T. BARNES.

EXPLOSIVE ENGINE.

APPLICATION FILED AUG 20, 1913.

1,116,211.

Patented Nov. 3, 1914.

2 SHEETS—SHEET 1.

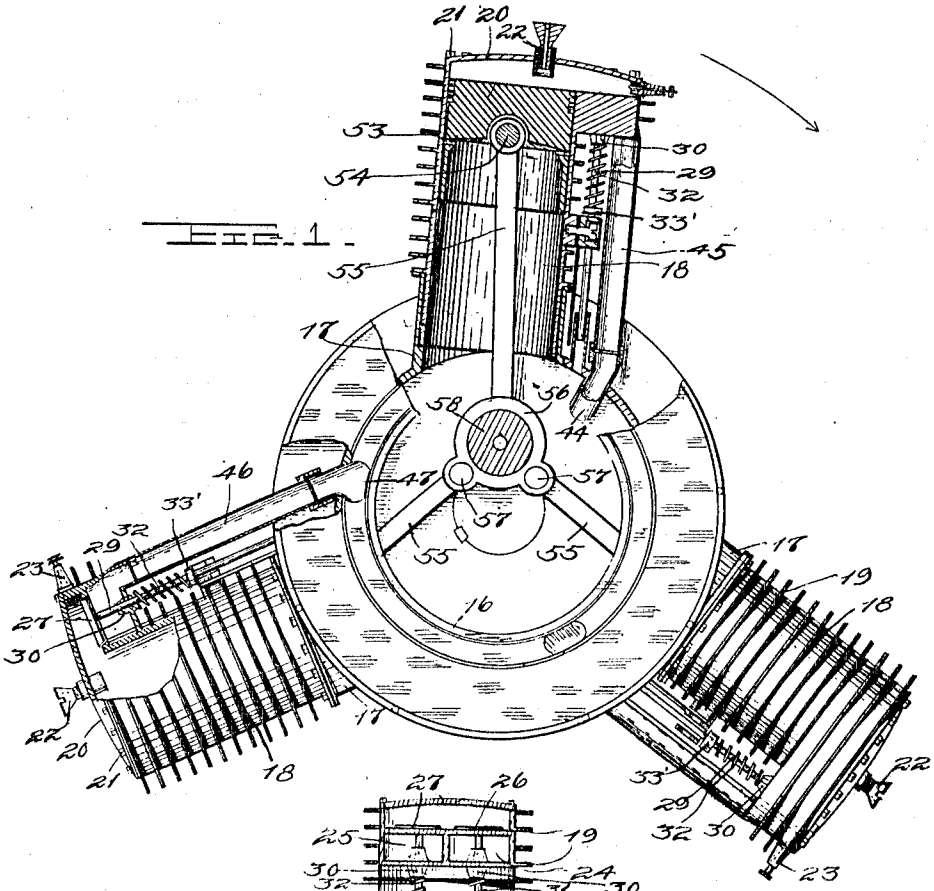


Fig. 1.

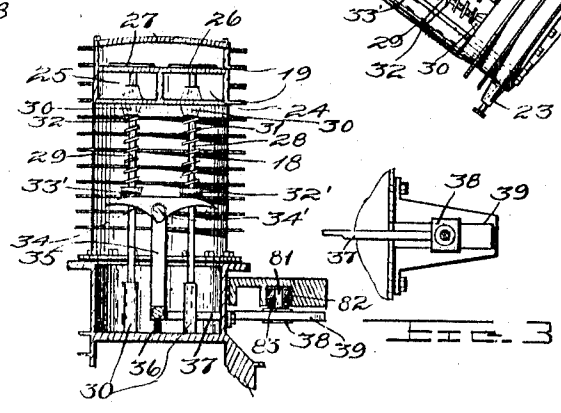


Fig. 2.

Fig. 3.

Witnesses.

Inventor.

Theodore Barnes,

By C. L. Parker

Attorney.

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2 SHEETS—SHEET 2.

