W. McHARRY.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JUNE 10, 1918.

1,289,498.

Patented Dec. 31, 1918.

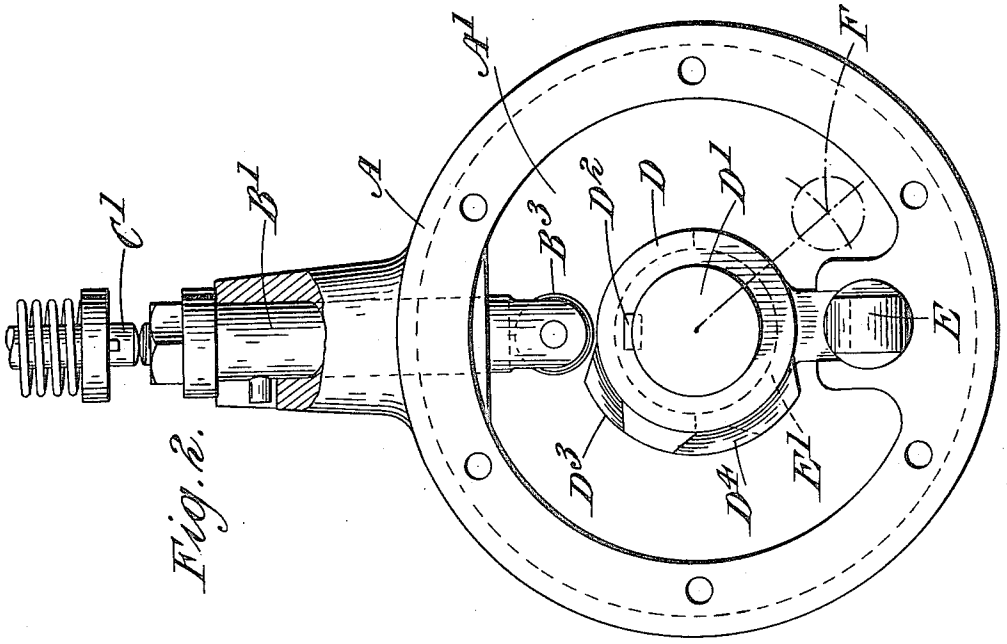


Fig. 2.

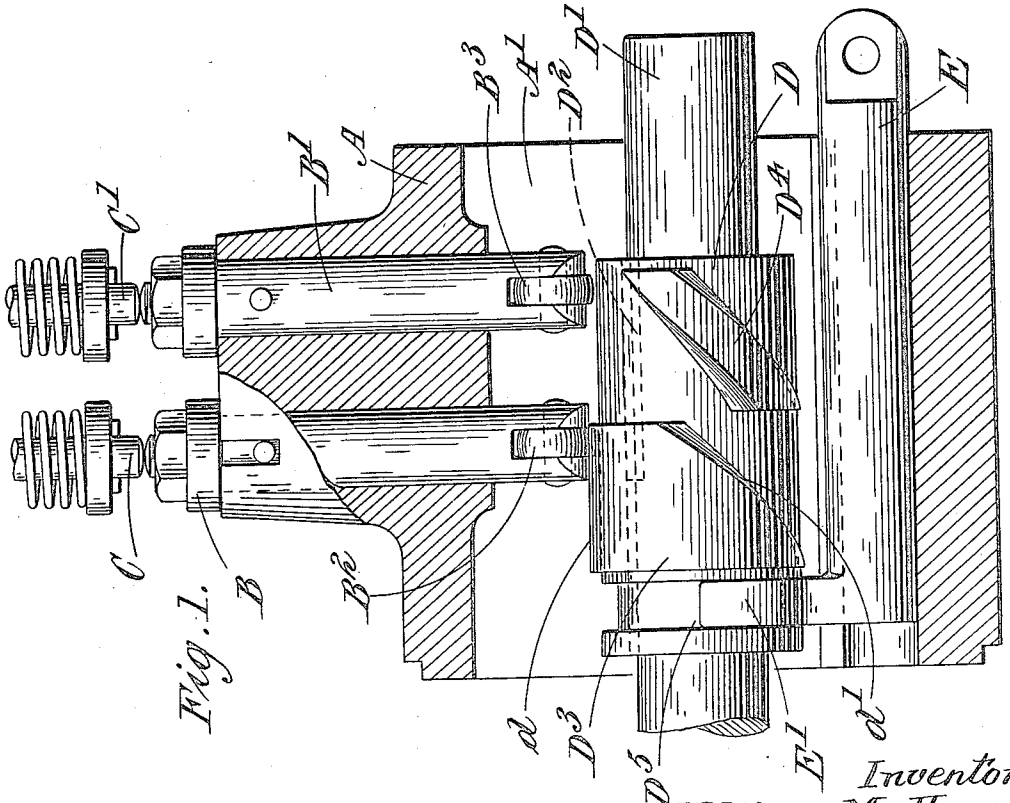


Fig. 1.

Inventor:
William McHarry
by Wilkinson & Giusta
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM McHARRY, OF COLCHESTER, ENGLAND.

INTERNAL-COMBUSTION ENGINE.

1,289,498. Specification of Letters Patent. Patented Dec. 31, 1918.

Application filed June 10, 1918. Serial No. 239,272.

