

R. M. ROOF.
VALVE MECHANISM FOR GAS ENGINES.
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995,807.

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Fig. 1.

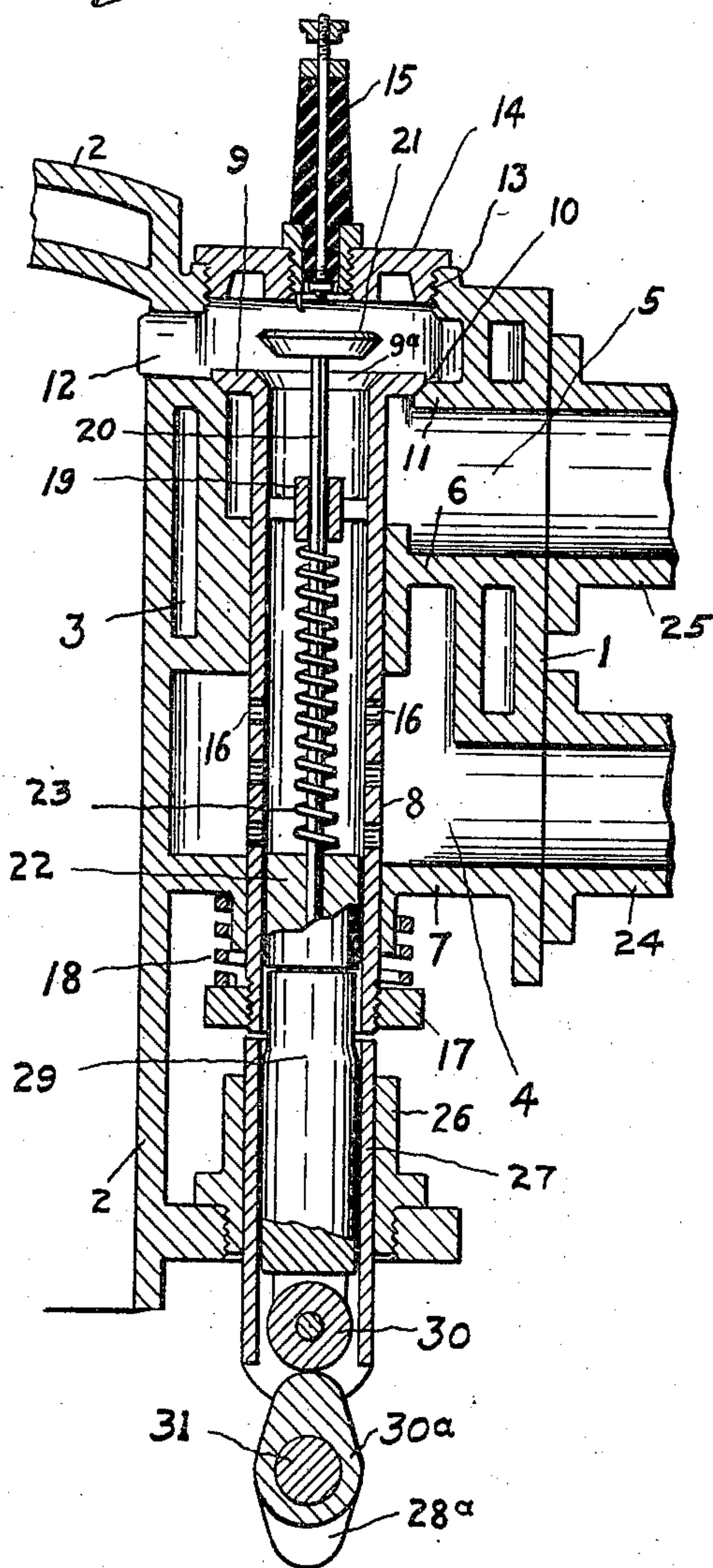
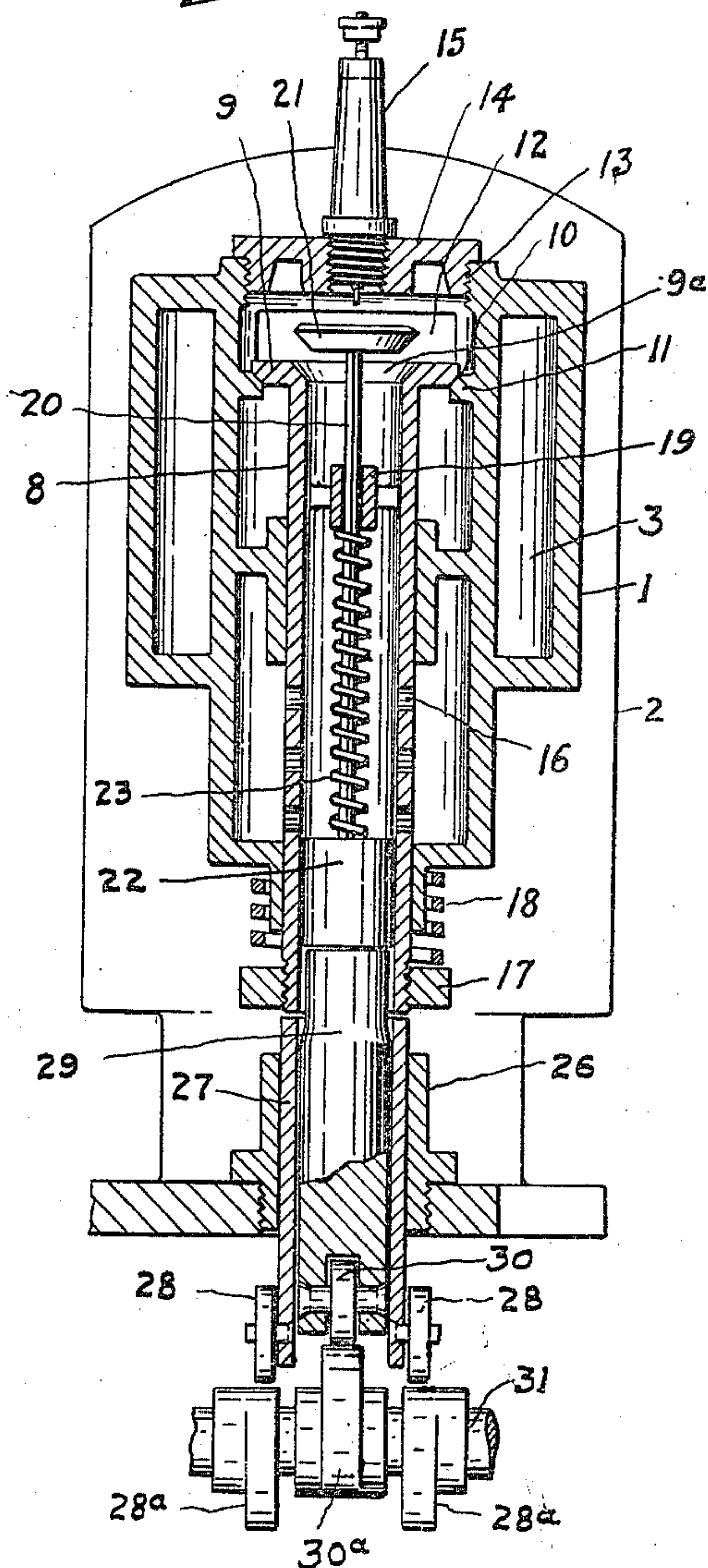


