Feb. 9, 1926. 1,572,068

E. G. GOULD

ENGINE

Filed August 31, 1921 3 Sheets-Sheet 1

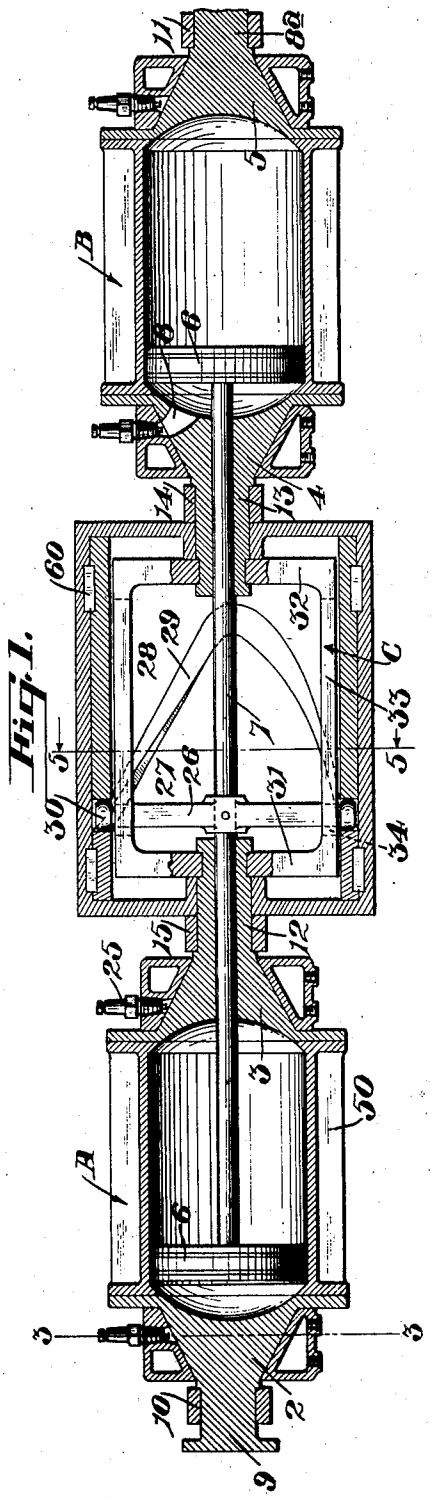

Fig. 1.

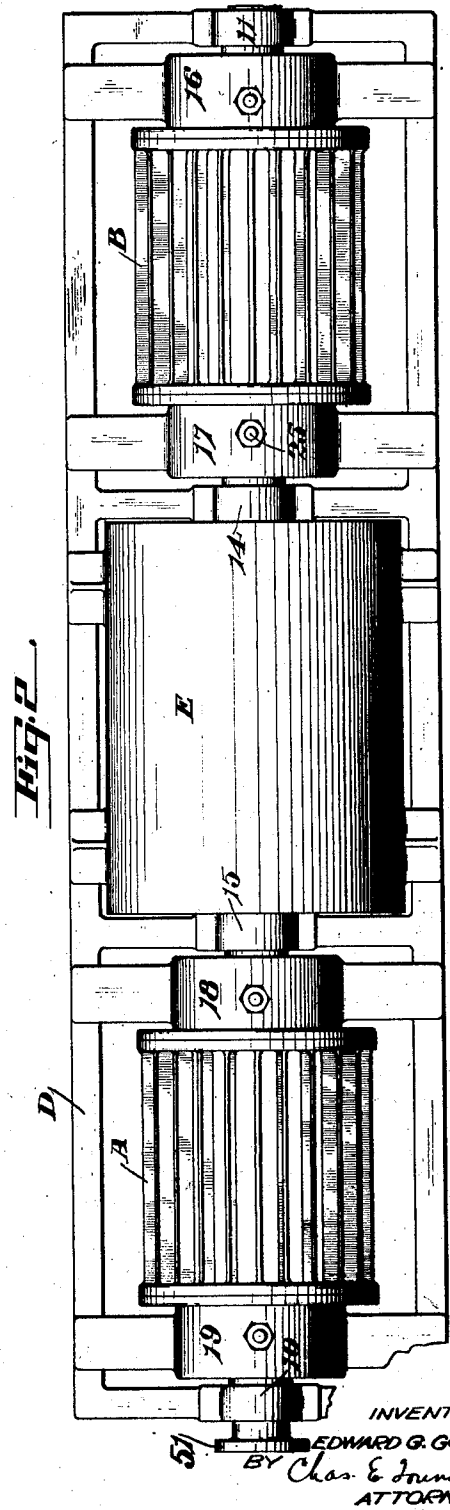

Fig. 2.

