PATENT SPECIFICATION

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Complete Specification Left: Feb. 24, 1939.

Complete Specification Accepted: Aug. 18, 1939.

PROVISIONAL SPECIFICATION

Improvements in Two-stroke Internal Combustion Engines

I, COLIN BAYNES TAYLOR, a British Subject, of Langdale, Duffield Road, Allestree, Derby, do hereby declare the nature of this invention to be as follows:—

This invention comprises certain improvements in two-stroke internal combustion engines.

According to the present invention, two opposed pistons are mounted in a cylinder, a common firing chamber being formed in the space between these pistons, and a space in the cylinder at the outer end of each piston forms a compression chamber for delivering gases to the said firing chamber. A rotary valve controls the admission of the said gases to the firing chamber.

According to one convenient embodiment of the present invention, a horizontal cylinder has two opposed reciprocating pistons mounted therein. The pistons are double ended and the firing chamber is formed between the opposed ends of the two pistons, whilst a compression space for feeding gases to the firing chamber is formed between the outer end of each piston and the respective end of the cylinder. The outer end of each piston is of enlarged diameter and the bore of the cylinder at each end is correspondingly enlarged. Each end of the cylinder is closed by an end plate on which is mounted a valve casing axially in alignment with the cylinder. A piston valve is slidably mounted in the valve casing, the end of the valve being adapted to seat on a conical seating on the said end plate under the force of a spiral spring bearing on the valve and the back of the valve casing. When the valve is opened by the gas pressure in the said compression space, gas passes from such space into an annular space between the said end plate and the valve casing, this annular space communicating with an annular passage in the wall of the valve casing, a delivery pipe being provided to place this annular passage in communication with a rotary valve controlling admission to the firing chamber.

The cylinder is mounted on a box-section crank case, in which is mounted a two-throw crank shaft. Two webs pass transversely across the full width of the crank case, at the top thereof, and a double armed rocker is mounted between them at each side, one in respect of each piston. The upper arm of each rocker lies centrally of their respective pistons, to which they are connected by inwardly directed short links, which are mounted on gudgeon pins fitted to the walls of the reduced portions of the pistons. These upper arms pass through slots in top wall of the crank case and the wall of the cylinder. The lower arms of the rockers are offset and are connected to their respective cranks, arranged at 180 degrees, by connecting rods.

The rotary valve aforementioned is mounted in the top wall of the crank case and is driven at engine speed by chain transmission from the crank shaft. The aforesaid delivery pipe from the compressors are jointed to the housing for the rotary valve and the gases are admitted to the inside of the valve through a port which is opened simultaneously with the opening of a port in the valve to a passage leading to the combustion chamber, the passage being tangential with one side of such chamber. When the pistons are at the inner dead centre the passage is conveniently of the width of the space between the ends of the pistons and of a length substantial equal to half the diameter of the bore of the cylinder. A sparking plug is housed in the wall of the cylinder centrally between the ends of the pistons. Exhaust ports are provided in the wall of the cylinder on the opposite side to the inlet port and such exhaust ports are uncovered when the pistons reach the end of the firing stroke. With this arrangement the sparking plug is cooled by the incoming charge and economy of fuel is obtained due to the controlled admission of the charge, thereby obviating loss through the exhaust ports. An efficient scavenge of the combustion chamber is also obtained without wasting fuel and a good scavenge is obtained at light loads, ensuring even two-stroking at slow running speeds.

An inlet port for combustible mixture

is provided at each end of the cylinder which is uncovered by the outer end of the respective piston when at the inner "dead centre". When each piston moves from the outer "dead centre" to the inner "dead centre", a partial vacuum is created in the larger bore of the cylinder at each end the inlet ports are opened by the pistons, when gas is inhaled during the remainder of the stroke. On the return movement of the pistons, the gas is compressed and the spring controlled valves are automatically opened and the gas is fed to the delivery pipe aforementioned, and by way of the rotary valve to the combustion chamber. A high volumetric efficiency of the compressors is thus obtained, as compared with the crank case compression of the usual type of two-stroke engine. Further there is no mixing of lubricant with fuel, which ensures better running and freedom from carbon deposit.

