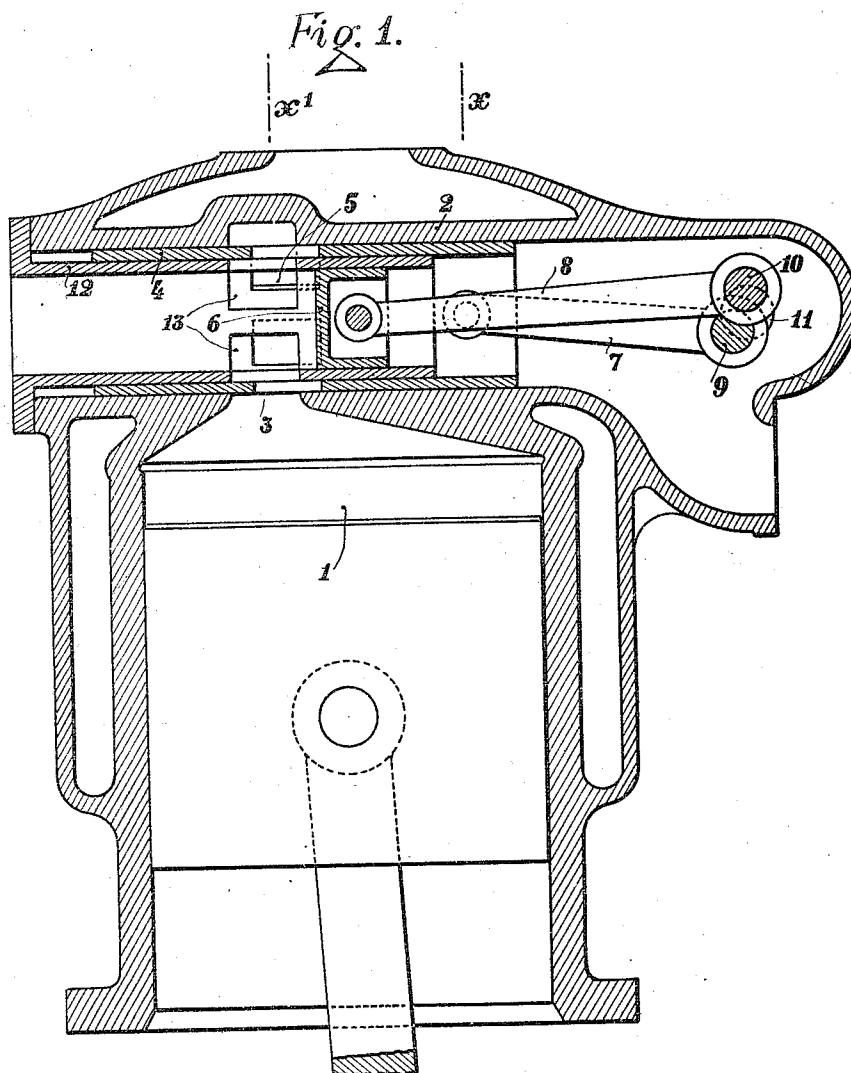


C. E. DRUMMOND & F. J. BOSTOCK.
VALVE MECHANISM FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED FEB. 25, 1910.

983,220.

Patented Jan. 31, 1911.

3 SHEETS—SHEET 1.



WITNESSES.

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Fig. 3.

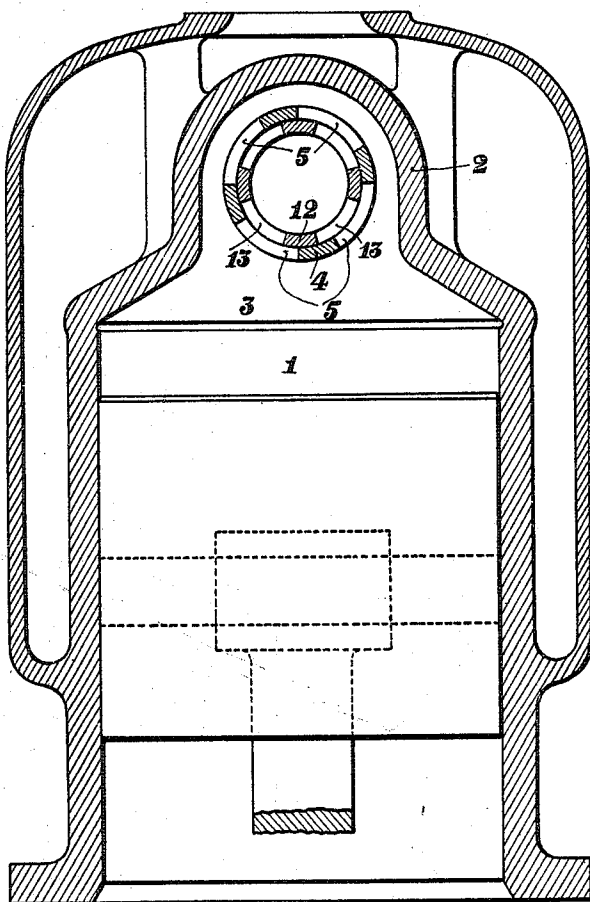
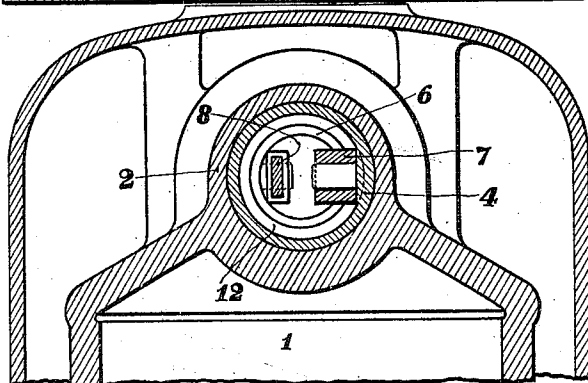


Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

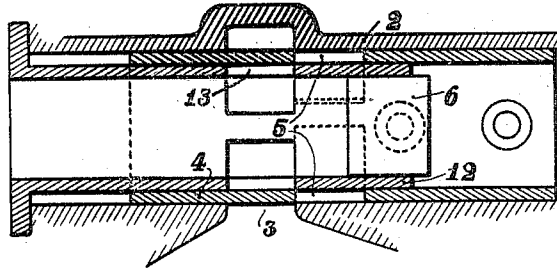


Fig. 5.

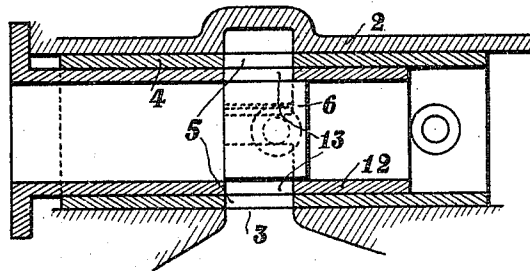


Fig. 6.

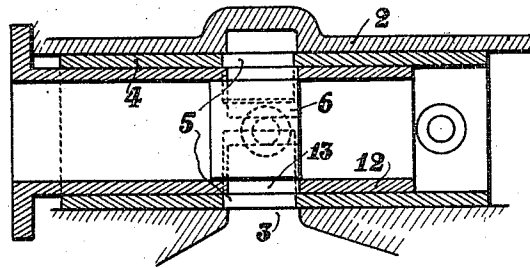
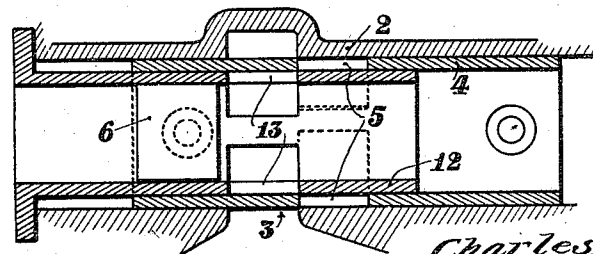


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES EDWARD DRUMMOND, OF SMALL HEATH, NEAR BIRMINGHAM, AND FRANCIS JOHN BOSTOCK, OF BOURNBROOK, NEAR BIRMINGHAM, ENGLAND.

VALVE MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

983,220.

Specification of Letters Patent.

Patented Jan. 31, 1911.

Application filed February 25, 1910. Serial No. 545,872.

To all whom it may concern:

Be it known that we, CHARLES EDWARD DRUMMOND and FRANCIS JOHN BOSTOCK, subjects of the King of Great Britain, residing at 11 Tennyson road, Small Heath, near Birmingham, England, and 22 Bristol road, Bournbrook, near Birmingham, England, respectively, have invented certain new and useful Improvements in Valve Mechanism for Internal-Combustion Engines, of which the following is a specification.

This invention relates to valve mechanism for controlling the inlet and exhaust gases of internal combustion engines, principally of the four-stroke cycle, said mechanism being of the slide valve type in which a piston, separating the inlet from the exhaust, is arranged to slide within, or work in conjunction with, a ported sleeve, which also has a sliding movement imparted to it.

The object of the present invention is to provide an improved and more efficient arrangement of such mechanism in which a fixed ported sleeve or liner is employed between the piston and the sliding sleeve.

