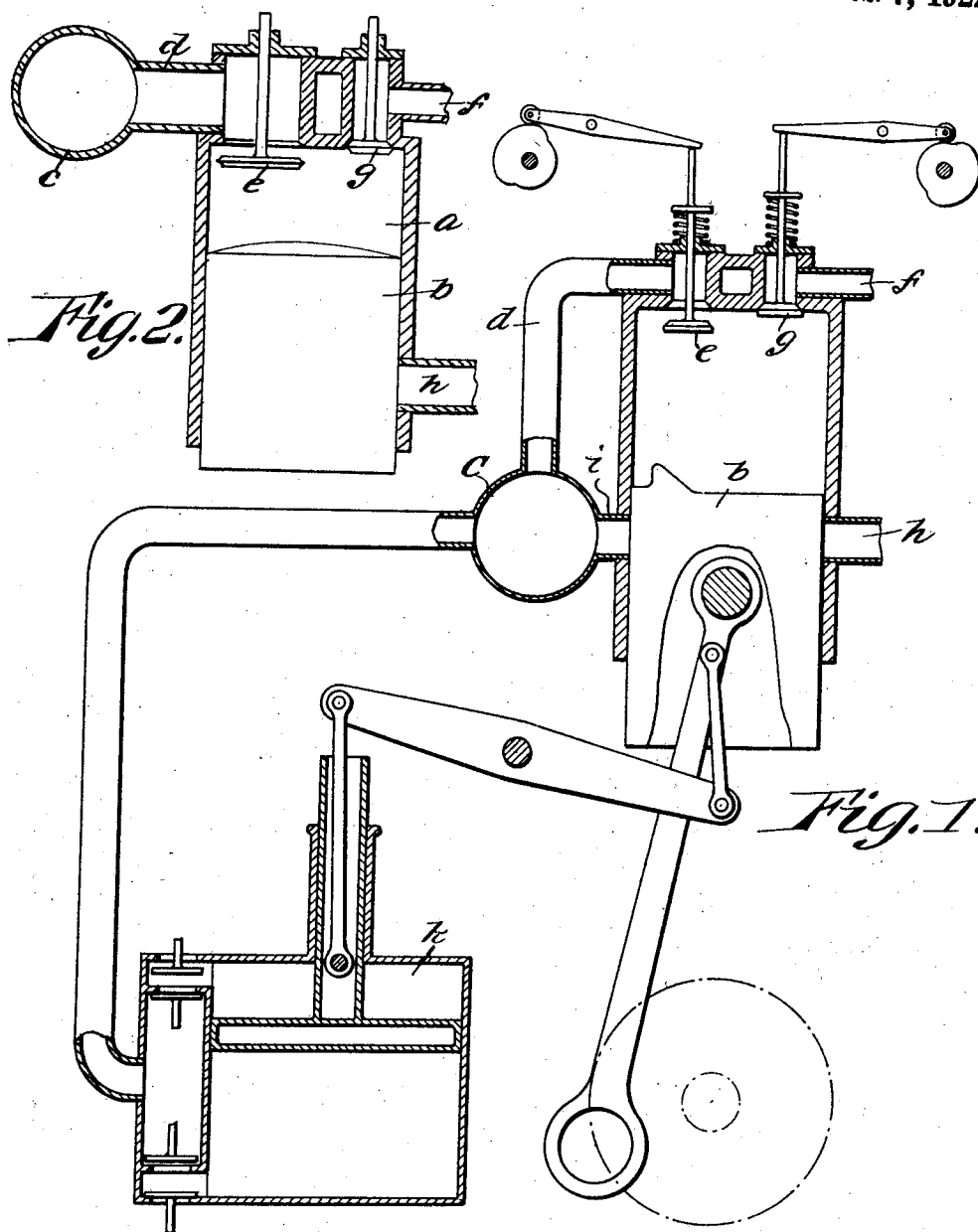


O. A. DERANS.
TWO-CYCLE ENGINE.
APPLICATION FILED OCT. 3, 1919.

1,405,975.

Patented Feb. 7, 1922.



Inventors

O. A. Derans,

by

H. R. Kerslake,

Attorney

UNITED STATES PATENT OFFICE.

OSCAR ALEXIUS DERANS, OF NYNÄSHAMN, SWEDEN, ASSIGNOR TO SVENSKA AKTIE-
BOLAGET NOBEL-DIESEL, OF NYNÄSHAMN, SWEDEN, A CORPORATION.

TWO-CYCLE ENGINE.

1,405,975.

Specification of Letters Patent.

Patented Feb. 7, 1922.

Application filed October 3, 1919. Serial No. 328,326.

To all whom it may concern:

Be it known that I, OSCAR ALEXIUS DERANS, subject of the King of Sweden, residing at Nynäshamn, in the Kingdom of Sweden, have invented certain new and useful Improvements in Two-Cycle Engines, of which the following is a specification.

