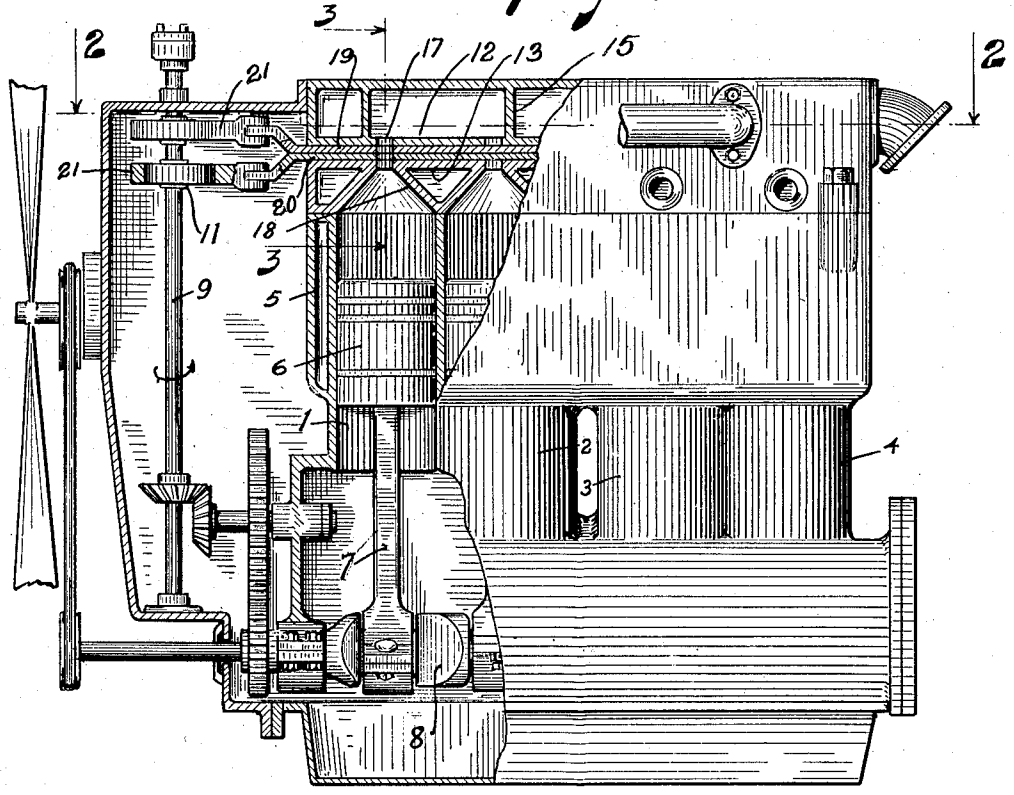
May 12, 1925. 1,537,248

T. J. MALONEY

INTERNAL COMBUSTION ENGINE

Filed Dec. 13, 1923 2 Sheets-Sheet 1

Fig. 1.



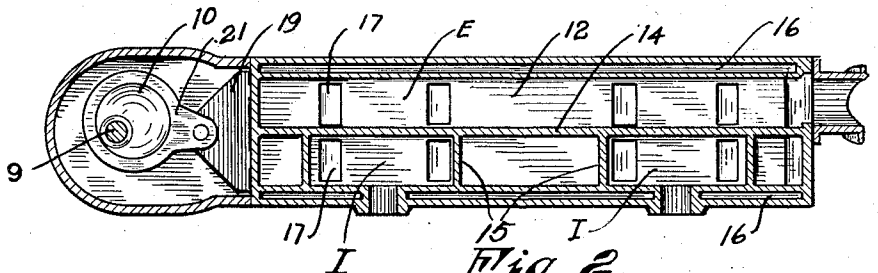


Fig. 2.

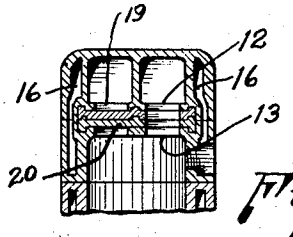


Fig. 3.