Fig 4

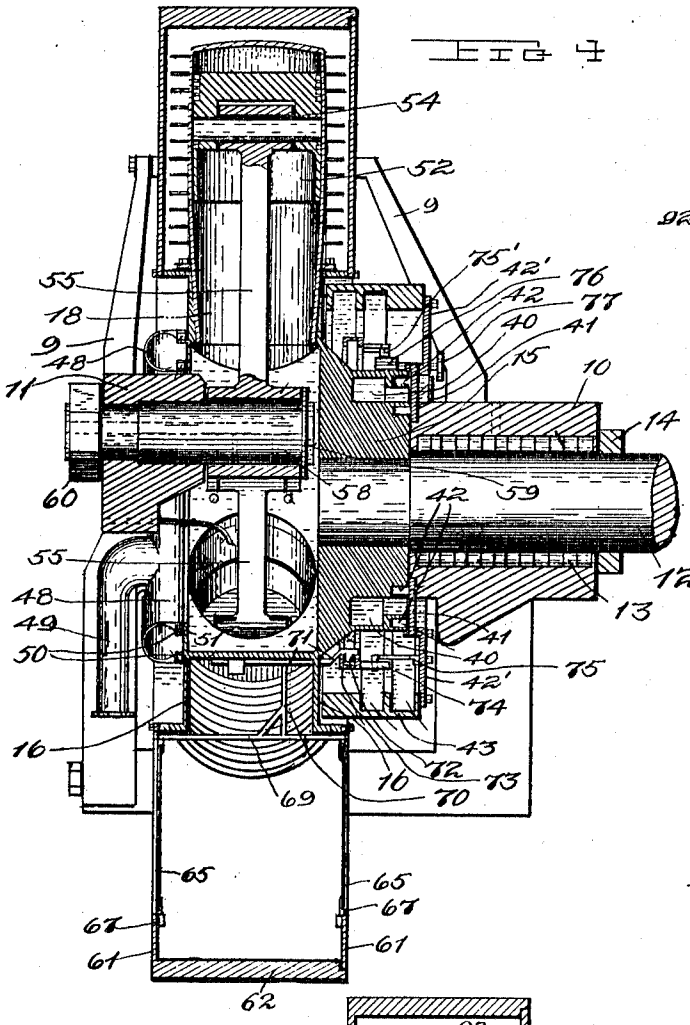


Fig 6.

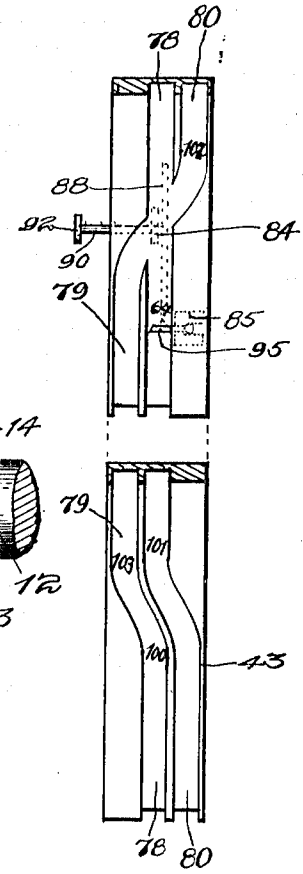
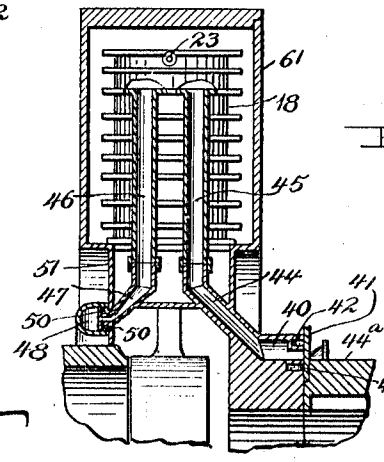


Fig 5



Witnesses.

J. M. Hyslop.

B. P. Hubbard

Inventor.

Theodore Barnes,

By C. L. Parker.

Attorney.

UNITED STATES PATENT OFFICE.

THEODORE BARNES, OF CHARITON, IOWA.

EXPLOSIVE-ENGINE.

1,116,211. Specification of Letters Patent. Patented Nov. 3, 1914.

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To all whom it may concern:

Be it known that I, THEODORE BARNES, a citizen of the United States, residing at Chariton, in the county of Lucas and State of Iowa, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to improvements in internal combustion engines of the type wherein one or more cylinders are employed, which are bodily rotated during the operation of the engine, such rotary movement being effected by the reciprocatory movement of the pistons therein.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a side elevation of an engine embodying my invention, parts being shown in section and parts omitted, Fig. 2 is a side elevation of one cylinder, taken at a right angle to the showing in Fig. 1, Fig. 3 is a detail elevation of a guide, Fig. 4 is a central vertical transverse sectional view through the engine, Fig. 5 is a detail section through the inlet and exhaust pipes of the cylinder, and, Fig. 6 is a diagrammatic view of a cam track.

