E. S. BROWER.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED APR. 2, 1912.

1,171,834.

Patented Feb. 15, 1916.

2 SHEETS—SHEET 1.

Fig. 1

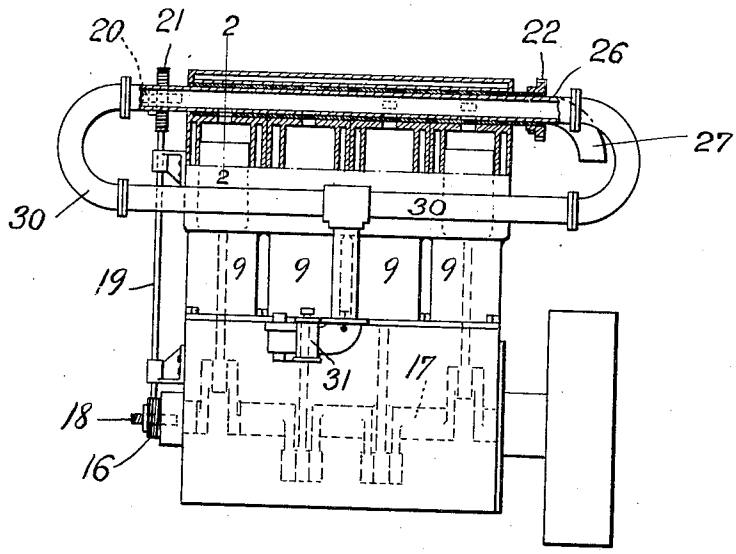


Fig. 2

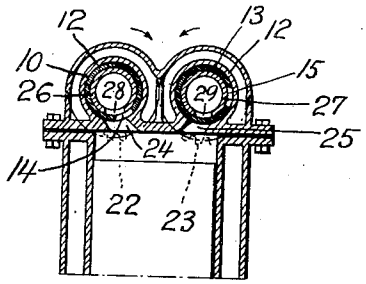
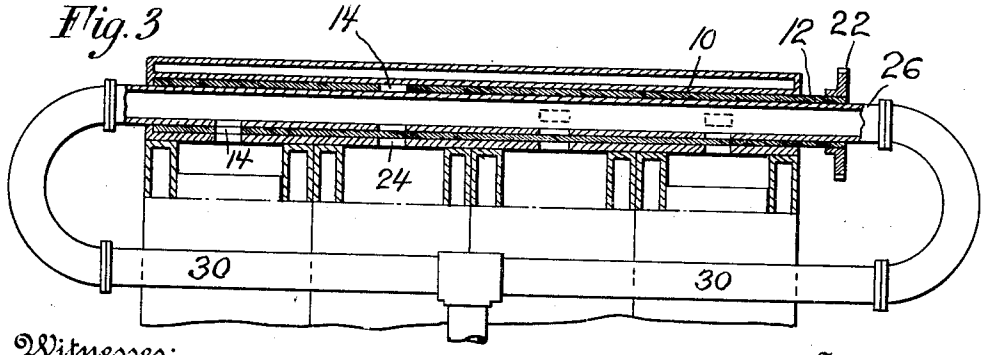


Fig. 3



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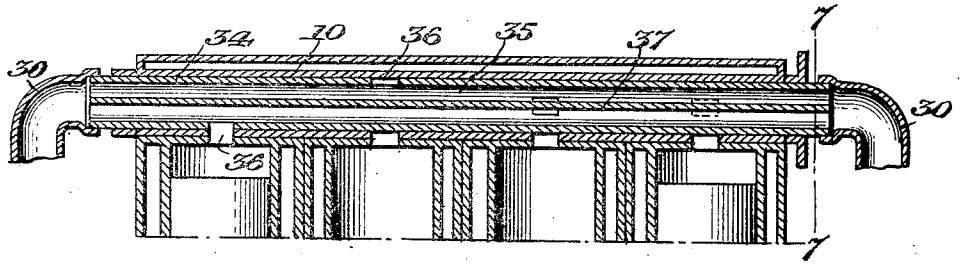


Fig. 6.

Fig. 4.

