V. SPUHLER.

TWO-STROKE-CYCLE INTERNAL COMBUSTION ENGINE.

APPLICATION FILED FEB. 11, 1916.

1,346,066.

Patented July 6, 1920.

Fig. 1.

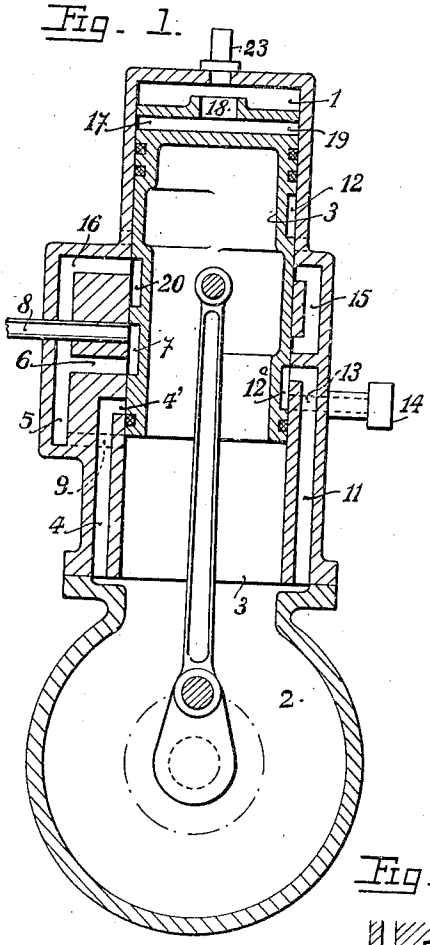


Fig. 2.

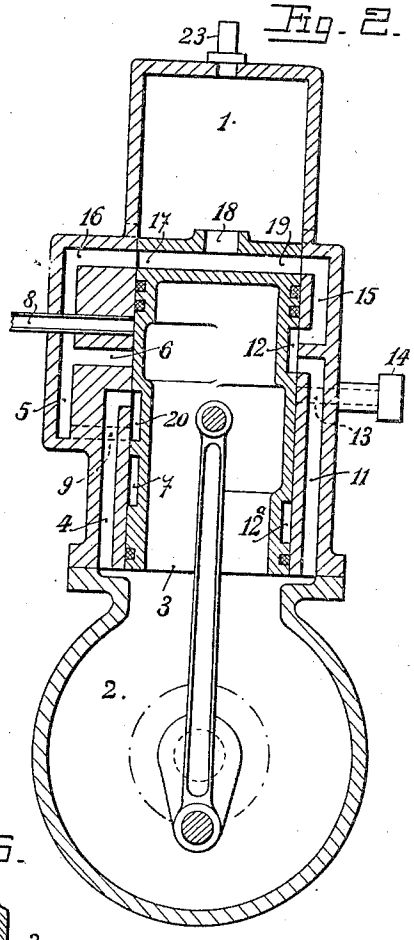


Fig. 5.

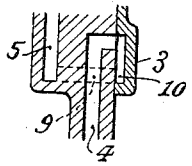


Fig. 3.

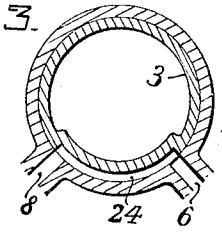


Fig. 6.

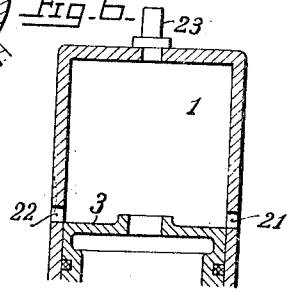
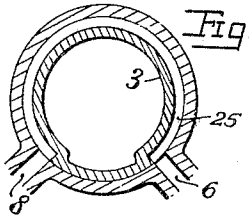


Fig. 4.



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TWO-STROKE-CYCLE INTERNAL-COMBUSTION ENGINE.

1,346,066. Specification of Letters Patent. Patented July 6, 1920.

Application filed February 11, 1916. Serial No. 77,769.

To all whom it may concern:

Be it known that I, VICTOR SPUHLER, a citizen of the Swiss Confederation, residing at Rothkreuz, Canton Zug, Switzerland, have invented new and useful Improvements in Two-Stroke-Cycle Internal-Combustion Engines, of which the following is a specification.

The present invention relates to a two-stroke-cycle internal combustion engine of the type in which the crank chamber co-acts with the piston to serve as a pump.

One object of the invention is to prevent the entrance of combustible or combustible mixture into the crank chamber.

A second object of my invention is to effectually eliminate all possibility of the escape of air, into the crank case, after such air has been injected into the explosion chamber of the engine.

A third object of my invention is to have my engine of such peculiar construction as to allow air to be injected into the combustion chamber at a comparatively low temperature.

Further objects and advantages of the invention will appear in the following description and the novel features thereof will be particularly pointed out in the appended claims.

The invention is shown in the drawings in a diagrammatical manner:

Figure 1 represents a sectional elevation of the engine with the piston in its top position;

Fig. 2 is a sectional elevation of the engine shown in Fig. 1 with the piston in its lowest position;

Fig. 3 is a cross section through the cylinder showing form and arrangement of ports and channel;

Fig. 4 is a cross section through the cylinder of another form of construction showing a different form of the port and channels.