With an engine as aforedescribed balance of both mechanical and combustion forces is obtained, whilst, as there is low piston speeds, there is low inertia forces and wear is reduced. The main forces in the engine are taken at the rocker bearings which are slow running bearings and consequently there is a minimum of stresses in the crank case the stresses being taken by the two webs across the crank case. The length of the cylinder ensures adequate cooling and the cool running combustion chamber and cylinder enables a high compression ratio to be used. A high power output is attained with a light weight engine.

In a modified form, the spring controlled compressor valves are omitted, the usual type pistons being employed, and the gases being forced directly from the compression spaces via piston operated ports into the delivery pipe communicating with the rotary valve. In this construction, the openings through which the rockers pass into the crank case are suitably sealed.

By substituting a fuel valve for the sparking plug, compression ignition can be used.

Dated this 23rd day of February, 1937.

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Agent for the Applicant,
3, New Street, Birmingham 2, and
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COMPLETE SPECIFICATION

Improvements in Two-stroke Internal Combustion Engines

I, COLIN BAYNES TAYLOR, a British Subject, of Langdale, Duffield Road, Allestree, Derby, 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:—

This invention comprises certain improvements in two-stroke internal combustion engines of the type comprising two opposed pistons mounted in a cylinder to reciprocate towards and away from one another and connected to a crank shaft by means of rocker levers, the ends of which are connected respectively to the pistons and to the crank shaft by means of links, the rockers being mounted in bearings on the crank case.

According to the present invention, the combustible mixture is fed into the cylinder centrally between the pistons by way of a rotary valve, the axis of which lies at right angles to the engine cylinder axis, an exhaust port or ports in the wall of the cylinder being opened and closed by pistons. The housing for the rotary valve may be formed on the crank case. The rocker arms may pass through slots in the piston cylinder. The rockers may be pivotally mounted on cross-webs cast on the upper portion of the crank case and intermediate the outer walls of the crank case.

In order that the invention may be clearly understood and readily carried into effect, reference may be had to the accompanying drawings on which:—

Figure 1 is a cross-sectional elevation of an engine constructed according to this invention, the section being taken on line *x x* of Figure 2,

Figure 2 is a longitudinal sectional elevation, and

Figure 3 is a section on line *y y* of Figure 1.

According to one convenient embodiment of the present invention, a horizontal cylinder 1 has two opposed reciprocating pistons 2 and 3 mounted therein, and the combustion chamber is formed between the opposed ends of the two pistons. Each end of the cylinder is closed by an end plate 4. The cylinder is mounted on a box-section crank case 5, in which is mounted a two-throw crank shaft 6. Two webs 7*a* pass transversely across the full width of the crank case 5, at the top thereof, and a double armed

rocker 7 is mounted between them at each side of the crank case, one in respect of each piston. The upper arm 8 of each rocker lies centrally of its respective piston, to which it is connected by an inwardly directed short link 9, which is mounted on a gudgeon pin fitted to the wall of the piston. These upper arms pass through slots 10 in top wall of the crank case and slots in the wall of the cylinder. The lower arms 11 of the rockers are off-set and are connected to their respective cranks, arranged at 180 degrees, by connecting rods or links 12.

A rotary valve 13 is mounted in the housing 13*a* on the top wall of the crank case and is driven at engine speed by chain transmission from the crank shaft 14. When the pistons are at the outer dead centre, the port of the rotary valve is in register with a port in the cylinder which is conveniently of the width of the space between the ends of the pistons when at the inner ends of the stroke and of a length equal to nearly the diameter of the bore of the cylinder. A sparking plug is housed in the wall of the cylinder centrally between the ends of the pistons. Exhaust ports 15 are provided in the wall of the cylinder on the opposite side to the inlet port and such exhaust ports are uncovered when the pistons reach the end of the firing stroke.