In the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of my invention, the numeral 9 designates a relatively stationary frame, having connection with bearings 10 and 11, as shown. The bearing 10 receives a main driving shaft 12, preferably operating in engagement with bearing rollers 13, as shown. Rigidly mounted upon the outer portion of the main driving shaft 12 is a ring 14, preventing the inward longitudinal movement of the shaft 12. Rigidly mounted upon the inner end of the main driving shaft 12 by any suitable means, such as a key or the like, is a central rotatable support or hub 15. As more clearly shown in Figs. 1 and 4, the numeral 16 designates an annular casing which is preferably formed integral with the hub 15. This annular casing is provided with one or more tubular sockets 17, which are preferably not exactly radially disposed with relation to the hub 15 but are slightly inclined forwardly toward the direction of rotation of the engine, with relation to said radii. This degree of angularity or inclination of the sockets 17 may be varied considerably.

The numeral 18 designates explosion cylinder or cylinders, there being preferably a plurality of the same corresponding in number with the sockets 17, and having their inner ends inserted within the tubular sockets 17 and held therein by any suitable means. The cylinders 18 are held by the sockets 17 in the same angular or inclined position with relation to the hub 15. These cylinders are identical so that a description of one will suffice for all. Each explosion cylinder 18 is preferably provided upon its exterior with cooling fins or ribs 19, as shown. The outer end of the cylinder 18 is closed by a head 20, detachably connected therewith by means of bolts 21 or the like, whereby access may be had to the interior of the same. The head 20 is preferably provided with a pressure relief cock 22, of any well known or preferred type. The cylinder 19 is provided with a spark plug 23, preferably arranged, as shown. As more clearly shown in Figs. 1 and 2, the cylinder 18 is provided adjacent its closed head 20 with laterally extending inlet and exhaust chambers 24 and 25, there being upwardly opening valves 26 and 27, which close openings that lead into the same. The valves 26 and 27 are carried by reciprocatory rods 28 and 29, operating through fixed guide sleeves 30, as shown. Surrounding the upper portion of the valve rods 28 and 29 are compressible and expansible coil springs 31, 32, engaging rings 32′ and 33′, which are rigidly mounted upon the valve rods 28 and 29. The springs 31 and 32 normally hold the valves 26 and 27 seated.

The numeral 34 designates a horizontal finger or operating element, having its opposite ends forked to receive the rods 28 and 29, the same engaging the lower ends of the rings 32′ and 33′. The operating element is fulcrumed between its ends upon a fixed rod 34′ or the like. Rigidly connected with the operating finger 34 equi-distantly between the ends thereof, is a depending lever 35, having pivotal connection, as shown at 36, with a horizontal reciprocatory rod 37. The rod 37 is pivotally connected with a slide 38, mounted within the guide 39. It is obvious that when the lever 35 is swung in one direction it will open one valve and swung in the

opposite direction the same will open the other valve.

The hub 15 is provided with an annular charge or gas holding chamber 40, having its outer side closed by means of an annular plate 41, (see Fig. 5) which is stationary and is rigidly connected with the bearing 10, by any suitable means. Connected with plate 41 is a gas supply conduit 41ª. The hub 15 is preferably provided with packing rings 42, which slidably engage the annular plate 41 to form a gas tight joint without excessive friction. The annular plate 41 may be formed in one or more parts. Rigidly connected with the annular plate 41 is an outer annular plate 42′, which may be formed of one or more parts. This outer annular plate has an annular cam track 43, rigidly connected therewith.

The numeral 44 designates a gas supply port, having communication with the gas chamber 40, and with an inlet pipe 45, which discharges into the inlet chamber 24.

The numeral 46 designates an exhaust pipe, which leads into the exhaust chamber 25. The inner end of the exhaust pipe 46 is connected with an extension 47, which operates within an annular exhaust pipe 48, the same discharging therein. The annular exhaust pipe 48 has connection with an outlet pipe 49, to which may be connected a muffler, if desired. The annular exhaust pipe 48 is provided with annular receiving packing rings 50 which slidably engage a side plate 51, attached to the ring 16.

Mounted to reciprocate within the cylinders 18 are preferably hollow pistons 52, provided with oil openings 53. Pivotally connected with the pistons 52, as shown at 54 are pitmen 55. One pitman 55 is rigidly connected with a sleeve 56 while the other pitmen 55 are pivotally connected therewith, as shown at 57. The sleeve 56 is rotatably mounted upon a stationary stub-shaft 58 and is held against longitudinal movement in one direction by a preferably detachable ring 59. The stub-shaft 58 is mounted within the bearing 11 and is held therein by a nut 60, as shown. The stub-shaft 58 is eccentrically arranged with relation to the main driving shaft 12. It is obvious that the reciprocatory movement of the pistons 52 will effect the rotation of the cylinders 18.