Fig. 5 shows a modification of parts of the engine in section;

Fig. 6 is a sectional view of the top of the cylinder, as illustrated in Fig. 1 of the drawings.

In the drawings 1 represents a cylinder in which a piston 3 is arranged. The piston is connected to a crank arranged in the crank case 2 the latter being closed and serving together with the piston 3 as a pump. In the cylinder 1 a passage 4 is arranged one end of which is in communication with the crank chamber the other end forms a port 4^1 which port is controlled by the piston 3. In the cylinder 1 there is an air inlet pipe 8 which is (in the position of the parts shown in Fig. 1) in communication with a passage 6 in the cylinder 1 by means of a groove 7 arranged on the outer face of the piston 3. From the passage 6 two channels 5 and 16 are branched-off, one of them, 16, communicating with a slot 17 in the piston 3 when the latter is in its lowest position (Fig. 2) and the other 5 is connected with the passage 4 by means of branch 9 and a channel 20 in the piston 3 in the lowest position of the piston 3. Channel 17 leads to a nozzle 18 disposed in axial direction on the piston 3. With the nozzle 18 another channel 19 is in communication which in the position of the piston shown in Fig. 2 is connected by means of the passages 15, 12 and 11 with the crank chamber 2. The passage 12 is arranged in the piston and the passages 11 and 15 in the cylinder. The gaseous mixture is admitted through a pipe 13 which leads to a carbureter 14 on the one hand and which is brought in communication with the passage 12 by means of a passage 12^a in the piston when the latter has attained its top position shown in Fig. 1. The cylinder 1 is provided with exhaust ports 21, 22 (Fig. 6) and with a sparking plug 23.

The engine operates as follows:

On the piston 3 reaching the limit of its inward motion the gaseous mixture which has been passed into the cylinder is fired the resulting explosion of the charge causing the outward motion of the piston 3. As long as the piston 3 is in or near the position shown in Fig. 1 fresh air may enter the crank case through the passages 8, 7, 6, 5 and 9. At the same time the gaseous mixture enters through the pipe 13 and passage 12^a into the passage 11. I construct my parts in such a manner that the gaseous mixture instead of entering the crank case 2, will only fill the top part of the passages 11. The outward motion of the piston 3 compresses the air in the crank case 2 and the gaseous mixture in the passage 11 as soon as the piston 3 closes the entrance opening of passage 9 and pipe 13. On the piston 3 reaching the limit of its outward motion the compressed air in the crank case 2 escapes on the one hand through the passages 4, 20, 9, 5, 16, 17 and

18 and on the other hand through the passages 11, 12, 15, 19 and 18 into the explosion chamber of the engine. The gaseous mixture which has been previously in the passage 11 has been driven into the explosion chamber by the compressed air escaping from the crank case. In the position of the piston shown in Fig. 2 all the passages up to the nozzle 18 are filled with fresh air. If the piston 3 moves upward it closes the passage 15 and the air in this passage 15 is not subjected to pressure when the piston 3 is descending. The air in the passage 15 rests cool and will not become mixed with the gaseous mixture. After firing the charge, the exhaust ports 21, 22 are uncovered and the air from the passage 15 enters first in the combustion room and prevents back firing. The gaseous mixture from the passage 11 now follows and after this fresh air from the crank case.

For the sake of simplicity as shown in Figs. 1 and 2, the passages 7, 12 and 20 extend in an axial direction with respect to the piston. I wish to have it understood, however, that if desired I may arrange them as depicted in Figs. 3 and 4. In the construction disclosed in Fig. 3 the passage 24, which is formed in the piston, serves to connect the passages 6 and 8 and is comparatively short. However, in the construction shown in Fig. 4, the passage 25 formed in the wall of the piston, is much longer, extending practically $\frac{3}{4}$ of the way around the circumference of the piston. The passages 24 and 25 are adapted to be used for the storage of air.

The entrance of air into the crank case may be controlled by the piston as shown in Fig. 5. Near the lower edge of the piston there is a passage 10 which interconnects the passages 4 and 9 as soon as the piston has reached the limit of its inward motion shown in Fig. 1.

While I have illustrated and described one practical embodiment of my invention, it is to be understood that the latter is not limited to the form shown but may be embodied in many other forms, and that many modifications may be made in the form illustrated without departing from the spirit of the invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

An internal combustion engine comprising a cylinder open at one end, a crank case at and open at said end of the cylinder so that communication is established between them, a piston in the cylinder, and provided with a chamber opening into said open end of the cylinder and also into the crank case, said piston having a transverse passage near its inner end, also having an opening at its inner end communicating with said passage; and being further provided on its exterior with two pairs of spaced passages, said cylinder having a fuel inlet, and a passage leading to said crank case, which inlet and passage are placed in communication with each other by one of said passages of the piston, when the latter is in instroke position, said cylinder having exhaust ports closed by the piston when the latter is in such position, and being further provided with an air inlet; a pair of communicating passages which are put in communication with the air inlet and the interior of the crank case, cylinder and piston by one of the passages of the piston when the latter is in such position; said cylinder also having a passage leading therefrom to the interior of the crank case, and put in communication therewith by the other passage of the piston when the latter is in outstroke position, the transverse passage of the piston being in communication with the passages of the cylinder when the piston is in such position.

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

VICTOR SPUHLER.

Witnesses:

WILLIAM OECHSLIN,

CARL GUTKEN.