J. G. A. KITCHEN.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED DEC. 28, 1908.

923,536. Patented June 1, 1909.

FIG. 1.

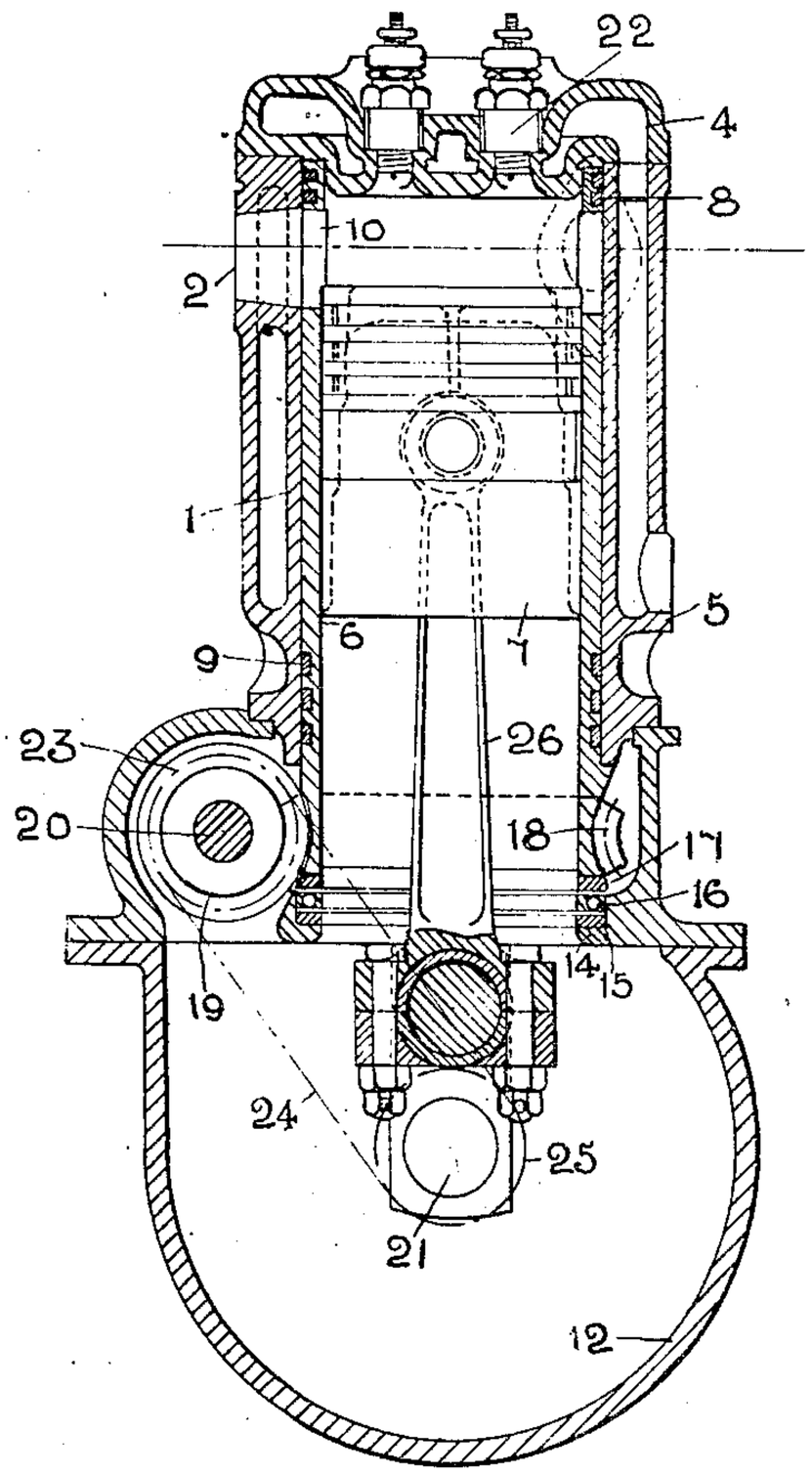

FIG. 2.

FIG. 3.