Figure 1 of the accompanying drawings is a sectional view of the improved valve mechanism, the eccentrics for operating the valve members being represented diagrammatically. This view shows the mechanism in the position in which the cylinder is placed in communication with the exhaust passage. Fig. 2 is a cross-section on line *a* Fig. 1. Fig. 3 represents a section on line *x* Fig. 1, showing the arrangement of the ports in the moving sleeve member and also in the fixed liner. Fig. 4 shows diagrammatically the position of the valve members immediately prior to placing the combustion chamber in communication with the exhaust passage. Fig. 5 illustrates the mechanism after the cylinder has been closed to the exhaust. Fig. 6 shows closed position of the valve just before the inlet passage is placed in communication with the cylinder. Fig. 7 represents a valve after communication with the inlet passage has just been cut off.

The same reference numerals indicate corresponding parts in each of the figures of the drawings.

At the upper end of the engine cylinder 1, a transverse horizontal cylinder 2 is provided, which communicates with the engine cylinder 1 by a port 3 through which both

the in-going and exhaust gases are arranged to pass to and from the cylinder. The left hand end of the cylinder 2 communicates with the exhaust passage and the right hand end with the inlet pipe. Extending into the said cylinder 2, but separated therefrom by an annular space, is a concentric fixed sleeve or liner 12 having ports 13 opposite to the cylinder port 3. Arranged to slide within the space between the fixed sleeve 12 and inside walls of valve cylinder 2 is a reciprocating sleeve 4 provided with ports or openings 5 adapted to cooperate with the port 3 leading into the engine cylinder so as to place the latter in communication with the inlet or exhaust passages, or so as to close the cylinder to both inlet and exhaust.

Within the interior of the fixed sleeve 12 is a sliding piston 6 adapted, by the means hereafter described, to be reciprocated backward and forward and to cooperate with the ports 13 in said sleeve 12 so as to determine whether the inlet or exhaust passages shall be placed in communication with the engine cylinder. The sliding sleeve 4 and piston 6 are arranged to be reciprocated by means of connecting rods 7, 8, connected with cranks or eccentrics 9, 10 (shown diagrammatically) set at a certain pre-determined angle relatively to one another, and mounted upon a shaft 11 driven from the engine by any suitable means.

The action of the mechanism is as follows:—Assuming the parts to be in the position shown in Fig. 4, then as the eccentric 11 rotates, the piston 6 and sleeve 4 both move toward the left, when the ports 5 in said sleeve immediately commence to overlap or uncover the cylinder port 3, placing the engine cylinder in communication with the exhaust passage, the exhaust gases leaving the cylinder and passing through the ports 13 of fixed sleeve or liner 12, and thence away to the left of the piston 6. As the sleeve 4 continues its motion, the piston 6 moves at a faster rate owing to the relative positions of the eccentrics or cranks, and by the time the ports of the sleeve coincide with the cylinder port, as shown in Fig. 5, the piston has completely closed the ports 13 in the sleeve 12, thus cutting off communication between the exhaust passage and the cylinder. Further movement of the piston to the left (see Fig. 6) causes the ports 13 to be uncovered by the right hand end of

the piston, the cylinder being thereby placed in communication with the inlet pipe during the suction stroke of the engine. The two members of the valve now move in opposite directions, the sleeve 4 returning toward the right and the piston continuing its movement to the left, said sleeve at the end of the suction stroke, closing the cylinder port as shown in Fig. 7. The said port continues to remain closed until the commencement of the exhaust stroke, the parts again coming to the positions shown in Fig. 4.

It is understood that the eccentrics which operate the piston and sleeve are so set with respect to one another that the parts are timed to act as above described. The liner 12 serves to protect the sliding sleeve 4 from the heat of the exhaust gases.

Having fully described our invention, what we desire to claim and secure by Letters Patent is:—

In a valve mechanism for internal combustion engines, in combination, a valve chamber having an intermediate port leading into the engine cylinder through which both the inlet and exhaust gases are compelled to pass, a stationary bushing arranged within the valve chamber in spaced relation thereto, the bushing communicating at its opposite ends respectively with the inlet and exhaust passages and having ports corresponding to and communicating with the

intermediate port, a sliding sleeve valve member which works in the space between the walls of the chamber and the bushing and has ports to cooperate with the said intermediate port and with the ports of the bushing, and a closed piston valve member which is positively and continuously reciprocated within the said bushing from a movable part of the engine, and constitutes a sliding partition to separate the inlet and exhaust ends of the valve chamber, the movement of the said piston member being so timed with relation to the movement of the sliding sleeve and to the exhaust and suction strokes of the engine piston as to alternately place the engine cylinder in communication with the inlet and exhaust ends of the valve chamber so as to govern the admission and exhaust of the engine, the end of said chamber which is opposite to that in communication with the cylinder being isolated from the latter by means of the inner piston member of the valve.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

CHARLES EDWARD DRUMMOND.
FRANCIS JOHN BOSTOCK.

Witnesses:

HENRY SKERRETT,
HENRY NORTON SKERRETT.