P. G. TACCHI.

ROTATING CYLINDER INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JAN. 2, 1918.

1,286,142. Patented Nov. 26, 1918.

Fig. 1.

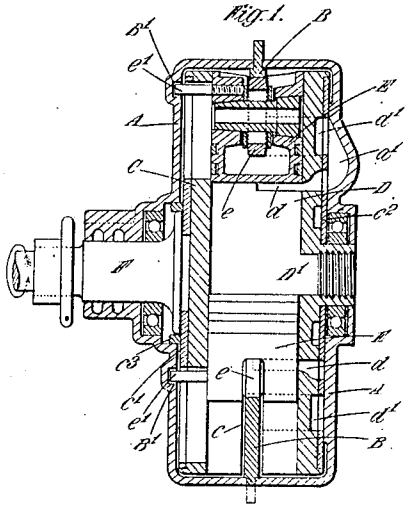


Fig. 2.

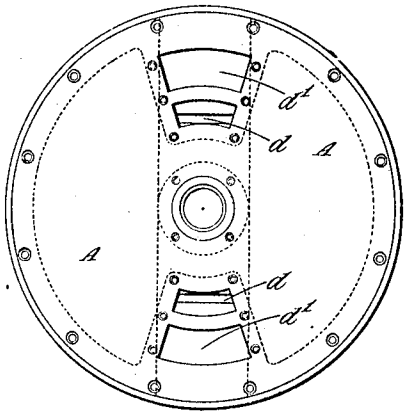


Fig. 3.

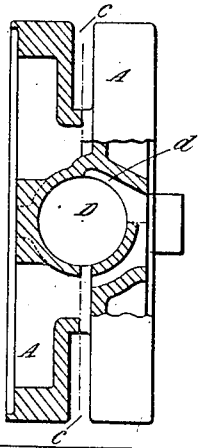


Fig. 4.

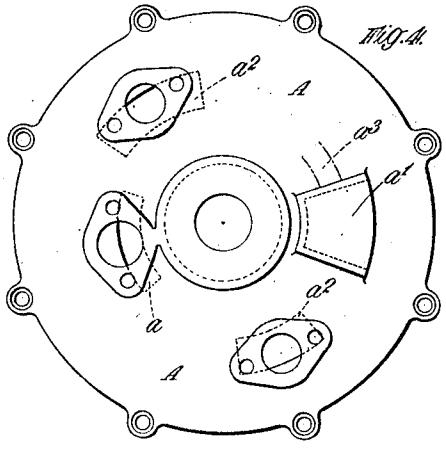


Fig. 5.

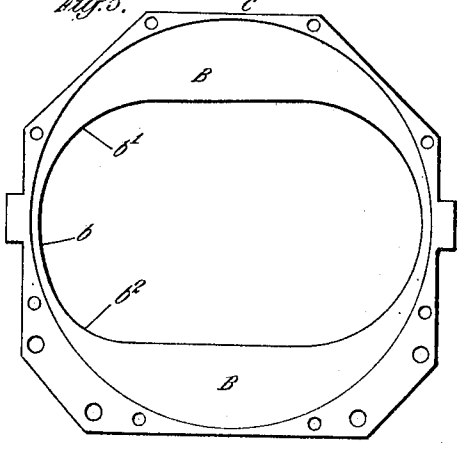
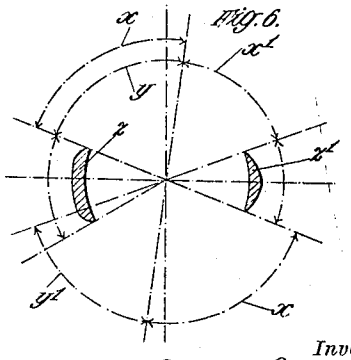


Fig. 6.



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Attys.

THE KORRES PETERS CO., PHOTO-LITHO., WASHING.

UNITED STATES PATENT OFFICE.