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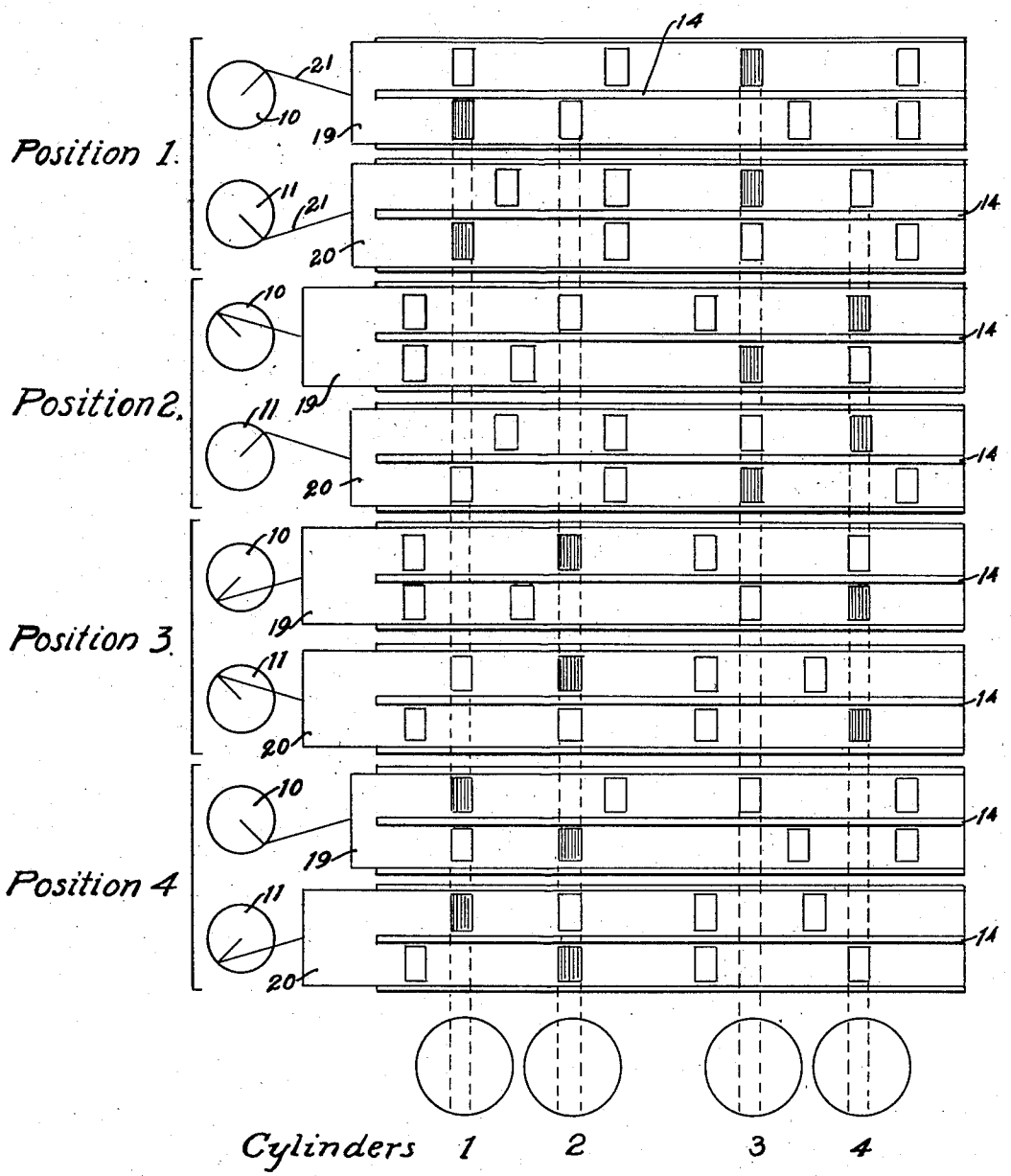


Fig 4.

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Patented May 12, 1925. 1,537,248

UNITED STATES PATENT OFFICE.

THOMAS J. MALONEY, OF DENVER, COLORADO.

INTERNAL-COMBUSTION ENGINE.

Application filed December 13, 1923. Serial No. 680,371.

To all whom it may concern:

Be it known that I, THOMAS J. MALONEY, a citizen of the United States, residing at Denver, in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in the construction of internal combustion engines.

The internal combustion engine, as ordinarily constructed, is provided with intake and exhaust valves of the poppet type, which are held in closed position by means of springs and opened by means of cams. This type of valve has many objectionable features, but is employed mainly because it is simple and inexpensive. Poppet valves are hard to keep clean and tight because carbon particles have an excellent opportunity to lodge between the seat and the valve. The most serious objection to the poppet valve is that it does not permit a sufficiently large opening to be formed to allow the explosive mixture to enter and the exhaust gases to leave with sufficient freedom to permit the engine to rotate at as high a speed as it could otherwise attain. In order to overcome the defects pointed out, it has been proposed to substitute for the poppet valves slide valves of various types and even rotary valves have been suggested.

It is the object of this invention to produce a valve mechanism that is simple and can also be readily applied to engines of ordinary construction without a great amount of alteration.