The action of the engine is as follows:— Assuming the pistons 2 and 3 at the end of their inward stroke, having compressed a charge of fuel mixture, the spark plug ignites this charge and, the rotary valve being closed, the resultant pressure drives the pistons outward imparting a rotary motion to the crank shaft by way of the rockers. At a convenient moment the exhaust ports are uncovered by the pistons and the spent charge is allowed to exhaust to atmosphere. The rotary valve is timed to open slightly after the exhaust ports and a fresh charge of fuel mixture under pressure from a compressor by way of a manifold cast on the crank case, enters the cylinder through the centre port, and scavenges the burnt gas through the exhaust ports. On the inward stroke of the pistons the exhaust ports are covered and then the rotary valve closes and compression of the charge starts and is fired by the plug at the end of the inward stroke of the pistons. An engine may consist of several of these units to form a multi-cylinder engine either air or liquid cooled and cylinders may also be placed underneath the crank case symetrically with the upper cylinders and using the same crank throws as the upper cylinders either by forked connecting rods or other means. With this arrangement the sparking plug is cooled by the incoming charge and economy of fuel is obtained due to the controlled admission of the charge, thereby obviating loss through the exhaust ports. An efficient scavenge of the combustion chamber is also obtained without wasting fuel and a good scavenge is obtained at light loads, ensuring even two-stroking at slow running speeds.

With an engine as afore described balance of both mechanical and combustion forces is obtained, whilst, as there are low piston speeds, there are low inertia forces and wear is reduced. The main forces in the engine are taken at the rocker bearings which are slow running bearings and consequently there is a minimum of stresses in the crank case the stresses being taken by the two webs across the crank case. The length of the cylinder ensures adequate cooling and the cool running combustion chamber and cylinder enables a high compression ratio to be used. A high power output is attained with a light weight engine.

By substituting a fuel valve for the sparking plug, compression ignition can be used.

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

1. A two-stroke internal combustion engine of the type set forth, in which the combustible mixture is fed into the cylinder centrally between the pistons by way of a rotary valve, the axis of which lies at right angles to the engine cylinder axis, an exhaust port or ports in the wall of the cylinder being opened and closed by the pistons.

2. A two-stroke internal combustion engine as set forth in claim 1, in which the housing for the rotary valve is formed on the crank case.

3. A two-stroke internal combustion engine as set forth in claim 1 or claim 2, characterised in that the rocker levers pass through slots in the piston cylinder.

4. A two-stroke internal combustion engine as set forth in any of the preceding claims, in which the rocker levers are pivotally mounted on cross-webs cast on the upper portion of the crank case and intermediate the outer walls of the crank case, for the purpose set forth.

5. A two-stroke internal combustion engine, substantially as herein set forth and illustrated in the accompanying drawings.

Dated this 30th day of June, 1939.

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31, Queen Street, Wolverhampton.

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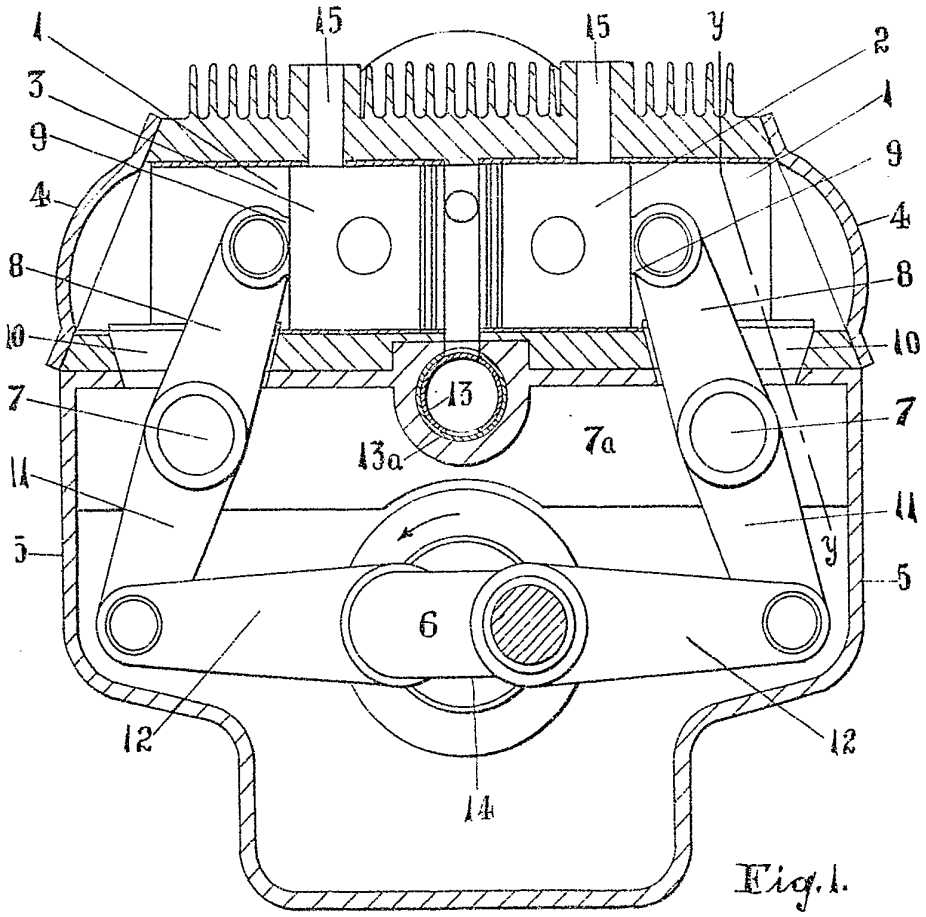


