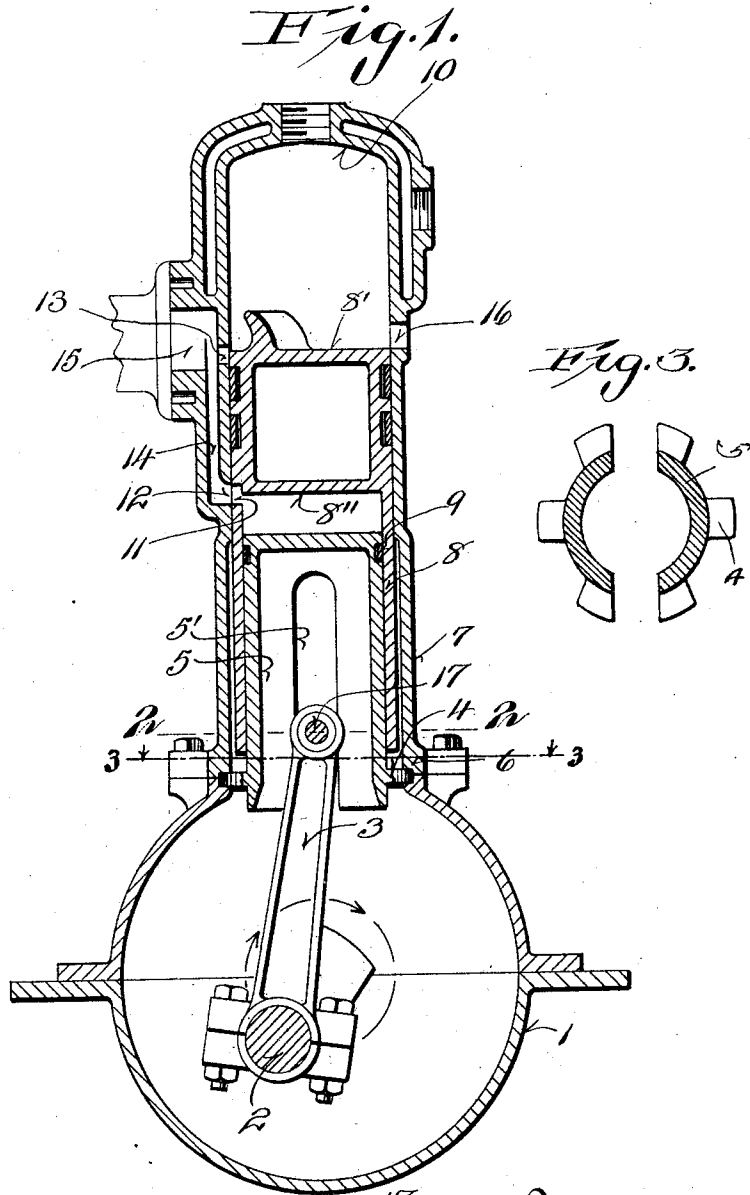


E. E. NELDNER.  
 TWO-CYCLE ENGINE.  
 APPLICATION FILED APR. 19, 1920.

1,405,545.

Patented Feb. 7, 1922.



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# UNITED STATES PATENT OFFICE.

EDWARD E. NELDNER, OF MILWAUKEE, WISCONSIN.

## TWO-CYCLE ENGINE.

1,405,545.

Specification of Letters Patent.

Patented Feb. 7, 1922.

Application filed April 19, 1920. Serial No. 374,964.

*To all whom it may concern:*

Be it known that I, EDWARD E. NELDNER, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Two-Cycle Engines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention refers to two cycle engines, and has for its object to provide a simple, economical and effective engine of this type.

Specifically the objects of my invention are to provide a triple port engine wherein the fuel charge is introduced into the compression end of the engine cylinder and thereafter shifted to the firing end of the same to thus dispense with the ordinary method of introducing the fuel charge into the crank casing. By this advance in the art, the crank casing may be cheaply constructed without regard to the minute fittings which are necessary when the crank casing is used to confine the fuel charge.

A further advantage of the construction of an engine in accordance with my invention, is, that the fuel charge will not come in contact with the lubricating oil ordinarily confined in the crank casing. Thus the fuel charge is not impregnated with foreign matter which will cause imperfect combustion.

A further object of my invention is to provide the triple port engine with a piston that is adapted to reciprocate between fixed heads and arranged to be operated in telescopic union with one of the heads whereby the compression chamber is formed for the fuel charge and leakage is thus avoided due to a simple packing connection between the telescopic parts.

With the above and other minor objects in view, the invention consists of certain peculiarities of construction, and combination of parts as are herein set forth with reference to the accompanying drawings and subsequently claimed.

In the drawings:

Figure 1 represents a sectional elevation of a triple port engine embodying the features of my invention.

Figure 2, a cross section of the same, the section being indicated by line 2—2 of Figure 1 and Figure 3 is a detailed view on

line 3—3 of Figure 1 showing the lower part of the cylinder head.