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Fig. 3.

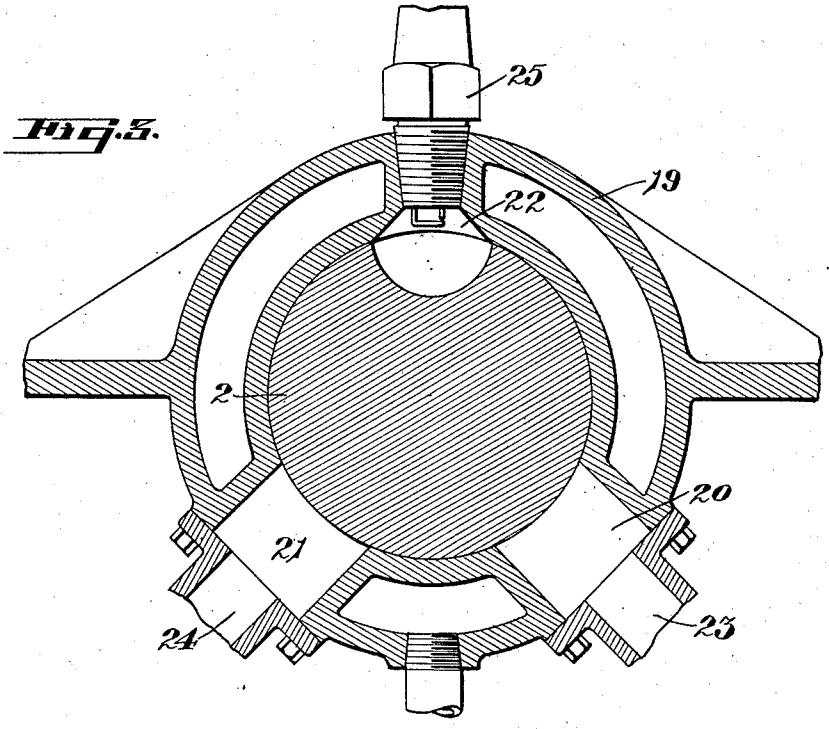

Fig. 4.

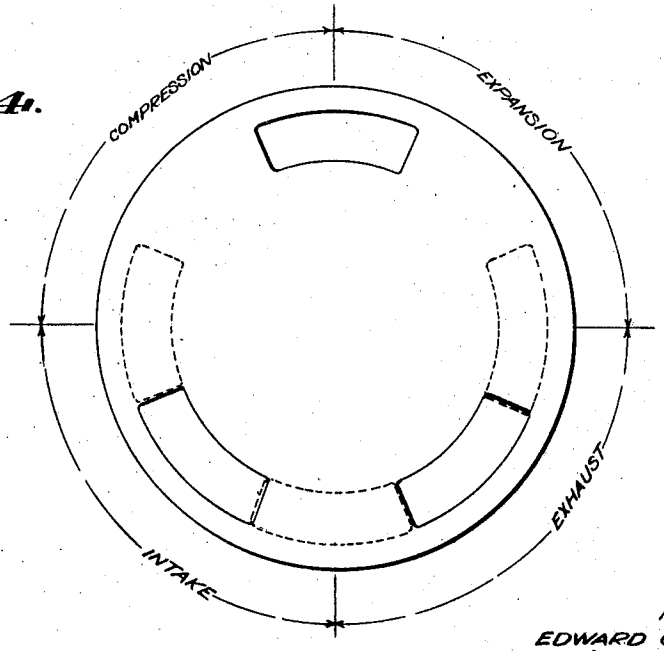

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Fig. 5.