The starting of two-cycle engines, particularly of such of larger sizes, is generally effected by means of compressed air from a suitable compressed air receiver or the like containing air under pressure of about 50 atmospheres. As soon as the engine has commenced its cycle of operation, the scavenging pump begins to work and scavenging air accumulates in the scavenging air receiver up to a certain pressure.

This pressure greatly depends on the speed of the engine so that on starting, when the number of revolutions of the engine is low and the time for scavenging the cylinder is comparatively long, the pressure of the scavenging air becomes very low. Consequently, the volumetric efficiency of the filling of the cylinder with air and the compression also become so low that the ignition often fails to take place. In other words, it is evident that the compression of the air in the cylinder is dependent of the pressure under which the scavenging takes place. The higher the pressure of the scavenging air, the higher will be the compression and thus also the temperature of the air.

The object of the present invention is to avoid these and other inconveniences and to facilitate a faster and surer starting.

This is attained in accordance with the invention by arranging the working cylinder so that it will work as an auxiliary air pump during the starting period. In order to attain this effect the working cylinder is preferably combined with the scavenging air receiver by means of a piping provided with a valve which opens during each compression stroke of the working piston. The advantages derived are: a greater quantity of scavenging air at a higher pressure, and lower starting pressure.

In prior practice, the starting air was compressed in the working cylinder during the return stroke of the piston, whereas according to the present invention, the air is allowed to escape into the scavenging air receiver, which is under a relatively low

pressure. The counter-pressure on the piston during its return stroke is therefore also relatively low and owing to this fact, it is possible to start the engine with compressed air of lower pressure than is possible with the engines used heretofore.

The advantages thus obtained principally consist therein that a lower pressure will do for the compressed air for starting, and that a greater quantity of scavenging air of higher pressure is obtained immediately after starting. This on the one hand involves a saving in the costs of installation and a simplification of the plant, and on the other hand the starting operation becomes faster and more certain, notwithstanding the fact that a lower pressure may be used for the starting air.

Two embodiments of the invention are shown in Figs. 1 and 2 of the accompanying drawing, the two figures being both diagrammatical representations of the characteristics described hereinbelow.

In Fig. 1, *a* denotes the cylinder, *b* the piston and *c* the ordinary scavenging pump receiver in which the compressed air for the scavenging of the cylinder is accumulated. Heretofore this receiver has been connected with the cylinder *a* only through a pipe *i* opening into that portion of the cylinder, which is above the piston at the lower extreme position of the latter. According to the invention the receiver *c* is also connected with the upper part of the cylinder by means of a pipe *d* through the medium of the non-return valve *e*. *f* designates the ordinary supply pipe from the compressed air receiver and *g* a starting valve; *h* is the exhaust pipe and *k* is the scavenging pump.

In accordance with the invention the valve *e* is controlled so that when starting, the valve is kept open during the compression stroke of the piston *b*, whereby the piston will work as an air pump and supply the receiver *c* with scavenging air together with the ordinary scavenging air pump. The quantity of scavenging air as well as the pressure thereof will therefore increase very rapidly, even if simultaneously the number of revolutions of the engine is low. In fact, even if the number of revolutions is low, the scavenging pressure will be high enough to bring about the same compression as at the normal number of revolutions.

Through the increased quantity of scavenging air the temperature thereof will also rise, and thereby the compression temperature will rise still further, all this facilitating and accelerating the passing on to a normal run.

In the embodiment according to Fig. 2 the pipe is omitted, and the receiver communicates with the upper part of the cylinder *a* only through the pipe *d*. The valve *e*, which normally serves as a scavenging valve, is controlled during the starting period in the same way as in Fig. 1.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A method for facilitating the starting of internal combustion engines, consisting in permitting compressed air to expand in the working cylinder of the engine to move the engine piston in one direction, utilizing the return movement of the piston to force the expanded air into a scavenging air receiver, scavenging the working cylinder by means of air supplied to said receiver, utilizing the working piston and a scavenging air pump for supplying air to the receiver, and

closing communication between the working cylinder and the scavenging air receiver when changing the operation of the engine from starting into normal operation.

2. In internal combustion engines, the combination with a working cylinder of means for starting the engine by allowing compressed air to expand in said cylinder, a scavenging air pump, operated by the engine, a receiver for said pump, a connection between said receiver and the working cylinder including a valve and means for operating said valve so as to open the connection between the receiver and the working cylinder during the return stroke of the working piston, thereby allowing the working cylinder to co-operate with the scavenging air pump in storing scavenging air during the starting operation.

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

OSCAR ALEXIUS DERANS.

Witnesses:

OSCAR GRAHN,
GRETA PRIEN.