The rings 61 are provided with segmental openings 64, receiving fans 65, which are adapted to be angularly adjusted by being turned upon their longitudinal axes. Each fan 65 is rigidly mounted upon a rock-shaft 66, which is radially disposed and has its opposite ends mounted within fixed bearings 67, as more clearly shown in Fig. 4. Each rock-shaft 66 has a pinion 68 rigidly connected therewith, which is engaged by the end of a transverse rack-bar 69. The rack-bar 69 is connected with a laterally extending arm 70 which is connected with a laterally extending operating rod 71. The rod 71 is provided with an outwardly extending tooth 72, slidably mounted within a grooved relatively stationary ring 73. This relatively stationary ring 73, is supported by a plurality of laterally extending angularly arranged slotted lugs 74, receiving the hooked ends of stationary supporting fingers 75. It is thus seen that by slightly turning the grooved annular ring 73, the same may be moved laterally in either direction, depending upon the direction of rotation thereof. To effect the slight rotation or turning of the ring 73, I attach thereto a toothed segment 75′, which is engaged by a pinion 76, which is operated by an exteriorly arranged hand wheel 77. It is thus seen that by turning the hand wheel 77 the blades 65 may be turned upon their longitudinal axes or angularly adjusted so that they will deflect the desired amount of air into the casing.

As more clearly shown in Fig. 6, the stationary cam track 43 is provided with an intermediate or central groove 78 and inner and outer grooves 79 and 80. The intermediate groove 78 makes almost a complete circuit of the member 43; the groove 80 extends about one-half way about it; and the groove 79 extends almost one-half way around the member. The remaining distance required to complete the two circuits of the member 43 is taken up in crossing from one groove to the other. As clearly shown in Fig. 3, the slide 38 is provided with a pin 81, upon which is suitably mounted a block 82, adapted to travel in the grooves 78, 79 and 80. A spring 83 surrounds the pin 81 and serves to force the block outwardly to engage the bottom wall of the grooves. The groove 80 where it crosses the groove 78, at point 84, is made deeper whereby the block 82 will be safely carried over.

The charge in each cylinder is fired when the cylinder has made two complete revolutions, whereby each engine unit is a four cycle engine, such firing of the charge being effected by any suitable means.

In the operation of the engine, (see Fig. 6), when the block 82 is in the groove 78, both the exhaust and inlet valves 26 and 27 will be closed; when the block 82 is in the groove 80 the exhaust valve 26 will be opened and inlet valve 27 closed; and when the block 82 is in groove 79 the exhaust valve 26 will be closed and the inlet valve 27 opened. Starting the block 82 at the point 100 in groove 78, both valves will be held closed by their springs, during the compression and working strokes. When the block 82 leaves the groove 78 at about the point 101 and passes into the groove 80, it opens the exhaust valve and holds it open

the required length of time, that is until the block reaches the point 102 in the groove 80. At the point 102 it leaves the groove 80, whereby the spring will at once close the exhaust valve, and passes into the groove 79, to open the intake valve 27 immediately after the closing of the exhaust valve. The intake valve is held open until the slide 82 reaches the point 103 or until a sufficient amount of gas has entered the cylinder, when the inlet valve is allowed to again close for the compression and working strokes by block 82 passing into the groove 78. When each cylinder has made two revolutions, the charges are fired.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having described my invention, I claim:—

1. An engine of the character described, comprising a rotatable hub, a plurality of cylinders carried thereby for rotation therewith, a pair of inlet and outlet valves for each cylinder, radially extending rods arranged upon one side of the cylinder in proximity thereto, for operating the valves, a pivoted head arranged between the rods to alternately move the same in corresponding directions, an inwardly extending lever connected with the head to swing it upon its pivot, a substantially horizontal arm connected with the inner end of the lever and provided near its outer end with a lateral extension, and a relatively stationary ring arranged adjacent one end of the hub and provided upon its inner face with cam grooves to receive the lateral extension.

2. An engine of the character described, comprising a relatively stationary frame, spaced bearings connected therewith and eccentrically arranged, a drive shaft rotatably mounted within one bearing, a rotatable hub carried by the drive shaft and operating within the frame, cylinders carried by the hub for rotation therewith, pistons operating within the cylinders, a pin mounted within the other bearing, pitmen pivotally connecting the pin and pistons, a pair of valves for each cylinder, a pair of radially extending rods for operating the valves, connected with each cylinder and having their inner ends terminating adjacent the inner end of the cylinder, a head pivoted between the rods and having its opposite ends forked to receive the rods to alternately move the same in corresponding directions, an arm connected to the head to swing the same upon its pivot, a rod pivoted to the arm and extending substantially horizontally outwardly and provided with a lateral extension, and a ring surrounding a portion of the hub in spaced relation and provided upon its inner surface with cam grooves to receive the lateral extension and held stationary by suitable means.

In testimony whereof I affix my signature in presence of two witnesses.

THEODORE BARNES.

Witnesses:
FLORENCE PERRINE,
J. H. COLLINS.

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