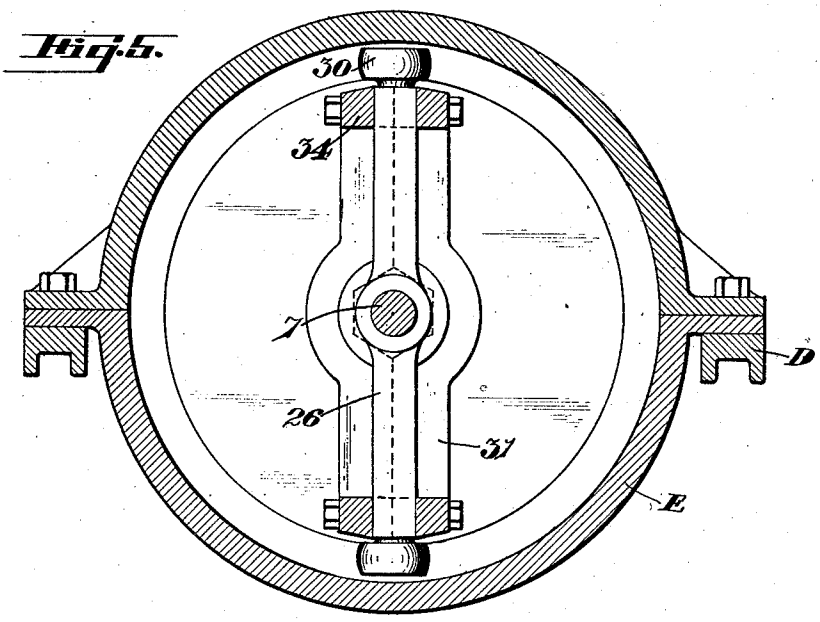
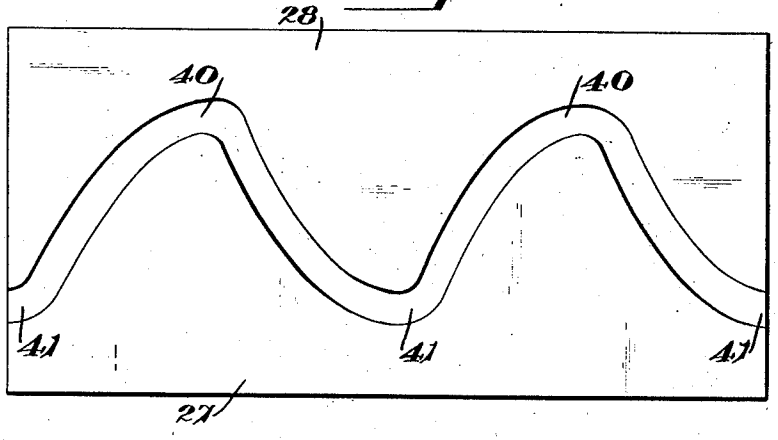


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD G. GOULD, OF OAKLAND, CALIFORNIA, ASSIGNOR TO ADVANCED ENGINE CO. INC., OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ENGINE.

Application filed August 31, 1921. Serial No. 497,216.

To all whom it may concern:

Be it known that I, EDWARD G. GOULD, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Engines, of which the following is a specification.

This invention relates to an engine, and especially to an internal combustion engine of the rotary cylinder type.

One of the objects of the present invention is to generally improve and simplify engines of the character described, and especially to provide a structure which will permit a minimum of parts, light weight horse power and a high efficient turning torque.

Another object of the invention is to provide a structure which will require a minimum of vertical space and which will permit accessibility for adjustment, inspection, repairs, etc.

Another object of the invention is to provide an engine comprising two cylinders preferably horizontally disposed and arranged in line formation; a double acting piston in each cylinder, a rod connecting the same, means actuated by the reciprocal movement of the pistons for transmitting a revolving movement to the pistons and cylinders in unison about their longitudinal axis, and further to provide a novel rotary valve mechanism whereby the gases may be admitted, ignited and exhausted.

Other objects will hereinafter appear.

The invention consists of the parts and the construction, combination and arrangement of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Fig. 1 is a central, vertical, longitudinal section through the engine.

Fig. 2 is a plan view of the same.

Fig. 3 is an enlarged cross section on line 3—3, Fig. 1.

Fig. 4 is a diagrammatic view showing the different positions assumed by the rotary valve mechanism.

Fig. 5 is an enlarged cross section on line 5—5, Fig. 1.

Fig. 6 is a diagram for the formation of the annular cam groove.

Referring to the drawings in detail, and particularly to Figs. 1 and 2, A and B indicate a pair of cylinders which are horizontally disposed and arranged in line formation. The cylinders are closed at their respective ends by head members such as indicated at 2, 3, 4, and 5, and each cylinder is provided with a piston 6, which pistons are connected by a common rod 7; the rods passing through the heads 3 and 4, and suitable stuffing boxes not here shown may be provided.