Fig. 1.

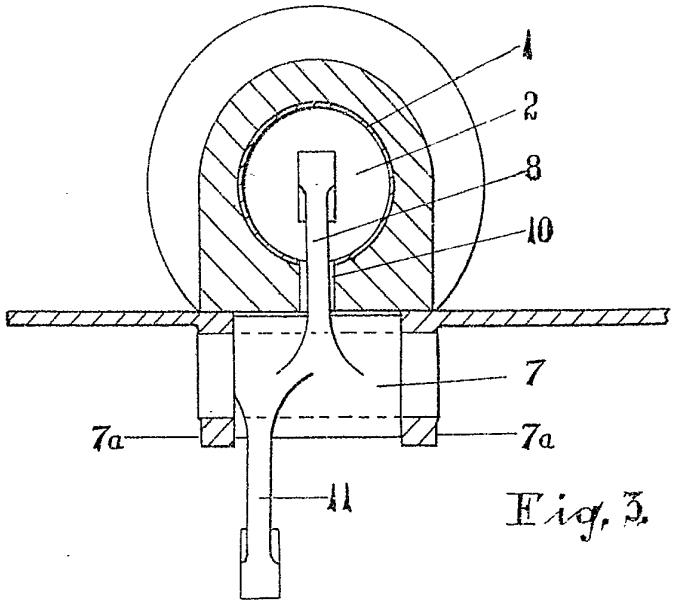
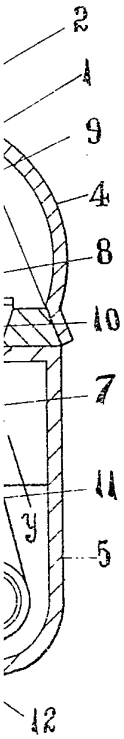


Fig. 3.



f. 1.