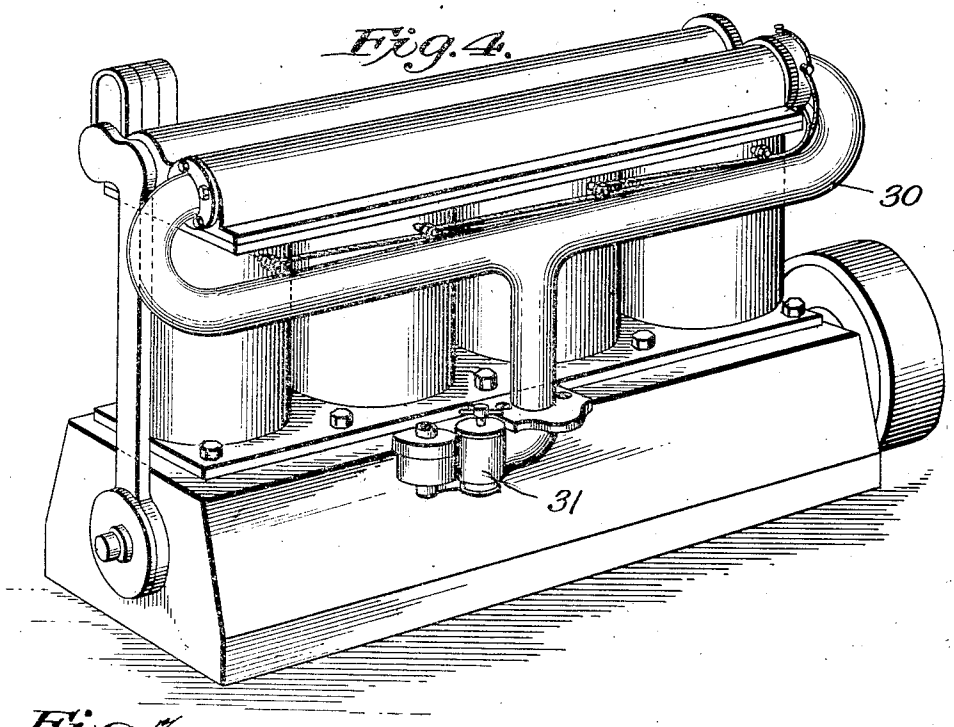


Fig. 7.

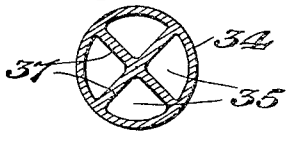
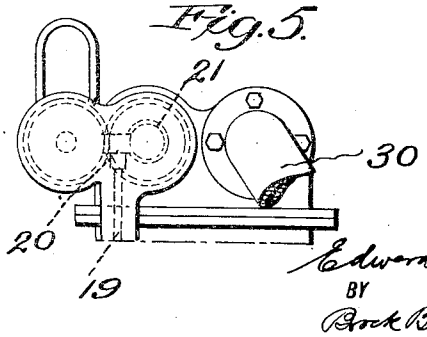


Fig. 5.



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EDWARD S. BROWER, OF RIDGEWOOD, NEW JERSEY.

INTERNAL-COMBUSTION ENGINE.

1,171,834. Specification of Letters Patent. Patented Feb. 15, 1916.

Application filed April 2, 1912. Serial No. 688,060.

To all whom it may concern:

Be it known that I, EDWARD S. BROWER, a citizen of the United States, and a resident of Ridgewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

My invention relates particularly to engines of the four-stroke-cycle type. The valving of these engines is usually accomplished by means of puppet valves. Valves of this character are objectionable on account of the noise necessarily accompanying the reciprocating movement of the parts, they are liable to wear unevenly and hence to leak, they necessarily involve a complication of many parts, and they are open to a great many other objections.

The main object of my invention is to overcome these objections and defects in the puppet valve type of engine, to reduce the number of parts, and eliminate all reciprocating parts, and in this way to produce an engine of the utmost simplicity and which shall be practically noiseless in its operation.

One feature of my invention consists, in the case of a multi-cylinder engine, in supplying the combustible mixture to the various cylinders by means of a supply conduit extending entirely through the heads of all the cylinders which thus acts as a manifold incorporated within the head of the engine and in connecting both ends of this supply conduit with a source of fuel supply, whereby each cylinder will receive its full share of the mixture from the continuous conduit without depriving any of the other cylinders of their proper share. The portion of the conduit which is within the engine is provided with ports in line with the individual cylinders and these ports are preferably controlled by means of a rotary ported valve which encircles the supply conduit and is rotated to time with the functions of the different cylinders. Or, to state it differently, the invention consists in an internal combustion engine having a plurality of cylinders provided with intake ports in the heads thereof, hollow admission valve means extending through the heads of all the cylinders having a rotating member with ports adapted to communicate with the ports in the cylinders, and fuel supply connections to the opposite ends of said admission valve means. The said hollow admission valve means may consist of an inner fixed fuel supply tube, an outer fixed valve chamber, and an intermediate rotary valve. Or the said hollow admission valve means may consist of a stationary valve chamber and a hollow rotating valve member, the latter constituting in itself the fuel supply tube.

The various other objects and features of the invention will appear as the specification proceeds.

In the accompanying drawings I have illustrated several preferred embodiments of the invention, but I would have it understood that various changes and modifications may be made therein without departing from the spirit and scope of the invention.