My invention, briefly described, consists in a cylinderhead adapted to be secured to the top of an engine block of ordinary construction. This cylinder head is hollow and has a horizontal partition which is double and between the two parts of which are located two cooperating slides which serve to open and close the ports leading from the intake and the exhaust manifolds to the cylinders. These slides are reciprocated by means of eccentrics and open and close the various parts in a predetermined sequence. That portion of the cylinderhead above the slides is divided into an intake and an exhaust manifold or chamber and the portion below the slides is provided with chambers through which the cooling liquid circulates.

My invention can be best described and most readily understood when reference is had to the accompanying drawings in which the present preferred embodiment is shown, and in which:

Fig. 1 is a side elevation of an engine constructed in accordance with my present invention, parts thereof being broken away to better disclose the construction;

Fig. 2 is a section taken on lines 2—2, Fig. 1;

Fig. 3 is a section taken on line 3—3, Fig. 1; and

Fig. 4 is a diagrammatic representation showing the slides in the positions which they occupy for each stroke of the engine.

The same reference characters will be employed to represent the same parts throughout the several views.

Numeral 1 designates an ordinary engine or cylinder block having four cylindrical chambers 1, 2, 3 and 4 surrounded by a water jacket 5. Within the cylinders are pistons 6 operatively connected by rods 7 to the crank shaft 8, all as is common and well known. A vertical shaft 9 is driven from the crank shaft by means of suitable timing gears and has secured thereto eccentrics 10 and 11, the former of which leads the latter by an angle of 90 degrees. The cylinderhead is hollow and has a double wall extending horizontally thereof. This wall has an upper portion 12 and a lower portion 13. Above the wall 12 there is a longitudinal vertical wall 14 which divides this space into an intake chamber I and an exhaust chamber E.

The intake chamber I may, if desired, be divided into several compartments by transverse walls 15 in the manner shown on the drawing. The cylinderhead has a water jacket 16 surrounding the same, in the manner shown, but as this has nothing to do with my invention, I will not describe the same, but shall devote myself to a description of the valves and valve-operating mechanism.

From both the intake and the exhaust chambers, port openings 17 extend through both of the walls 12 and 13 and side walls 18 extend from the wall 13 to the upper edge

of the cylinder walls in the manner shown in Fig. 1.

Between the walls 12 and 13 are two slides, the upper of which I have designated by the numeral 19 and the lower by numeral 20. These slides are provided with perforations spaced in the manner shown in Fig. 4 where the circles marked 1, 2, 3 and 4 represent the cylinders of the engine and the dotted lines indicate the location of the port openings 17. In Fig. 2 I have shown a connecting rod 21, which operatively connects the slide 19 with eccentric 10. A similar rod connects slide 20 with the eccentric 11. The shaft 9 rotates in the direction of the arrow in Fig. 1 and this causes a counter-clockwise rotation of the cams or equivalent parts in Fig. 4. Cam 10 leads cam 11 by 90 degrees.

Referring now more particularly to Fig. 4, it will be noticed that I have shown four different positions of the slides, position 1 showing the intake open to cylinder 1 and the exhaust port open from cylinder 3. The shaded rectangles indicate the open ports. Position 2 shows the intake port open to cylinder 3 and the exhaust port from cylinder 4. Position 3 shows the intake open into cylinder 4 and the exhaust open from cylinder 2, while position 4 shows the intake open to cylinder 2 and the exhaust from cylinder 1. The four positions shown complete the cycle. The wall 13 is in contact with the cooling water on its lower side and is thereby prevented from reaching an excessively high temperature.

With the type of valve described by me and operated by eccentrics or equivalent cams, there are no intermittently movable parts as in an engine employing poppet valves, as the slides 19 and 20 are constantly moving, being stationary only for an instant at the time the direction of travel is being reversed, which overcomes the noise that invariably accompanies the use of poppet valves. The ports 17 can be made wide so that there will be sufficient space to permit the gases to enter without wire-drawing and to leave freely so as to prevent excessive back-pressure.

Having now described my invention, what I claim as new is:

1. An internal combustion engine having a plurality of cylinders arranged in a row, intake and exhaust ports opening into said cylinders, means for periodically opening and closing said ports in a predetermined sequence, said means comprising two flat slides, each provided with two parallel rows of four openings, each of the openings adapted to register with certain port openings and with corresponding openings in the other slide so as to permit gases to enter and leave said cylinders in a predetermined sequence, and means for reciprocating said slides in accordance with the speed of the engine.

2. An internal combustion engine having a plurality of cylinders arranged in a row, intake and exhaust ports opening into said cylinders, means for periodically opening and closing said ports in a predetermined sequence, said means comprising two flat slides, each provided with two parallel rows of four openings, each of the openings adapted to register with certain port openings and with corresponding openings in the other slide so as to permit gases to enter and leave said cylinders in a predetermined sequence, and means for reciprocating said slides in accordance with the speed of the engine, said means comprising an eccentric and a connecting rod for each slide, said eccentrics being rotated at the same angular velocity and one having a lead of substantially 90 degrees with respect to the other.

