H. W. ROWING & V. W. RILEY.

INTERNAL COMBUSTION MOTOR OR ENGINE.

APPLICATION FILED NOV. 29, 1907.

966,953. **Patented Aug. 9, 1910.**

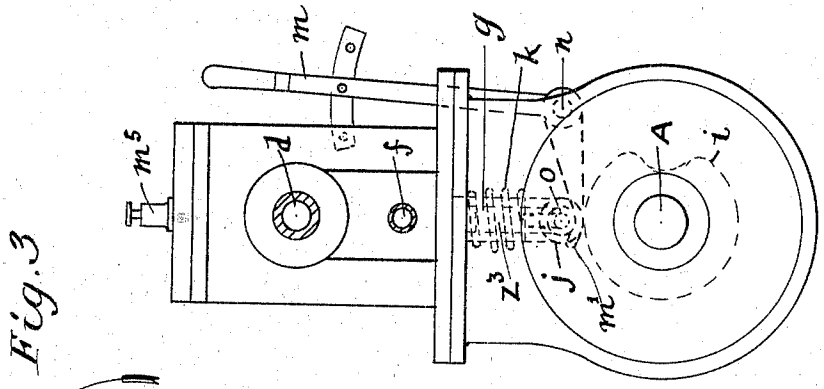
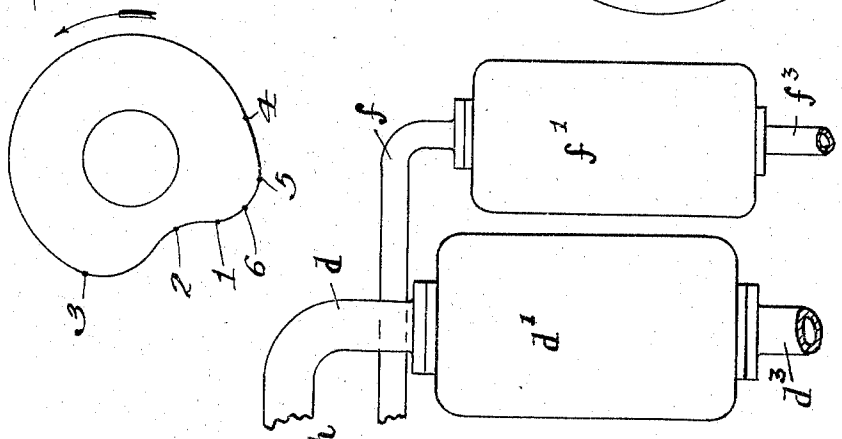


Fig. 2.

Fig. 3



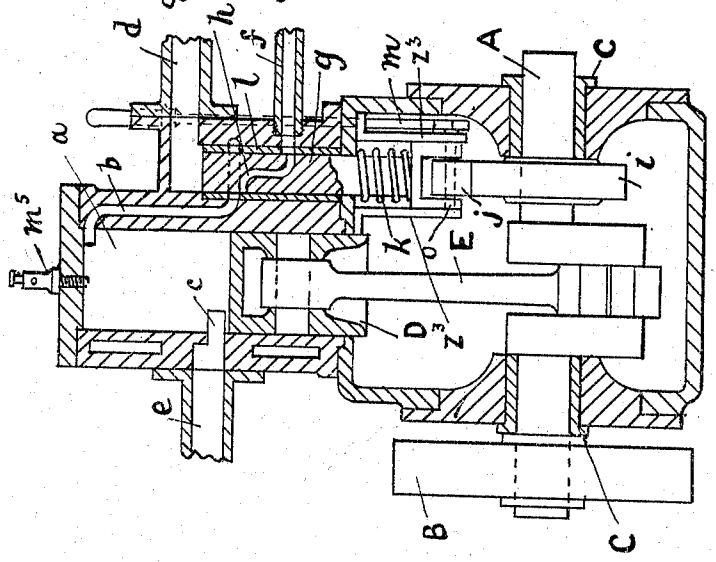


Fig. 1.

Witnesses
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UNITED STATES PATENT OFFICE.

HERBERT WILLIAM ROWING AND VICTOR WATSON RILEY, OF LONDON, ENGLAND.

INTERNAL-COMBUSTION MOTOR OR ENGINE.

966,953. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed November 29, 1907. Serial No. 404,318.

To all whom it may concern:

Be it known that we, HERBERT WILLIAM ROWING and VICTOR WATSON RILEY, subjects of the King of Great Britain, residing at 7 St. George street, E., London, England, have invented new and useful Improvements in Internal-Combustion Motors or Engines, of which the following is a specification.

This invention has for its object the construction of an internal combustion engine or motor so as to embrace simplicity and cheapness in manufacture and at the same time to produce an efficient engine or motor.

Our engine or motor may be made single or double acting as desired.

Our invention is illustrated by the accompanying drawings in which:—

Figure 1 represents a vertical section through a two stroke cycle internal combustion single acting engine or motor constructed according to our invention showing means which may be employed for the supply to our engine or motor of working combustible mixture and compressed air for scavenging respectively. Fig. 2 is end view of our engine or motor showing the lever hereinafter referred to as "*m*." Fig. 3 shows the cam used to operate the valve of our engine or motor arranged as a two stroke internal combustion engine or motor.

The same letters denote the same parts in all the figures.

A is the crank shaft, B the fly wheel, C C the crank shaft brasses, D the piston and E the connecting rod. All these parts are old and well known and may be of any suitable known type so that no further description of them is necessary.