In the drawings: Figure 1 is a view, partly in elevation and partly in section, of an engine embodying my invention. Fig. 2 is a transverse sectional view of the same take on line 2—2 of Fig. 1. Fig. 3 is a view corresponding to Fig. 1 on a larger scale. Fig. 4 is a perspective view of the engine showing the preferred arrangement for supplying fuel to the different cylinders. Fig. 5 is a detail view of the gearing shown in Fig. 4. Fig. 6 is a longitudinal sectional view of a modified form of the invention. Fig. 7 is a cross-sectional view of the form of supply tube shown in Fig. 6, taken on substantially the line 8—8 of that figure.

Like reference characters refer to corresponding parts throughout the several views.

According to my invention the fuel is admitted and the burned gases are exhausted, both by rotary valves. For this reason the engine, whether it consists of one or a number of engine cylinders 9, is provided with a pair of substantially cylindrical valve chambers 10 and 11, extending through the head of the engine, which receive the substantially cylindrical valves 12 and 13. Of these two valves, the one denoted 12, is the inlet valve and the other is the exhaust valve. I have described the valve chambers and the valves therein as being "substantially cylindrical" because they need not be truly cylindrical, but might in fact be tapered longitudinally to a greater or less extent to always insure the valves fitting closely within their respective chambers. The respective valves are provided with inlet and exhaust ports 14 and 15, in line with the individual cylinders, and the two valves are rotated by any suitable gearing. In the present instance the gearing consists of a worm 16, on

the crank shaft 17, which, meshing with a worm gear 18, on upright shaft 19, rotates said shaft, and said shaft carries a worm gear 20 at its upper end meshing with a worm gear 21 on the exhaust valve 13. The two valves are then geared to rotate in unison by means of the spur gears 22 and 23.

Intake and exhaust ports 24 and 25 respectively extend from the interior of each engine cylinder to the inlet and exhaust valve chambers 12 and 13.

The explosive mixture and the burned gases are preferably conveyed to and from the respective cylinders by means of relatively fixed supply and exhaust tubes 26 and 27, which are disposed concentrically within the substantially cylindrical inlet and exhaust valve chambers, these relatively fixed tubes being surrounded by the inlet and exhaust valves respectively. The supply tube is provided with inlet ports 28 in line with the intake ports in the cylinders and the exhaust tube is provided with exhaust ports 29 in line with the exhaust ports in the cylinders. It will therefore be seen that as the valves rotate, the ports in the valves will be brought into register with the intake and exhaust ports in the cylinders in such way as to alternately admit and exhaust the gases to and from the individual cylinders.

A special feature of the invention, in connection with the ported supply conduit which extends concentrically through the inlet valve chamber, resides in supplying the fuel to both the ends of the conduit, whereby each cylinder will receive its proper supply of fuel irrespective of its position and without robbing any of the other cylinders. This feature is illustrated in Figs. 1, 3 and 4 wherein it will be seen that the fuel is supplied through a continuous looped conduit 30, having substantially parallel sides 26, one of the said sides passing longitudinally through the inlet valve chamber, while the other side lies exterior of and alongside the cylinders and has connected to it a source of fuel supply 31.

Another method which I have devised for insuring that each cylinder shall receive its proportionate share of the mixture, is illustrated in Figs. 6 and 7. In this case, the supply tube 34 is provided with separate passages 35 extending each from the inlet end or ends of the tube to an individual cylinder and terminating at such cylinder in an inlet port 36. In this particular instance the supply tube is rotated so as to serve also as a rotary valve for the different cylinders. In a four cylinder engine, as in the case shown, the supply tube is simply divided by the intersecting partitions 37, into four passages and each passage is provided with a port in line with a particular cylinder.

What is claimed, is:

1. In an internal combustion engine, the combination with a plurality of engine cylinders provided each with an intake port in the head thereof, of a relatively fixed supply tube extending through the heads of all the cylinders and provided with inlet ports registering with the intake ports of the individual cylinders, fuel supply connections to the opposite ends of the said supply tube, a rotary valve concentrically disposed with respect to the supply tube provided with valve ports therein to register with the inlet ports in the supply tube and the intake ports in the cylinders, and means for rotating the said valve in time with the functions of the different cylinders of the engine.

2. In an internal combustion engine, the combination with a plurality of engine cylinders provided each with an intake port in the head thereof, of a relatively fixed supply tube extending through the heads of all the cylinders and provided with inlet ports registering with the intake ports of the individual cylinders, a source of fuel supply, connections from said source of fuel supply to the opposite ends of the supply tube, and a rotary valve concentrically disposed with respect to the supply tube having valve ports therein to register with the inlet ports in the supply tube and the intake ports in the cylinders.