3. An internal combustion engine comprising a cylinder block having a plurality of cylinders arranged in a substantially straight line, a piston in each cylinder, a crank shaft, a rod connecting each piston to a crank arm, a removable cylinderhead, said cylinderhead having an intake and an exhaust port opening for each cylinder, two parallel flat slides cooperatively connected with said cylinderhead, each slide having two rows of four openings each adapted to register with certain of said port openings at some particular position of the slide, the openings in the slides being also arranged to register with each other at certain predetermined relative positions of the slides, and means operatively connected to the crank shaft for reciprocating said slides in accordance with the speed of rotation of the engine.

4. An internal combustion engine comprising a cylinder block having a plurality of cylinders arranged in a substantially straight line, a piston in each cylinder, a crank shaft, a rod connecting each piston to a crank arm, a removable cylinderhead, said cylinderhead having an intake and an exhaust port opening for each cylinder, two parallel flat slides cooperatively connected with said cylinderhead, each slide having two rows of four openings each adapted to register with certain of said port openings at some particular position of the slide, the openings in the slides being also arranged to register with each other at certain predetermined relative positions of the slides, and means operatively connected to the crank shaft for reciprocating said slides in accordance with the speed of rotation of the engine, said means comprising an eccentric and a connecting rod for each slide, said eccentrics being rotated at the same angular velocity but one leading the other by substantially 90 degrees.

5. An internal combustion engine comprising a cylinder block having a plurality of cylinders arranged in a substantially straight line, a piston in each cylinder, a crank shaft, a rod connecting each piston to a crank arm, a removable cylinderhead secured to said engine block, said cylinderhead having two spaced parallel horizontal walls extending the entire length thereof, said walls having an intake and an exhaust port opening for each cylinder, a pair of flat slides located in the space between said walls, said slides each having two rows of four openings each adapted to register with the first-mentioned port openings and with each other at predetermined positions of the slides, and means operatively connected with the crank shaft of the engine for reciprocating said slides whereby the intake and exhaust ports will be opened and closed in a predetermined sequence.

6. An internal combustion engine comprising a cylinder block having a plurality of cylinders arranged in a substantially straight line, a piston in each cylinder, a crank shaft, a rod connecting each piston to a crank arm, a removable cylinderhead secured to said engine block, said cylinderhead having two spaced parallel horizontal walls extending the entire length thereof, said walls having an intake and an exhaust port opening for each cylinder, a pair of flat slides located in the space between said walls, said slides each having two rows of four openings each adapted to register with the first-mentioned port openings and with each other at predetermined positions of the slides, and means operatively connected with the crank shaft of the engine for reciprocating said slides whereby the intake and exhaust ports will be opened and closed in a predetermined sequence, said means comprising a shaft rotatably connected to the crank shaft, a pair of eccentrics non-rotatably connected to the shaft, and a connecting rod joining each eccentric to one of said slides, one of said eccentrics leading the other by substantially 90 degrees.

7. An internal combustion engine comprising a cylinder block having a plurality of cylinders arranged in a substantially straight line, a piston in each cylinder, a crank shaft, a rod connecting each piston to a crank arm, a removable cylinderhead secured to said engine block, said cylinderhead having two spaced parallel horizontal walls extending the entire length thereof, said walls having an intake and an exhaust port opening for each cylinder, a pair of flat slides located in the space between said walls, said slides each having two rows of four openings each adapted to register with the first-mentioned port openings and with each other at predetermined positions of the slides, the adjacent faces of the parallel walls having longitudinal grooves, said slides having projections adapted to engage in said grooves, and means operatively connected with the crank shaft of the engine for reciprocating said slides whereby the intake and exhaust ports will be opened and closed in a predetermined sequence.

8. An internal combustion engine comprising a cylinder block having a plurality of cylinders arranged in a substantially straight line, a piston in each cylinder, a crank shaft, a rod connecting each piston to a crank arm, a removable cylinderhead secured to said engine block, said cylinderhead having two spaced parallel horizontal walls extending the entire length thereof, said walls having an intake and an exhaust port opening for each cylinder, a pair of flat slides located in the space between said walls, said slides each having two rows of four openings each adapted to register with the first-mentioned port openings and with each other at predetermined positions of the slides, the adjacent faces of the parallel walls having longitudinal grooves, said slides having projections adapted to engage in said grooves, the adjacent sides of the slides having cooperating grooves and projections, and means operatively connected with the crank shaft of the engine for reciprocating said slides whereby the intake and exhaust ports will be opened and closed in a predetermined sequence.

In testimony whereof I affix my signature.

THOMAS J. MALONEY.