

PATENT SPECIFICATION



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COMPLETE SPECIFICATION.

Improvements in Two-stroke Internal Combustion Engines.

We, CENTRA HANDELS-UND INDUSTRIE A.-G., a corporation organized under the laws of Switzerland, of Quaderstrasse, Chur, Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

In internal combustion engines, in which more than two pistons work in a common combustion chamber, the piston face must be arched or roof-shaped for the purpose of giving a good shape to the combustion chamber. The roof-shape of the piston face is more particularly required where the Diesel method of operation is used, as a Diesel engine requires a particularly small combustion chamber.

In two-stroke internal combustion engines, where the scavenging operation is controlled by the piston, this shape of piston face is disadvantageous if the scavenging ports are distributed uniformly about the circumference of the cylinder in the usual manner, as the scavenging air entering the cylinder is deflected by the arched surface and flows in a relatively thin layer at high speed through the central zone of the cylinder, while on each side of this thin layer of scavenging air eddy currents are formed, which do not participate in scavenging.

According to our invention these defects are avoided by arranging the scavenging ports which face each other parallel with the back of the roof-shaped piston face. With this arrangement and shape of the scavenging ports in relation to the roof-shape of the piston face the streams of scavenging air issuing from the scavenging ports form jets which collide with each other without being deflected by the piston face. In virtue of the collision the kinetic energy of the air streams is practically destroyed so that the space above the dome-shaped piston face is completely filled with scavenging air, which under the influence of the air subsequently entering forms a cushion of air filling the entire cross section of the cylinder and pushing out gases of combustion in front of it. The formation of eddy currents is

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thus avoided.

In order to avoid, as far as possible, deflection of the entering air streams by the port-closing edge of the piston face, the scavenging ports are so arranged that the edge of the piston passes beyond the outer edges of the ports during the outward stroke. This ensures that the air streams issuing from the scavenging ports do not undergo deflection by the edge of the piston face during the greater part of the scavenging period, but rather enter the cylinder parallel with the back of the dome-shaped piston face.

The annexed drawings illustrate a two stroke internal combustion engine according to the invention.

Fig. 1 is a cross section through the engine, Fig. 2 shows a portion of the engine on a larger scale, Fig. 3 is a vertical longitudinal section on the line A—B of Fig. 2, and Fig. 4 is a cross section on the line C—D of Fig. 3 as seen from below.

In the two-stroke internal combustion engine illustrated, which may work on the Diesel principle, a cylinder star is provided having three cylinders *a*, in which work pistons *b*. The three pistons *b* work in a common combustion chamber *c* and their faces are roof or dome-shaped, so that they form a very small combustion chamber when in the inner dead centre positions. The piston face has the form shown in Fig. 3, which is a section across the roof. The controlling edge of the piston comprises two flats *d* inclined to each other like a roof and the central curved part *e* forming the back of the dome.

The scavenging ports *f* in the cylinders *a* are parallel with the domed back *e* of the piston face and with the level lines of the flats *d*. There are consequently two groups of scavenging ports *f*, which are opposite each other and are located in positions swept by the end of the dome-shaped piston face *d, e* (Fig. 4). Moreover the scavenging ports *f* are so arranged that their controlling edges suit the shape of the dome-shaped piston face *d, e* (Fig. 3). Thus all the scavenging ports *f* are exposed simultaneously by the piston *d*.

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The scavenging ports f are also so located in the cylinder in relation to the outer dead centre position of the piston b , that when in the outer dead centre position (Fig. 3) the controlling end of the piston face d, e , is at a distance x from the outer edges of the scavenging ports f .

In the example illustrated the ports act as scavenging ports in two cylinders a , while in the third cylinder the ports act as exhaust ports g .

If during the outward stroke of the piston b the scavenging ports f of two cylinders a are exposed, air issues from these ports in streams parallel with the domed back e and correspondingly directed in relation to the level lines of the flats d . These air streams are not deflected by the dome-shaped formation of the piston face. The air streams issuing from opposite groups f of scavenging ports collide with each other, so that their kinetic energy is largely destroyed and the portion of the cylinder a above the piston face d, e is completely filled with scavenging air. This air is driven by the scavenging air subsequently entering the cylinder a , and drives the gases towards the exhaust ports g in the manner of an air piston.

After completely exposing the scavenging air ports f the piston b continues to move outwards to the extent x (Fig. 3), and the controlling end of the piston face d, e , only reaches the outer edges of the scavenging air ports during the subsequent inward stroke after passing once

more through the distance x . In this way, during a large portion of the scavenging period, the controlling end of the piston b is out of reach of the scavenging ports f , and it is ensured that during this time the air jets issuing from the scavenging ports f are not deflected in an undesirable manner by the piston end.