The heads employed are, practically speaking, identical in formation. They are all cone shaped as shown and each is provided with a single port 8, said ports serving the function of admitting the impelling fluid, igniting the same and exhausting the fluid when the forces have been expended as will later be described. The head members 2 and 5 are provided with extensions 8^a and 9, which are supported by journal members 10 and 11. The heads 3 and 4 are similarly provided with extensions 12 and 13, supported by journal members 14 and 15, and they are further extended to permit the cylinders to be connected by means of a cross head generally indicated at C. The engine as a whole is supported by a main frame D (see Fig. 2); the respective journals 10, 11, 14 and 15, being supported thereby and secured thereto. The main frame also serves as a support for a series of manifolds, indicated at 16, 17, 18 and 19, respectively, and it further forms a support for a cam housing generally indicated at E. The manifolds just referred to are identical in construction and are clearly illustrated in Fig. 3. Each manifold is provided with three ports or passages as indicated at 20, 21 and 22. These ports are so positioned as to align with the ports 8 in the respective cylinder heads. The ports 20 are all connected with an exhaust manifold 23; the ports 21 with an inlet manifold 24, and the ports 22 each serve as a support for a spark plug 25.

The cylinders, the heads secured at each end thereof, the pistons reciprocally mounted in the respective cylinders, and the common rods 7, connecting the same, are all adapted to rotate during the operation of the engine. This is accomplished in the following manner:

Secured on the rods 7, within the cam housing E, is a cross arm 26. Secured within the cam housing are two cam members 27 and 28, which are sufficiently separated to form an annular cam groove 29, having a shape or formation substantially such as

shown in Fig. 6. Mounted on each end of the cross arm 26 is a roller 30, which is adapted to engage the opposite cams 27 and 28, and adapted to rotate in unison with the cross arm 26 is a cross head C, which is attached, as previously stated, at its opposite ends to the cylinder head extensions 12 and 13. The cross head C consists of a pair of arms 31 and 32, which are secured at their inner ends to the extensions 12 and 13. The outer ends of the arms 31 and 32 are connected by longitudinal bars 33 and these in turn are longitudinally slotted as at 34 to permit the ends of the cross arm 26 to extend therethrough. Therefore if a reciprocal movement is transmitted to the pistons and the rods 7, it is obvious that the cross arm 26 secured thereto will move in unison therewith, but as the ends of the arm are provided with rollers 30 and these in turn are engaged by the opposite cams 27 and 28, it is obvious that a rotary movement will be transmitted not only to the rods 7 and the pistons carried thereby, but also to the heads 3 and 4, which are attached to the respective cylinders, as a driving connection is formed between the arm 26 and the cross head C, due to the fact that arm 26 passes through the longitudinal slots formed in the connecting bars 33 of the cross head. Hence a reciprocal movement will not only be transmitted to the pistons during the operation of the engine, but a turning movement will simultaneously be transmitted, thereby causing the pistons, the cylinders, the heads, the cross head and the cross arm 26, to rotate in unison about their longitudinal axis. The heads are as previously stated surrounded by the stationary manifolds 16, 17, 18 and 19, and the ports 8 formed in the respective heads will therefore alternately register with the inlet and exhaust ports formed in the manifold, and also with the spark plugs 25.

During the rotation of the cylinders, gas will alternately be admitted to opposite ends of the cylinders, compressed, ignited and finally exhausted, and one impulse will be imparted during each quarter of a revolution of the cylinders due to the fact that the annular cam groove 29, formed between the cams 27 and 28, has two rises and two depressions formed therein as indicated at 40 and 41, respectively. In other words two complete reciprocations are imparted to the pistons during each revolution and hence an impulse or working stroke is imparted once during each one-fourth revolution, thereby producing a highly efficient turning torque.

In an engine constructed as here illustrated, it is exceedingly compact and simple, a minimum of parts is employed due to the fact that mechanically actuated valves are entirely eliminated. In fact the heads of the respective cylinders, in cooperation with the stationary manifolds, serve the function of valves whereby the gases are admitted and exhausted. The engine may furthermore be air cooled due to the fact that the cylinders rotate, and the ribs, such as indicated at 50, may be formed on their exterior surfaces. Power may be transmitted by forming a pulley on the exterior surface of one or both cylinders, or a coupling such as shown at 51 may be formed on the extension 9. Another feature of the present invention is that the vertical space consumed by the engine is reduced to a minimum, hence producing an ideal structure for aeroplane work or the like as head on or air resistance is exceedingly minimized when comparison is made with standard types of motors now employed. Another feature of the invention is accessibility. All parts are separated due to the arrangement provided, thereby permitting inspection, adjustments, and repairs, and lubrication can easily be accomplished and independently taken care of as the cylinders are separated and form independent units, and similarly the cam housing, which may be filled with ordinary transmission case grease or the like. Another important feature is the construction of the annular cam whereby rotary movement is transmitted. This cam is made in two sections and independently secured by keys or the like, such as illustrated at 60, which are interposed between the cams and the cam housing. Longitudinal adjustment is therefore permitted between the cams, thus taking care of all wear which may take place.