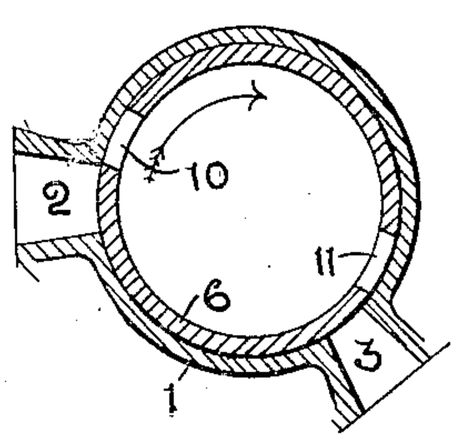

FIG. 4

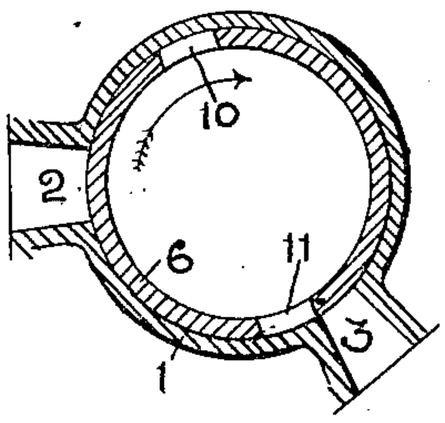

FIG. 5.

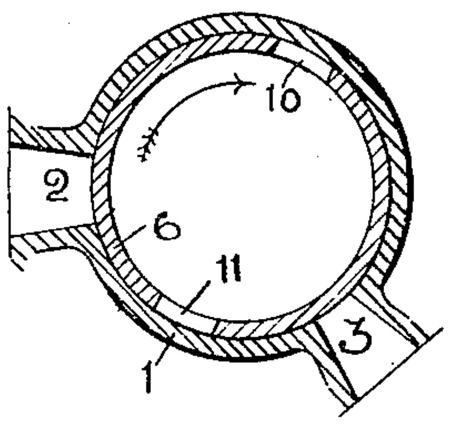

FIG. 6.

Witnesses

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JOHN GEORGE AULSEBROOK KITCHEN, OF LANCASTER, ENGLAND.

INTERNAL-COMBUSTION ENGINE.

No. 923,536. Specification of Letters Patent. Patented June 1, 1909.

Application filed December 18, 1908. Serial No. 469,602.

To all whom it may concern:

Be it known that I, JOHN GEORGE AULSEBROOK KITCHEN, a subject of the King of Great Britain and Ireland, and resident of Lancaster, in the county of Lancaster, England, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in internal combustion motors in which the usual tappet or mushroom valves are replaced by ports in the cylinder bodies or casings and in movable linings or valves between the piston and the casings.

The object of the invention is chiefly to simplify and cheapen this class of motors.

This invention consists in the arrangement of a revoluble lining or valve inside a cylinder or casing provided with an admission and exhaust port in which lining or valve the piston moves, the rotation of which valve opens and closes the cylinder ports as required for the governing of the motor by the rotation of the valve.

On the drawing appended hereunto a construction of the improved motor valve and valve gear are represented as examples how the invention may be carried out.

Figure 1 shows a vertical section through the motor and Fig. 2 a cross section through the same at the ports, with a valve arranged to make half a revolution for the four stroke cycle. Figs. 3 to 6 show the positions of the valve at the commencement respectively of the four strokes of the motor.

The cylinder body or casing 1 hereinafter referred to as the casing, is provided near to its upper or outer end with an exhaust port 2 and an admission port 3. The casing 1 and the cylinder end or head 4 are preferably separate pieces as shown, and the lower end of the casing is provided with a flange 5 for securing it to the bed plate or crank chamber. The casing may be jacketed for water as shown or provided with gills for air cooling and is provided with firing plugs 22 in the usual way. Inside the casing 1 is provided with a revoluble liner or valve 6, in which the piston 7 moves, the liner being made gas tight with the casing at the top end by means of piston rings 8 and near the bottom end by means of piston rings 9 or in any other suitable way. In the valve 6 are provided two ports 10 and 11 opposite each other registering with the ports 2 and 3 alternately. The liner is held in position preferably by a ball bearing carried by the lower end of the casing 1 or the crank case. As shown an intermediate casting 13 is arranged which may be considered as a continuation of the crank case 12. On the bottom flange 14 of this casting is bedded a steel ring 15, on which is placed a ring 16 with holes containing balls, which support the steel ring 17 fixed to the bottom end of the valve 6. The valve is preferably rotated by means of worm gearing, and for this purpose a wormwheel 18 is cut or fixed on the lower end of the valve 6 and a worm 19 having a multiple thread is fixed upon a shaft 20 supported in bushes in the casting 13 and parallel to the crankshaft 21 to which the piston 7 is connected by the pitman 26. The shaft 20 is driven from the crankshaft by sprocket wheels 25, 23 and a driving chain band 24. The ratio of the wheels and worm gear is such, that the valve 6 makes half a revolution for every two revolutions of the crank shaft or for four piston strokes. Obviously the valve 6 may be driven by any other suitable kind of gearing in the same ratio to the crankshaft.