The invention is also applicable to two-stroke internal combustion engines having more than three pistons, provided the latter work in a common combustion chamber.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A two-stroke cycle internal combustion engine in which more than two pistons having dome or roof-shaped faces work in a common combustion chamber, having oppositely placed scavenging ports disposed parallel with the backs of the roof-shaped piston faces.

2. An engine according to claim 1, wherein the scavenging ports are so arranged that their outer edges are passed by the controlling edges of the piston faces during the outward strokes.

Dated this 31st day of December, 1929.

For the Applicants.

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Fig. 1

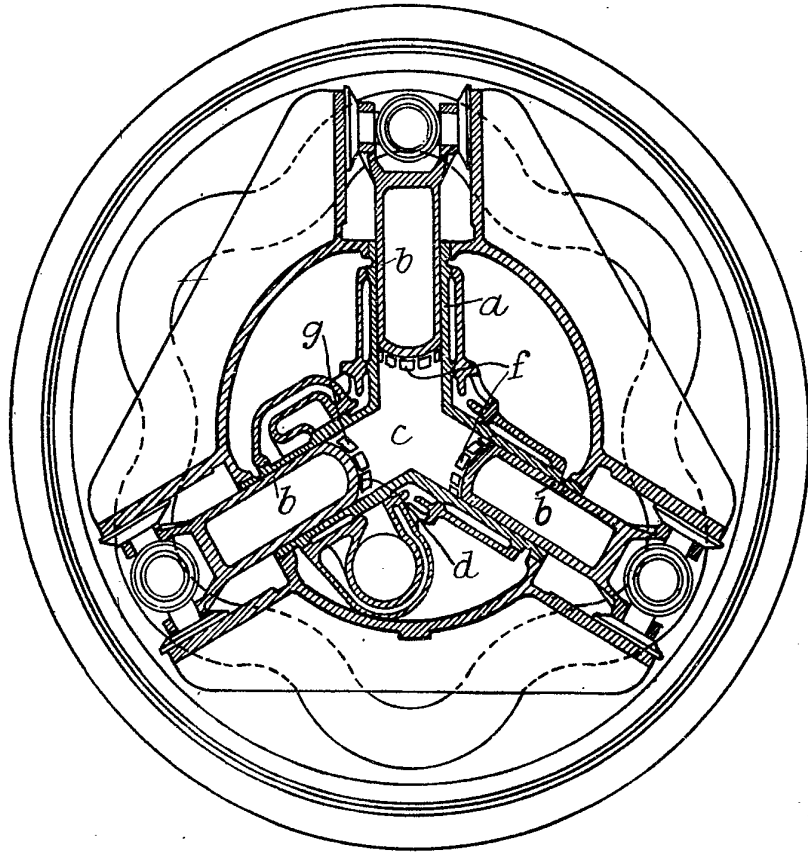


Fig. 2

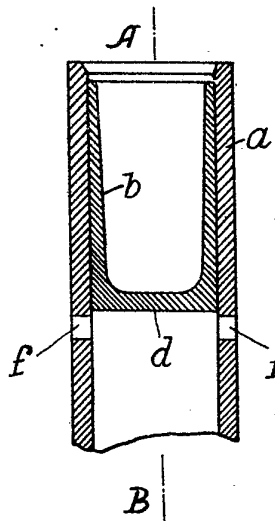


Fig. 3

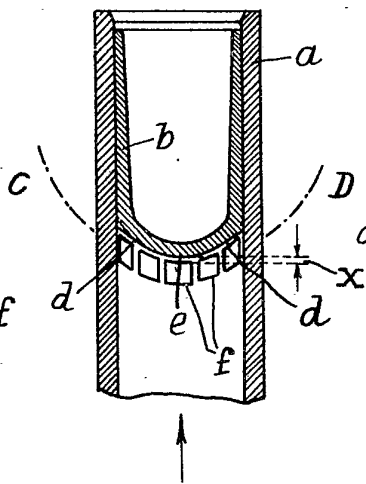
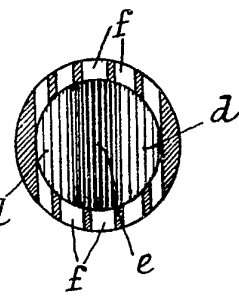


Fig. 4



[This Drawing is a reproduction of the Original on a reduced scale.]