PERCY GEORGE TACCHI, OF NEW WANSTEAD, ENGLAND, ASSIGNOR TO CENTRUM SYNDICATE LIMITED, OF LEEDS PLACE, LONDON, ENGLAND.

ROTATING-CYLINDER INTERNAL-COMBUSTION ENGINE.

1,286,142. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed January 2, 1918. Serial No. 209,855.

To all whom it may concern:

Be it known that I, PERCY GEORGE TACCHI, a subject of the King of Great Britain, residing at Baytree House, New Wanstead, in the county of Essex, England, have invented certain new and useful Improvements in Rotating-Cylinder Internal-Combustion Engines, of which the following is a specification.

This invention relates to two-stroke internal combustion engines of the type in which rotating cylinders are employed, having outwardly driven pistons controlled by means of a fixed cam track, the chief object of the invention being to simplify the construction of this type of engine and to avoid the use of valves.

According to this invention the pistons during their inward stroke are arranged to draw the charge of combustible mixture or air into the engine casing and to compress it in the casing during the greater part of their inward stroke, the compressed charge being admitted to the combustion chamber through a transfer port or channel opened by a piston shortly after the exhaust has been opened by another piston.

In order that the said invention may be clearly understood and readily carried into effect we will describe the same more fully with reference to the accompanying drawings, in which:—

Figure 1 is a section through the axis of a single cylinder engine with a pair of opposed cylinders, the two pistons being shown in different positions for purposes of illustration.

Fig. 2 is an elevation of the cylinder casting.

Fig. 3 is a part sectional view of the said casting taken at right angles to Fig. 1.

Fig. 4 is an elevation of the engine casing.

Fig. 5 shows the cam track; and

Fig. 6 is a diagram of the engine cycle.

A is the fixed engine casing, made in two disk-shaped halves bolted together with the cam track B between them. C is the cylinder casting bored diametrically with the cylinder D, forming two cylinder elements each with a piston E.

The cylinder casting C is mounted centrally upon the engine shaft F and the two pistons are provided with rollers e running on the track B and with studs e' at one side, entering into the auxiliary cam track B′ formed by a cam-shaped groove in the casing A which follows the outline of the main cam track B and keeps the pistons out when the engine is stationary and the pistons are unsupported by internal pressure in the common combustion chamber D′.

Each cylinder element is provided with a piston controlled port d which registers alternately with an exhaust aperture a in the engine casing and with a fuel transfer channel a' in the engine casing, so that at the end of the outward stroke of the pistons, when the cylinder ports d are both uncovered, the charge, slightly compressed in the casing as hereinafter described, enters the combustion chamber D′ at one end, driving out the products of combustion through the exhaust a at the other end, and fills the chamber with a fresh charge which is compressed between the pistons on their return stroke, as soon as they close the cylinder ports d.

The external cam track B is so formed that the piston E controlling the exhaust begins to uncover its cylinder port d, which port already communicates with the exhaust channel a in the casing A, before the other piston begins to open the transfer port. The exhaust therefore is always opened slightly before the fuel is admitted to the cylinder so that the pressure in the cylinder falls below the pressure in the casing before the new charge is admitted, the products of combustion being driven out in front of the entering charge.

The cam track B is made slightly unsymmetrical to give the desired lead to the exhaust and a portion of the track b at one end where it is most distant from the center may be made concentric so that the pistons remain stationary in their cylinders during the greater part of the exhaust, to allow the transfer and exhaust ports to remain fully open and insure a full supply of new mixture and an efficient exhaust. The exhaust opening portion b' of the track is formed in a curve of larger radius than the compression portion b^2 to give the slight lead to the exhaust. The transfer channel a' in the casing A is preferably arranged to make communication between the piston controlled port d in each of the cylinder elements and a second or outer cylinder port or channel d', a short distance beyond the first port d and open to the casing behind the piston. The channel d' extends around the outside of the cylinder D to meet the deep channel c in the casing C, into which the

cam track B extends. The transfer channel a' can be made very short, and consists merely of a bulge on the casing, as shown in Figs. 1 and 4.