On the drawing the piston is shown at the end of the exhaust and commencement of the suction stroke, and the valve is in such a position, that the port 10 has just passed the exhaust port 2 and closed it. As the valve is further rotated in the direction of the arrow, the port 11 opens the admission port 3. The ports 2, 10, and 11 may have a circumferential length of about one sixteenth of the circumference, or be otherwise so dimensioned that they keep the exhaust open for about one eighth of a revolution of the valve or during the entire stroke. The suction port 3 may have the same length but is preferably shortened at the leading end as shown, so that the valve does not open the admission port 3 till the piston has made about one quarter of its down stroke, and produced a partial vacuum in the cylinder, which causes the gas mixture to rush in quickly and accelerate the carbureter jet. Another object obtained thereby is that the gas is for a shorter time in the cylinder, before the admission port is closed and compression begins, leaving less time for the gas to become expanded by the heat of the casing and valve. At the end of the suction stroke the valve has attained the position shown in Fig. 4 and closed the admission port, which, as also the exhaust port 2, remains closed during the

compression stroke, at the end of which the valve has the position shown in Fig. 5, and during the following firing stroke, at the end of which the valve occupies the position shown in Fig. 6. The port 11 then opens the exhaust port 2 and the action repeats itself. The ports 10 and 11 thus act alternately for admission and exhaust. The ports in the casing 1 are set so that their closing edges are distant from each other by about 135 degrees. Lead can be given to the valve by setting the wheel 24 on the shaft 20 accordingly.

I claim as my invention:

1. In an internal combustion engine the combination of a cylindrical casing, having lateral suction and exhaust ports, a cylindrical revoluble valve fitting into said casing and adapted to open and close said ports, a piston inside said valve, a crank shaft and a pitman connecting said piston and crankshaft, and gearing adapted to drive said valve from the crankshaft at a positive ratio.

2. In an internal combustion engine the combination of a cylindrical casing having a suction and an exhaust port, a cylindrical revoluble valve fitting into said casing and having ports adapted to register with the ports in said casing, a piston inside said valve, a crankshaft and a pitman connecting said piston and crankshaft, and gearing adapted to drive said valve from the crankshaft so as to make one revolution for twice as many revolutions of the crankshaft as there are ports in said valve.

3. In an internal combustion engine, the combination of a cylindrical casing having a lateral suction and a lateral exhaust port near to its outer end, a cylindrical revoluble valve fitting into said casing and having two diametrically opposite ports adapted to register with the ports in said casing, a piston inside said valve, a crank shaft and a pitman connecting said piston and crank shaft, and gearing adapted to drive said valve from the crank shaft so that the valve makes one revolution for four revolutions of the crankshaft.

4. In internal combustion engines the combination of a cylindrical casing having a lateral suction and a lateral exhaust port near its outer end, a revoluble cylindrical valve fitting into said casing adapted to open and close said ports, a piston inside said valve, a crankshaft and a pitman connecting said piston and crankshaft, a wormwheel attached to said valve at its inner end, a shaft parallel to the crankshaft and a worm with multiple thread engaging with said wormwheel and fixed on the said shaft and gearing adapted to drive said shaft from the crankshaft.

5. In internal combustion engines the combination of a cylindrical casing having a lateral suction and a lateral exhaust port near to its outer end, a cylindrical revoluble valve fitting into said casing and having two diametrically opposite ports adapted to register with said ports in said casing, a piston inside said valve, a crankshaft and a pitman connecting said piston and crankshaft, a worm wheel attached to said valve at its inner end, a shaft parallel to said crankshaft and a worm with multiple thread engaging with said worm wheel and fixed on said shaft, a chain pulley on the crankshaft, another chain pulley on the worm shaft, and a driving chain passing around said chain pulleys, the chain pulleys, worm and wormwheel being so proportioned that they rotate the said valve once for every four revolutions of the crankshaft.

In witness whereof I have hereunto set my signature in the presence of two witnesses.

JOHN GEORGE AULSEBROOK KITCHEN.

Witnesses:

CARL BOLLÉ,

WILLIAM JONES.