable cylinder head section 9 driving the latter upward against the tension of the springs 17 to the position illustrated in Fig. 3 beyond which point it is prevented from moving by the crank 13 which is swung upward to the upward limit of its movement. This provides a temporary compression and combustion chamber and while the parts are in position shown in Fig. 3, the plug shown at 20 emits a spark which explodes a charge and drives the main piston 2 downward. Just before the piston

2 reaches the downward movement of its limit it unmasks an auxiliary exhaust port 21 extending through the side wall of the cylinder and just at this time the auxiliary cylinder 9 descends and acts to force a good portion of the exhaust gases out through the port 21. At the downward limit of the movement of the piston 9, the bottom thereof lies flush with the inner surface of the main cylinder head as shown in Figs. 1 and 2 so that when the main cylinder 2 moves upward, the remaining gases are discharged past the exhaust valve 6 which is held open at the appropriate time for that purpose. Then as the piston 2 begins to descend, the exhaust valve 6 closes and the intake valve 5 opens to admit the other charge of mixture to the main cylinder. It will thus be seen that the cylinder is thoroughly scavenged in each cycle of operation of the engine, resulting in the inflow and compression of a fresh pure charge of gas which is productive of a more powerful explosion and a material increase in the efficiency of the engine without any increase in the consumption of fuel. The new charge does not come in contact with the highly heated sides of the combustion chamber as they are unmasked or uncovered by the auxiliary piston 9. There being little or no burnt gas to mix with the first charge during the subsequent stroke, the new charge does not become heated and expands during the subsequent stroke thus resulting in a much denser charge. On this account the charge may be compressed to a materially higher degree without fear of preignition. The diameter of the auxiliary cylinder is about equal to the length of that portion which is opened up into connection with the main cylinder thus presenting a comparatively smaller cooling surface during exposure.

I claim:

1. In an internal combustion engine, the combination of a main cylinder, a main piston therein, an auxiliary cylinder communicating with the compression space of the main cylinder, a scavenging piston in the auxiliary cylinder, said auxiliary cylinder being open at its outer end, a pitman connected with the scavenging piston and extending out of the open end of the auxiliary cylinder, a rocking crank shaft with which the pitman is connected, a spring connected with the crank shaft to normally hold the same off dead center and allowing the scavenging piston to move outwardly when the pressure in the main cylinder exceeds the tension of the spring and moving the scavenging piston inwardly when the pressure in the main cylinder drops to a point lower than the tension of the spring.

2. In an internal combustion engine, the combination of a main cylinder, a main piston therein, an auxiliary cylinder communicating with the compression space of the main cylinder, a scavenging piston in the auxiliary cylinder, a crank, a pitman between the crank and scavenging piston, said crank serving to limit the outward movement of the scavenging piston when the crank reaches its outer dead center, and a yielding element operatively connected with the crank and pitman to hold the crank normally off its inner dead center and to effect the instroke of the scavenging piston during the period of exhaust.

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

ALPHONSE BUTSCH.

Witnesses:

W. R. MYERS,
F. BOUCHES.