Referring by characters to the drawings, 1 represents a two part crank casing having mounted therein a crank shaft 2 which carries the usual piston rod 3. The upper section of the crank casing is open and is recessed for the reception of the flange 4 that projects from the lower end of a hollow head 5. The head 5 is held in position by the lower flanged end 6 of the cylinder 7, the inner walls of which cylinder at this lower end are spaced from the outer wall of the fixed head 5 to form a clearance space for the lower end 8 of a hollow shell-like piston which is in telescopic union with the fixed head 5.

As shown, the lower end of the piston is packed with respect to the upper end of the head 5 by a suitable ring 9 and it should be understood that the lower flange 4 of said head is preferably of skeleton form to prevent air compression at this end, due to the reciprocation of the piston. The upper end of the engine cylinder is provided with the usual closed head 10 having a threaded opening therein for the reception of a spark plug mechanism, not shown.

The head of the piston is preferably cast hollow and provided with an upper firing wall 8' and a lower compression wall 8'', which in connection with the side wall 8, forms a compression chamber for receiving the fuel charges. The wall 8 of the piston is also provided with a port 11 which port is adapted to alternately register with a receiving port 12 and a delivery port 13, the same being formed in the walls of the cylinder at suitably spaced intervals. These two ports also communicate with a gas passage 14 and an intake mouth 15 which mouth is connected to the fuel supply mechanism, not shown. The engine cylinder is also provided with an exhaust port 16, which port is approximately upon the same plane as the delivery port 13, it being understood that the delivery port and exhaust port in conjunction with the piston operate in the same manner as is usual in two cycle engines.

For convenience in assemblage and cheapness of construction, the fixed cylinder head 5 is provided with longitudinal slots 5'—5' through which the end sleeve 3' of the pis-

ton rod extends. The said sleeve being mounted upon a pin 17 which is fitted in suitable bearings which are provided in the opposite side walls of the sleeve portion 8 of said piston, as best shown in Figure 2.

If desired, obviously the upper section of the crank casing may be extended in one piece to approximately the upper terminal of the fixed head 5 at which point the sleeve would be provided with flanges adapted to bolt a standard cylinder thereon.

In the operation of the engine, as shown in Fig. 1, the piston is just starting on its upward stroke, in which position the fuel gas which has previously been compressed in the lower chamber, is caused to travel upwardly through the passage 14 to be delivered into the firing head or end of the cylinder through the port 13, whereby the spent gases are scavenged through the exhaust port 16. In completing the upward movement of the piston, the gas charge is compressed and exploded, and at this time the port 11 of the piston will register with the delivery port 13, whereby a fresh charge of fuel will enter the compression chamber formed between the lower face 8'' of the piston and the opposite face of the fixed head 5. This charge will pass into the chamber or cavity due to suction, caused through partial vacuum and as the piston moves down upon its working stroke, this charge will be compressed and delivered to the firing end of the cylinder, as previously mentioned, upon the initial up stroke of the aforesaid piston.

From the foregoing description and operation, it will be seen that the fuel gases are initially compressed in the chamber upon the crank casing and thereafter discharged into the firing chamber whereby said gases are economically controlled and kept from contact with the lubricating oils of the engine ports, thus insuring a maximum utility of the charge and thereby preventing to a large extent, carbon deposits or imperfect combustion.

Obviously I may vary the structural features of the engine described, without departing from the spirit of my invention.

I claim:

1. In an internal combustion engine, a crank case, a cylinder mounted thereon, a

cylinder head disposed within the lower end of the cylinder and spaced therefrom and having a flange clamped between the cylinder and the crank case, a reciprocable piston head within the cylinder and having a sleeve at one end fitting into the space between the cylinder and its head to form a fuel chamber between the piston head and the cylinder head, a fuel passage way, two inlet ports in said cylinder in communication with said passage way, a single port in said piston head sleeve which is in registry with the upper cylinder port at the end of the up stroke, and in registry with the lower cylinder port at the end of the down stroke, said upper port being also uncovered by the piston head when in its lowermost position whereby fuel is discharged from the fuel chamber to the firing end of the cylinder, and an exhaust port in the cylinder on the side opposite to the inlet ports.

2. In an internal combustion engine, a crank case, a cylinder mounted thereon, a cylinder head disposed within the lower end of the cylinder and spaced therefrom and having a flange clamped between the cylinder and the crank case, a reciprocable piston head within the cylinder and having a sleeve at one end fitting into the space between the cylinder and its head to form a fuel chamber between the piston head and cylinder head, said flange having openings therethrough to provide free communication between the lower end of the space which receives the piston head sleeve and the interior of the crank case, a fuel passage way, two inlet ports in said cylinder in communication with said passage way, a single port in said piston head sleeve which is in registry with the upper cylinder port at the end of the up stroke, and in registry with the lower cylinder port at the end of the down stroke, said upper port being also uncovered by the piston head when in its lowermost position whereby fuel is discharged from the fuel chamber to the firing end of the cylinder and an exhaust port in the cylinder on the side opposite to the inlet ports.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee and State of Wisconsin.

EDWARD E. NELDER.