3. In an internal combustion engine, the combination with a plurality of alined engine cylinders each provided with an intake port in the head thereof, a substantially cylindrical valve chamber extending longitudinally through the heads of the cylinders and into which the various intake ports open, a relatively fixed supply tube extending entirely through said valve chamber and disposed concentrically therein, the said supply tube having ports registering with the intake ports of the cylinders, a source of fuel supply, connections from said source of fuel supply to the opposite ends of the supply tube, and a rotary valve journaled to rotate within the substantially cylindrical valve chamber and surrounding the relatively fixed supply tube, the said valve having ports to register with the intake ports of the cylinders and the inlet ports of the supply tube.

4. In an internal combustion engine, a plurality of alined cylinders having substantially cylindrical inlet and exhaust valve chambers extending longitudinally through the heads of all the cylinders, intake and exhaust ports opening from the individual cylinders into the inlet and exhaust valve chambers respectively, a ported exhaust valve rotatably mounted in the exhaust valve chamber, a relatively fixed supply tube extending through the inlet valve chamber and disposed concentrically therein, said supply tube having ports in line with the intake ports in the respective cylinders, a ported

inlet valve rotatably journaled in the inlet valve chamber and surrounding the supply tube therein, a source of fuel supply, connections from said source of fuel supply to both ends of the supply tube, and gearing for rotating the exhaust valve and inlet valve in time with the different functions of the engine.

5. In an internal combustion engine, the combination with a plurality of alined engine cylinders having substantially cylindrical inlet and exhaust valve chambers extending longitudinally through the heads of all the cylinders, and intake and exhaust ports opening from the individual cylinders into the inlet and exhaust valve chambers respectively, of a relatively fixed ported supply tube extending through the inlet valve chamber and disposed concentrically therein, a source of fuel supply, connections from said source of fuel supply to the opposite ends of the supply tube, a rotary ported inlet valve journaled in the inlet valve chamber and surrounding the supply tube therein, a ported exhaust tube disposed concentrically within the exhaust valve chamber, a substantially cylindrical ported exhaust valve rotatably mounted in the exhaust valve chamber and surrounding the exhaust tube therein, and gearing for rotating the exhaust and inlet valves in time to accord with the different functions of the engine.

6. In an internal combustion engine, a plurality of alined engine cylinders provided with intake and exhaust ports in the heads thereof, substantially cylindrical inlet and exhaust valve chambers extending longitudinally through the heads of all the cylinders, the intake and exhaust ports opening from the individual cylinders into the inlet and exhaust valve chambers respectively, a continuous looped supply conduit having substantially parallel sides, one of said sides lying without said engine cylinders and the other of said sides extending concentrically through the inlet valve chamber and provided with ports registering with the inlet valves of the respective cylinders, a source of fuel supply connected to the outer substantially parallel side of the supply conduit, a substantially cylindrical ported valve mounted for rotation in the inlet valve chamber and surrounding that portion of the supply conduit within said chamber, a relatively fixed exhaust tube mounted concentrically within the exhaust valve chamber provided with ports registering with the exhaust ports of the individual cylinders, a substantially cylindrical exhaust valve rotatably mounted within the exhaust valve chamber, surrounding the exhaust tube therein, and gearing for rotating the inlet and exhaust valves in time with the different functions of the engine.

7. In an internal combustion engine, the combination with a plurality of alined engine cylinders provided with substantially cylindrical inlet and exhaust valve chambers extending longitudinally through the heads of all the cylinders, of a looped supply conduit having a portion passing the entire length of the inlet valve chamber and disposed concentrically therein, said supply conduit having ports in line with the individual cylinders, a source of fuel supply connected to the looped supply conduit, a ported substantially cylindrical inlet valve journaled for rotation within the inlet valve chamber and surrounding that portion of the supply conduit within said chamber, a relatively fixed exhaust conduit disposed concentrically within the exhaust valve chamber and having ports in line with the individual cylinders, a ported substantially cylindrical exhaust valve journaled for rotation in the exhaust valve chamber and surrounding the exhaust conduit therein, gearing for rotating the inlet and exhaust valves in unison with the different functions of the engine, and intake and exhaust ports extending from the interior of the individual cylinders to the inlet and exhaust valve chambers respectively, the said intake and exhaust ports entering the inlet and exhaust valve chambers substantially tangentially in the direction of rotation of the valves within said chambers whereby gas under pressure within the cylinders will act tangentially through the said ports to assist in rotating the valves.

Signed at New York city, in the county of New York and State of New York, this 25th day of March, A. D. 1912.

EDWARD S. BROWER.

Witnesses:
LOUISA E. SIMSON,
PHILIP S. MCLEAN.