3

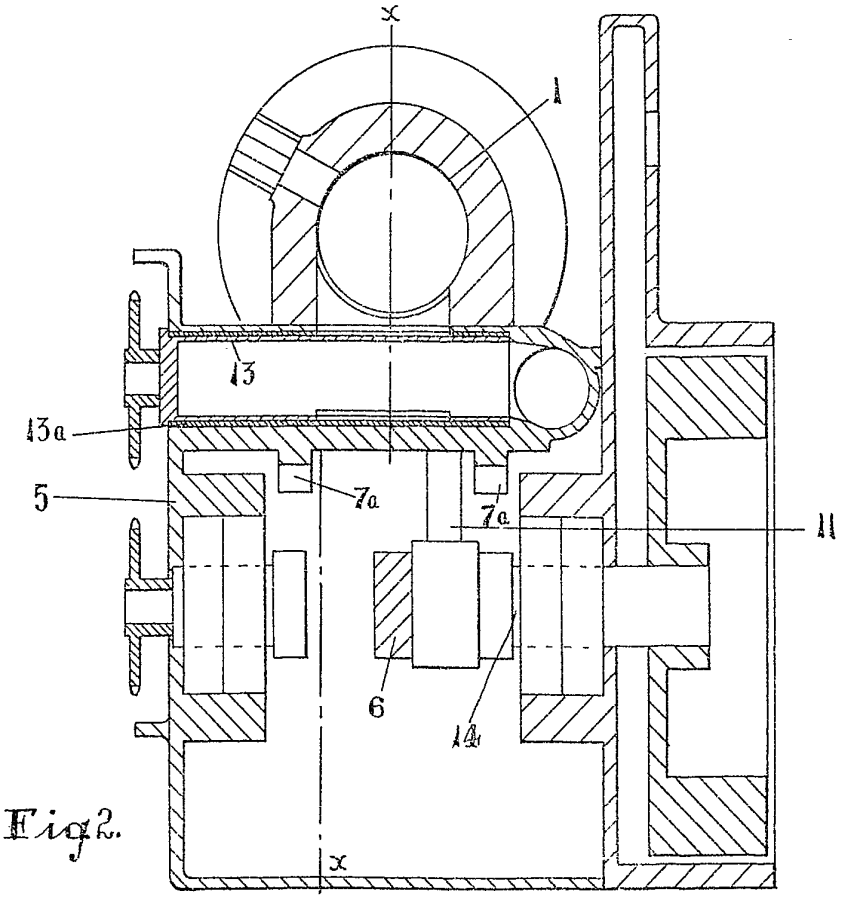


Fig 2.

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511,456 COMPLETE SPECIFICATION

2 SHEETS

SHEET 1

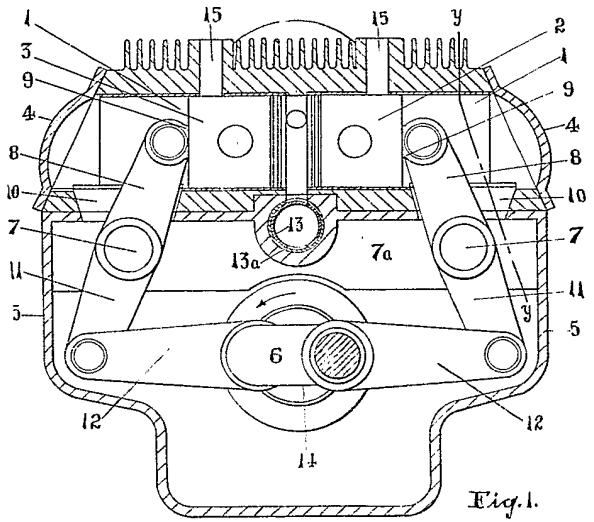

Fig. 1.

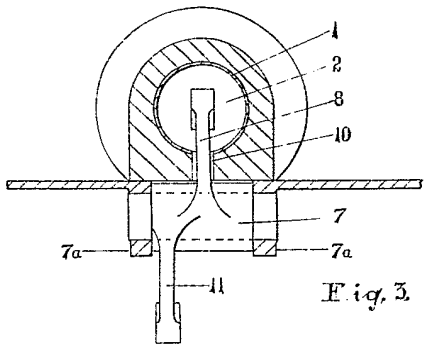

Fig. 3.

SHEET 2

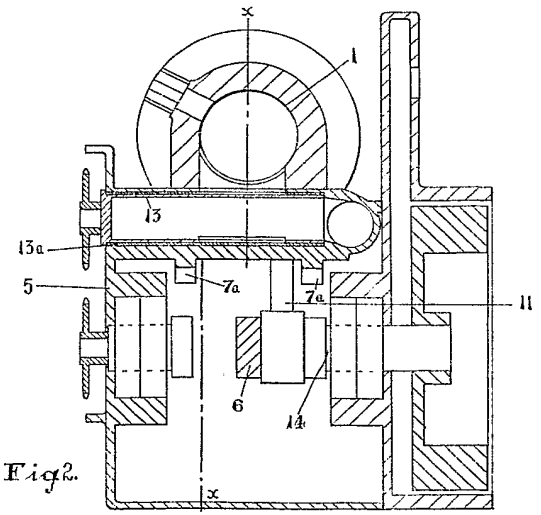

Fig 2.

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

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