The charge is drawn into the casing A through suitable suction ports a^2 open to a carbureter if the combustible mixture is to be drawn in. The said ports a^2 register with the outer cylinder ports or channels d' during the suction part of the cycle, but are closed by the cylinder casting C at the end of the inward piston stroke to prevent escape of the charge during the compression in the casing. The outer cylinder ports d' therefore perform a double function. The charge may be compressed in the casing to say about 9 lbs. per square inch.

The pistons and ports alternately perform the exhaust and transfer functions so that two complete cycles are obtained for each revolution of the engine. The alternating operation also serves to equalize the temperature. If scavenging air is compressed in the casing the fuel may be injected into the transfer channel a' during the latter portion of the scavenging operation in order to form the explosive mixture. A fuel connection a^3 is indicated in chain lines in Fig. 4.

The faces of the cylinder casting are covered in by the disks c', c^2 which make a gas tight joint with the casing, a ring c^3 being provided at the shaft side of the casting to form the joint.

The diagram, Fig. 6, shows the various stages of a complete cycle of the engine illustrated, the cycle being repeated at every half revolution. Starting with the pistons at the beginning of the compression stroke (in the position of the upper piston of Fig. 1), the compression in the cylinder and simultaneous suction of the new charge into the casing during the inward piston stroke are indicated by the lines x, y extending for equal angles to the end of the inward piston stroke, when both pistons are in the position of the lower piston in Fig. 1. The expansion or working stroke of the pistons is indicated by the line x' and the simultaneous compression in the casing by the line y'. The exhaust and scavenging period indicated by the shaded part z representing the port opening overlaps, as shown, the case compression and cylinder expansion period owing to the lead given to the exhaust by the cam track acting through the piston at the exhaust side while the fuel transfer and scavenging period indicated by the shaded part z' begins at the end of the expansion stroke (when both ports d are uncovered by their pistons) and occupies a smaller angle.

All the operations are effected without the use of valves, so that the engine is entirely valveless, piston and cylinder controlled ports effecting the complete cycle.

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

1. In a rotating cylinder internal combustion engine of the kind set forth, means for introducing a charge into the fixed engine casing by the inward stroke of the pistons and for compressing it in the casing by the outward stroke, a piston controlled exhaust and a piston controlled transfer port in the cylinder admitting the compressed charge to the combustion chamber.

2. In a rotating cylinder internal combustion engine of the kind set forth, a fixed engine casing, an admission port in said casing, a rotating cylinder casting adapted to cover and uncover said admission port for the admission of the charge to the casing by the inward stroke of the pistons and for compression therein by the outward stroke, a piston controlled exhaust and a piston controlled transfer port in the cylinder admitting the compressed charge to the combustion chamber.

3. In an engine as claimed in claims 1 and 2, said admission port in the fixed casing adapted to be opened to the interior of the casing by the aforesaid transfer port in the cylinder, for the purpose specified.

4. In an engine as claimed in claim 1, said piston ports each adapted to be uncovered by its piston, an exhaust port in the casing adapted to register in turn with the said cylinder ports, a fuel transfer channel in the casing also adapted to register with the said ports and auxiliary cylinder ports in communication with the interior of the casing, adapted to be placed into communication with the first named cylinder ports through the said transfer channel, for the purpose specified.

5. A rotating cylinder two-stroke internal combustion engine comprising a fixed external casing, a fixed cam track, a disk-shaped cylinder casting having a diametrical cylinder, two opposed pistons in the said cylinder operating under the control of the track, means for admitting a charge to the casing, two pairs of cylinder ports, exhaust ports and a fuel transfer port in the casing, all adapted to register with the cylinder ports, the transfer port effecting communication between the two cylinder ports of each pair, for the purpose specified.

6. In an engine as claimed in claims 1 and 2, a cam track so formed as to cause one piston to uncover the exhaust and another to open the transfer port to the cylinder after the exhaust has been uncovered, for the purpose specified.

PERCY GEORGE TACCHI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."