

945,232.

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UNITED STATES PATENT OFFICE.

SHERREN BRUCE DOUGLAS HARDING, OF LONDON, ENGLAND.

INTERNAL-COMBUSTION ENGINE.

945,232.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed May 1, 1909. Serial No. 493,432.

To all whom it may concern:

Be it known that I, SHERREN BRUCE DOUGLAS HARDING, a subject of the King of Great Britain and Ireland, residing at 50 Whitecross street, in the city and county of London, England, have invented a new and useful Improvement in Internal-Combustion Engines, of which the following is a full and complete specification.

This invention relates to internal combustion engines of the two-cycle rotary type, and it consists of the improved construction hereinafter more particularly specified which has for its object increasing the efficiency of this type of engine. I attain this end in the manner illustrated in the accompanying drawing in which the figure is a view in longitudinal section.

The cylinder a is of the same diameter throughout and terminates at one end in a crank-chamber c . The piston b working in the cylinder a is of annular form and is connected to two cranks d^1 and d^2 of the crank-shaft d by two connecting rods e . The second piston has a hollow trunk b^1 which is open to the back end of the cylinder, passes through the annular piston b and is connected to the crank d^3 of the crank-shaft d by a connecting rod e^1 . The crank-chamber c is provided with suitable bearings c^1 for the crank-shaft d . The back end of the cylinder a is closed by a plate carrying an extension forming a hollow axle f which runs in a bearing h carried by a bracket or block h^1 . At the other end of the cylinder, i . e . beyond the extension forming the crank-chamber, is a similar bracket or block h^2 in which is fixed a stud axle g which projects toward the cylinder a and forms a bearing h^3 on which the cylindrical end c^3 of the crank-chamber c takes a bearing. On the stud axle g is formed or fixed a bevel wheel i with which a similar bevel wheel i^1 on the crank-shaft gears, so that the rotation of the shaft d imparts rotary motion to the cylinder a . In the trunk b^1 of the piston b^2 are a series of radially arranged inlet ports k^1 , and in an extension b^3 of the piston b are a series of radially arranged ports k , the arrangement of said ports being such that when the two pistons b and b^2 are at or about the ends of their outward or working strokes the two sets of inlet ports k and k^1 coincide and place the interior of the trunk b^1 in communication with the combustion chamber between the two pistons. The ex-

haust ports l which are located toward the back end of the cylinder a are uncovered by the piston b^2 as said piston reaches the end of its outward or working stroke and are closed by said piston on its inward or return stroke.

The explosive mixture is drawn into the back end of the cylinder a during the inner or return strokes of the pistons through ports m and n in the bracket or block h^1 and the hollow axle f respectively, the location of the port n in the hollow axle f being such that it is open during the time the pistons are on their inward or return strokes. When the inlet ports k and k^1 coincide the charge compressed in the back end of the cylinder a by the piston b^2 rushes into that part of the cylinder between the two pistons through said ports and drives the exhaust gases out through the exhaust ports l . The exhaust ports open into an expansion chamber l^1 which surrounds the cylinder a and is provided with a number of outlet holes l^2 . This chamber can conveniently operate as a fly wheel.

On the exterior of the cylinder a are a series of ribs o —preferably longitudinally arranged—for radiating purposes.

The charge may be fixed in the cylinder by an electric spark or by any other of the well-known methods and the power may be taken from the rotating cylinder by a belt or by suitable gearing.

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

1. An internal combustion engine of the two-cycle rotary type comprising a cylinder terminating at one end in a crank-chamber and mounted in suitable longitudinally arranged bearings so that it can rotate about its axis; an annular piston working in said cylinder and coupled to the crank-shaft by a pair of oppositely disposed connecting rods, a second piston working in said cylinder and having a hollow trunk which is open to the back end of the cylinder and passes through the annular piston, a single connecting rod coupling said trunk to the crank-shaft, a bevel wheel carried by the crank-shaft, a bevel wheel carried by the crank-chamber and gearing with the bevel wheel on the crank-shaft, an inlet port through the bearing at the back end of the cylinder and leading into said cylinder, ports in the trunk of the second piston and in an extension of the annular piston which when they coincide

put the back end of the cylinder into communication with the part of the cylinder between the two pistons, and exhaust ports in the back end of the cylinder adapted to be
5 opened and closed by the second piston.

2. An internal combustion engine of the two-cycle rotary type comprising a cylinder terminating at one end in a crank-chamber and mounted in suitable longitudinally arranged bearings so that it can rotate about
10 its axis, an annular piston working in said cylinder and coupled to the crank-shaft by a pair of oppositely disposed connecting rods, a second piston working in said cylinder and having a hollow trunk which is open
15 to the back end of the cylinder and passes through the annular piston, a single connecting rod coupling said trunk to the crank-shaft, a bevel wheel carried by the crank-shaft, a bevel wheel carried by the crank-chamber and gearing with the bevel wheel
20 on the crank-shaft, an inlet port through the bearing at the back end of the cylinder and leading into said cylinder, ports in the trunk of the second piston and in an extension of the annular piston which when they coincide
25 put the back end of the cylinder into communication with the part of the cylinder between the two pistons, exhaust ports in the back end of the cylinder adapted to be
30 opened and closed by the second piston, and an expansion chamber surrounding the cylinder into which the exhaust ports open and having openings to the atmosphere.

35 3. An internal combustion engine of the

two-cycle rotary type comprising a cylinder terminating at one end in a crank-chamber and mounted in suitable longitudinally arranged bearings so that it can rotate about
its axis, an annular piston working in said 40 cylinder and coupled to the crank-shaft by a pair of oppositely disposed connecting rods, a second piston working in said cylinder and having a hollow trunk which is open to the back end of the cylinder and passes through 45 the annular piston, a single connecting rod coupling said trunk to the crank-shaft, a bevel wheel carried by the crank-shaft, a bevel wheel carried by the crank-chamber and gearing with the bevel wheel on the 50 crank-shaft, an inlet port through the bearing at the back end of the cylinder and leading into said cylinder, ports in the trunk of the second piston and in an extension of the annular piston which when they coincide 55 put the back end of the cylinder into communication with the part of the cylinder between the two pistons, exhaust ports in the back end of the cylinder adapted to be opened and closed by the second piston, an 60 expansion chamber surrounding the cylinder into which the exhaust ports open and having openings to the atmosphere, and longitudinally arranged ribs on the exterior of the cylinder for radiating purposes.

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