Another important feature is the cone shaped formation of the cylinder heads. This is important as it permits a leak-proof running fit to be readily maintained between the heads and the stationary manifolds surrounding the same.

While the engine is here described as an internal combustion engine, it is obvious that the inlet manifolds might be connected with a source of steam or air supply, and that the engine will be equally operable in either instance. I further wish it understood that various changes in form and proportion may be resorted to within the scope of the appended claims, similarly that the materials and finish of the several parts employed may be such as the experience and judgment of the manufacturer may dictate or varying uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In an internal combustion engine of the character described, spaced longitudinally aligned cylinders rotating about a common axis, each cylinder provided at both ends with heads having a port and provided with extensions forming journals, inner and outer

bearings for the journals, a stationary manifold surrounding each of the cylinder heads and provided with inlet and exhaust ports adapted to register alternately with the port of the cylinder head, pistons operating within the cylinders and means for rigidly connecting the inner journals with each other and actuated by the reciprocation of the pistons and for rotating both the cylinders and the pistons about a common axis.

2. In an internal combustion engine of the character described, spaced longitudinally aligned cylinders rotating about a common axis and each cylinder provided at its inner and outer ends with conical cylinder heads provided with ports and having extensions forming journals, inner and outer bearings for the journals, a stationary manifold surrounding each of the conical cylinder heads and fitting the same and provided with inlet and exhaust ports to register alternately with the port of the cylinder head, pistons operating within the cylinders and means for rigidly connecting the inner journals of the cylinders and actuated by the reciprocation of the pistons rotating the cylinders and the pistons about a common axis.

3. In an internal combustion engine of the character described, spaced longitudinally aligned cylinders rotating about a common axis, each cylinder being provided at its inner and outer ends with heads having extensions forming journals, inner and outer bearings for the journals, a rotary cross head located between the inner bearings and rigidly secured to the inner journals, pistons operating within the cylinders and means actuated by the reciprocation of the pistons for rotating the said cross head and the pistons about a common axis.

4. In an internal combustion engine of the character described, spaced longitudinally aligned cylinders rotating about a common axis, each cylinder being provided at its inner and outer ends with heads having extensions forming journals, inner and outer bearings for the journals, a rotary cross head located between the inner bearings and rigidly secured to the inner journals, pistons operating within the cylinders and means actuated by the reciprocation of the pistons for rotating the said cross head and the pistons about a common axis, and a closed cylindrical casing also located between the inner bearings and receiving the said cross head and the said means for rotating the same, said casing having end walls through which the inner journals of the cylinders extend.

5. In an internal combustion engine of the character described, spaced longitudinally aligned cylinders rotating about a common axis and provided at their inner and outer ends with journals, inner and outer bearings receiving the journals, rotating pistons reciprocal within the cylinders, a piston rod connected to and rotating with the pistons and extending through the inner journals, a stationary cam housing located between the inner bearings and having a continuous annular cam, a rotating cross head arranged within the housing and rigidly connecting the inner journals and an arm carried by the piston rod and extending through the rotating cross head and engaging the annular cam.

6. In an internal combustion engine of the character described, spaced longitudinally aligned rotating cylinders, provided with inner and outer journals, inner and outer bearings for the said journals, rotating pistons reciprocal in the cylinders, a piston rod slidable through the cylinders and connected to and rotating with the pistons, a stationary cam housing arranged between the inner bearings and provided with adjustable cam members forming a continuous cam, a rotating cross head operating within the housing and connected to the inner journals, and an arm rigid with the piston rod and connected with the rotating cross head and engaging the continuous cam.

7. In an internal combustion engine of the character described, the combination of aligned rotating cylinders, a stationary cam housing interposed between the cylinders and arranged exteriorly of the same and cams mounted within the housings to form an annular cam groove, means for permitting endwise adjustment of the respective cams, a piston in each cylinder, a connecting rod common to both pistons and slidable through the inner ends of the cylinders, a cross-head within the cam housing connecting the respective cylinders, and a cross arm secured to the piston rod and having its opposite ends extending through the cross-head and entering the annular cam groove for imparting rotary movement to the cylinders, the pistons and the piston rod.

EDWARD G. GOULD.