To all whom it may concern:

Be it known that I, WILLIAM McHARRY, a subject of the King of England, residing at Colchester, Essex, England, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to two-stroke cycle internal-combustion engines and has for its object to provide an engine of this type which shall have greater flexibility of load than those at present in use. Usually the exhaust- and inlet-ports of these engines are controlled by the piston, with the result that the only means for varying the charge for different loads is a throttle for varying the supply of gas and air to the pump-chamber. It has also been proposed to release through a specially controlled valve, a portion of the explosive charge either to waste or to by-pass it from the engine-cylinder back to the pump-chamber, but all these methods of running result in excessive temperature of the charge previous to compression, at light loads, and undue dilution of the charge with inert gases as well as waste of fuel.

According to this invention, a two-stroke cycle engine having inlet- and exhaust-valves and operating-mechanism therefor, is characterized by the said operating-mechanism being so constructed that it can be adjusted at will or by automatic means while the engine is running, to cause the exhaust-valve to remain open during a greater or smaller angular movement of the crank-shaft and the inlet-valve to open always at such time before the closing of the exhaust-valve as will permit the delivery of the charge into the cylinder to be completed approximately at the moment of closing the said exhaust-valve, for the purpose of giving flexibility of load without the disadvantages referred to above.

Any suitable mechanism may be employed for operating the valves in the manner described, provided such mechanism can be adjusted at will or by automatic means according to the variations of load.

A simple form of mechanism is shown in the accompanying drawings wherein:—

Figure 1 is a section through the valve-mechanism on the axis of rotation of the operating-shaft, and

Fig. 2 shows the parts illustrated in Fig. 1 viewed from the right of that figure.

The same letters indicate the same parts in both figures of the drawings.

The mechanism shown can be applied to any convenient construction of engine and can be attached to the side of such engine by bolts passed through the circular casting A. In the casting, tappet-rods B, B^1 are mounted so that they can slide vertically. Resting upon the tops of the tappet-rods are the stems C, C^1 of exhaust- and inlet-valves respectively, which may be of the puppet type and may be kept closed by springs. The lower ends of the tappet-rods enter a chamber A^1 in the casing A and bear against a cam-member D which is carried by a shaft D^1 which extends through the chamber A^1. The shaft is coupled to, or is an extension of the engine crank-shaft and rotates at the same speed as the crank-shaft. The cam-member D can slide on the shaft D^1 but has driving connection therewith by means of the feather D^2. On the shaft are two cams D^3 and D^4 respectively. The cam D^3 has an opening edge d which is parallel with the axis of rotation of the shaft D^1 and a closing edge d^1 which follows a helical line relatively to the shaft D^1. Both edges of the cam D^4 are helical and the closing edge conforms with the closing edge of the cam D^3.

To slide the cam-member D, an operating-rod E is provided, having a fork E^1 which engages a circumferential channel D^5 in the cam-member.

The bottom ends of the rods B, B^1 carry rollers B^2, B^3, which bear against the cam-member against which they are thrust by the springs of the valves which press the stems C, C^1 down upon the tappet-rods.

The operation of this mechanism is as follows:—

With the parts in the position shown in Fig. 1, the mechanism is arranged for full load. The position of the crank-pin relatively to the cams D^3 and D^4 is indicated at F, Fig. 2, and it will be seen that the cam D^3 will open the exhaust-valve C when the crank-pin is about 40° from the bottom dead-center. At about the dead-center, the cam D^4 will commence to open the inlet-valve C^1 and the two valves will close simultaneously when the crank-pin arrives at about 40° on the other side of the dead-center. With the cam-member D in this position, the exhaust-valve is open for the smallest angular movement of the crank-shaft for which the mech-

anism allows, but as the member D is slid to the right of Fig. 1 by operating the rod E, (which can be done either by hand or by known automatic governing means) as the load decreases, the valve remains open for a greater angular movement of the crank-shaft though it always opens with the crank-shaft in the same angular position because the edge *d* is straight. The width of the cam D^4 is sufficient to allow the delivery of the charge into the engine-cylinder to be completed approximately at the moment of closing the exhaust-valve so that this is arranged to open the inlet-valve when the crank-shaft is at different angular positions which depend upon the position the shaft will occupy at the moment the exhaust-valve closes. The opening and closing sides of the cam D^4 need not be parallel.

It will be seen that the member E can be operated freely while the engine is running and that the mechanism for operating the valves in the manner described may be easily arranged so that for any particular engine when running at maximum load, the exhaust-valve may be made to remain open for a third of the compression-stroke of the piston so that the expansion-stroke is a third greater than the compression-stroke, which gives high thermal efficiency.

What I claim as my invention and desire to secure by Letters Patent is:—

In a two-stroke cycle engine, the combination of inlet- and exhaust-valves, operating-mechanism therefor, and means whereby the operating-mechanism can be adjusted while the engine is running to cause the exhaust to remain open during a greater or smaller angular movement of the crank-shaft according to load and to simultaneously cause the inlet-valve to open always at such time before the closing of the exhaust-valve as will permit the delivery of the charge into the cylinder to be completed approximately at the moment of closing the said exhaust-valve for the purpose described.

In testimony whereof I affix my signature.

WILLIAM McHARRY.