Referring to Fig. 1 *a* is the cylinder which is furnished with an admission port *b* for the combustible mixture and an exhaust port *c* for the exhaust gases—the piston D serving also as the exhaust valve by reason of its uncovering the exhaust port at the end of the outstroke. *d* is the pipe which conveys the combustible mixture under pressure from the reservoir *d'* to the engine or motor. The reservoir is provided with an inlet d^3 for the combustible mixture—and which is connected with the source of supply of such mixture. *e* is the exhaust pipe. *f* is a pipe which conveys air under pressure from the reservoir *f'* to the engine or motor to clear the cylinder of spent gases. The reservoir *f'* is provided with an inlet f^3 for the air and which is connected with the source of supply of such air.

The mixture and air under pressure respectively may be forced into the respective reservoirs by any suitable means and which may be a pump actuated by the engine or motor or otherwise—one side of the pump piston being used to compress mixture while the other side is used to compress air only.

g is a piston valve having a port *h* therein which when the valve *g* is moved upward opens communication between the pipe *f* and the interior of the cylinder by means of the port *b*. When the valve is in its lower position mixture is admitted into the cylinder.

i is a cam secured to the crank shaft by means of which the valve *g* is actuated.

j is a roller connected to the valve *g*.

k is a spring to keep the roller *j* in contact with the cam *i*.

m^5 is a sparking plug of any ordinary type.

The action of the engine or motor arranged as above described is as follows:—Supposing the engine or motor to be ready to make a working stroke the charge of mixture is fired and the piston D is driven outward till the upper edge thereof uncovers the exhaust port *c* in the cylinder wall to allow the spent gases to escape. On the return stroke before the exhaust port closes the valve *g* is moved to allow air under pressure to pass through the ports *h* and *b* into the cylinder and out through the exhaust port thus scavenging the cylinder of spent gases. This movement of the valve *g* will also enable the cylinder to be cleared of its working charge in case of a misfire. When the exhaust port *c* is almost closed the valve *g* uncovers the port *b* by the cam *i* and admits the combustible mixture under pressure into the cylinder. As the exhaust port is still slightly open the cylinder is sure of receiving a full charge. When the cylinder is full of mixture the ports *c* and *b* are closed by the action of the piston and valve respectively and compression takes place to the end of the stroke; the charge is then fired for a working stroke and so on, a working stroke being obtained every revolution. The valve *g* works in a liner *l* of suitable metal.

The cam *i* is shaped so as to give the required motion to the valve *g* and a quick opening to the port *b*. The shaping of the

cam and its operation in effecting the required movements of the valve will be more clearly understood by the following explanation:

Referring to Fig. 3 and which, as will be seen, is a representation of the cam and which rotates in a direction from right to left in its position shown on the said drawing, its operation relatively to the valve *y* is as follows:—During its rotation under the valve from the points 1, 2 the valve *g* descends until the upper part of the valve is below the lower opening of the port *b* in the cylinder wall and explosive mixture flows into the cylinder. When point 3 of the cam has arrived below the valve the valve has been gradually raised and as a consequence the port *h* has become gradually closed and quite closed at point 3 of the cam, thus both the mixture and air inlets are closed and these inlets remain closed during the rotation of the cam under the valve between the points 3 and 4 when compression and firing take place. During the further rotation of the cam under the valve between the points 4 and 5 the valve is raised till the port *b* is brought into communication by means of the port *h* in the valve with the air inlet pipe *f* and scavenging takes place, the piston having simultaneously uncovered the exhaust port *c*. On the cam at point 6 arriving under the valve the valve is lowered and the air inlet is cut off and remains cut off until on the successive revolution of the cam point 4 is again under the valve. When point 1 of the cam again arrives under the valve the valve having descended as the result a further charge of mixture is admitted to the cylinder and this cycle of operations is repeated with each rotation of the cam.

The amount of opening to be given to the port *b* may be obtained by an arrangement such as is shown by way of example by Fig. 2 by which the roller *j* at the bottom of the valve is raised and held clear of the cam to the required distance so as to vary the port opening or to close the port *b* altogether. As shown such arrangement consists of a lever *m* pivoted at *n* the short arm of the said lever being turned up at m^1 to engage with the head of the pin *o* on which the roller *j* rotates.

We prevent the rotation of the valves by the means shown at Z^3.

What we claim and desire to secure by Letters Patent of the United States is:

In an internal combustion two cycle engine or motor, the combination of a cylinder having an admission port at one end thereof and an exhaust port in the wall thereof, with a valve chamber at the side of the cylinder parallel thereto and communicating with the interior of the cylinder by means of the admission port, an inlet for combustible mixture in the valve chamber at the top end thereof, an inlet for compressed air for scavenging in the valve chamber located between the inlet for combustible mixture and the crank shaft, an admission valve for combustible mixture and scavenging air in the valve chamber, the said valve consisting of a piston of uniform diameter throughout that portion thereof which is located in the valve chamber and having a port in such portion, the said port being adapted to connect the air inlet port in the valve chamber with the cylinder admission port in one position of the valve, the said valve admitting combustible mixture to the cylinder over the top of the valve in another position of the valve, and a cam on the crank shaft to operate the said valve, the cam having a portion of its periphery concentric with the crank shaft, the remainder of the periphery forming a series of curves not concentric with the crank shaft running into one another and approaching the crank shaft, as specified for the purpose stated.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HERBERT WILLIAM ROWING.
VICTOR WATSON RILEY.

Witnesses:
H. C. FOWLER,
B. H. FOWLER.