Fig. 2.



WITNESSES:

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VALVE MECHANISM FOR GAS-ENGINES.

995,807.

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To all whom it may concern:

Be it known that I, ROBERT M. ROOF, a citizen of the United States, and a resident of the city of Muncie, in the county of Delaware and State of Indiana, have invented new and useful Improvements in Valve Mechanism for Gas-Engines, of which invention the following is a specification.

This invention relates to improvements in valve mechanisms for internal combustion engines, and has for its objects to provide a valve mechanism which will be positive and reliable in operation, of economical and durable construction, and which will not be liable to get out of order or repair.

More specific objects of my invention are to provide a valve mechanism of the concentric-valves type, which may be easily installed in operative position and may be easily and quickly removed, and which will be capable of being operated by direct and very simple actuating means.

The objects of my invention are accomplished by the new construction, combination and arrangement of parts described in this specification, defined in the appended claims, and illustrated in the accompanying drawings.

Corresponding parts are referred to by similar numerals of reference in the views shown in the drawings,—in which—

Figure 1 is a longitudinal vertical sectional view, and Fig. 2 is a transverse vertical sectional view of my invention.

The valve chest 1 may form an integral part of the engine cylinder 2, and its water passages 3 will communicate with the water passages of the said cylinder. I provide in this valve chest an intake chamber 4 and the exhaust chamber 5 immediately adjacent to each other, the said chambers being separated by the partition 6. The thickened central portion of the said partition, and of the wall 7 are bored vertically, and arranged slidably in the bores is the machined valve-sleeve 8. The head 9 of this valve-sleeve is flared and machined to fit the machined annular opening 10 provided therefor in the partition 11, and through which said opening there is afforded communication between the exhaust chamber 5 and the port passage 12 that leads into the upper end of the engine cylinder.

Screwed into the opening 13 of the top of the valve chest is the cap 14 in which is

carried the suitable spark plug 15. The portion of the valve-sleeve that is surrounded by the intake chamber 4 is provided with the perforations 16; the lower end of the valve sleeve is threaded and screwed tightly thereon is the flange ring 17. The coil spring 18 having its upper end to bear against the underside of the valve chest, and its lower end against the flange ring, will urge the valve sleeve downwardly and the opening 10 will be kept normally closed by the head 9.

Slidably disposed in the internal guide-head 19 that is supported by the webs formed integral with the valve-sleeve, is the valve stem 20 upon the upper end of which valve stem is secured the valve-head 21. The underside of this valve head 21 is machined to fit the machined internal face 9^a of the head 9 of the valve sleeve. The lower end of the valve stem 20 is secured to the piston head 22 which will move slidably in the said valve sleeve. The coil spring 23 disposed on the valve stem and having its ends to bear against the guide-head 19 and piston head 22 will hold the valve head 21 normally in closed position on the internal face 9^a. The conduits 24 and 25 secured to the outer face of the valve chest will communicate with the intake chamber 4 and the exhaust chamber 5 respectively.

My improved valve mechanism is capable of being actuated by cams and the preferable general form of motion transmitting means is that shown in the drawing.

In a suitable guide block 26 secured in a position immediately below the valve-sleeve, a tripper sleeve 27 is slidably disposed; on the sides of the lower end thereof are pivotally retained the rollers 28. Within the tripper sleeve is slidably disposed the tripper head 29 in the lower end of which is centrally pivoted the roller 30, as plainly shown in Fig. 2. The cam 30^a which will engage the roller 30, and the cams 28^a which will engage the rollers 28, may be carried by a shaft 31 suitably arranged to be driven by the engine. When the actuating means are operated, the valve head 21 will be raised from its seat 9^a, while the head 9 of the valve sleeve 8 will occupy its normally closed position on the seat of the opening 10; and when the valve head 9 is raised, the valve head 21 will be in closed engagement with its seat 9^a.

The usual vaporized fuel which fills the

intake chamber 4 will enter and fill the valve-sleeve 8 through the perforations 16. The connections and gearing between the main shaft of the engine and the shaft 31 are such that with the movement of the engine's piston from the head of its cylinder, the valve head 21 is raised which permits an inflow of fuel into the port 12 of the cylinder. As the piston reaches the limit of its stroke the valve head 21 is returned to the closed position. The return stroke of the piston then compresses the charge of fuel and as it reaches the limit of its said return movement, ignition is caused by the spark at the spark plug 15. The piston is driven forwardly and upon the next return stroke thereof, the valve head 9 is raised which permits, during the return movement of the piston, the outflow and discharge through the port 12 and the exhaust chamber 5, of the spent products of combustion. As the engine's piston reaches the limit of this return stroke the valve head 9 returns to closed position and the valve head 21 is raised. A fresh charge of fuel enters and the operation of the valve mechanism is repeated in the manner just described.

By the new construction, combination and arrangement of parts constituting my invention great advantages are accomplished. This valve mechanism, in addition to being compactly constructed, and composed of few parts, will afford a positive and accurate movement of the valves. More direct and unobstructed channels for intake and exhaust are afforded whereby the possibility of pre-heating of the vaporized mixture is minimized, and a free and complete discharge of exhaust is accomplished. There will be slight noise in operation, minimum lubrication will be needed, and the amount of machine work necessary in the construction of my improved valve mechanism is materially reduced. Another advantage is that the fuel intake is from below the exhaust outlet and conduits thereby simplifying the formation and arrangement of the fuel conduit.

To remove the valve-mechanism from the engine, the cap 14 is unscrewed, then the flange ring 17 is removed, and the entire valve mechanism may be lifted out of the valve chest. The advantages of this feature are especially apparent where an engine having a plurality of cylinders is in use, as the disuse of one cylinder does not necessarily render the engine inoperative. The valve-sleeve and the stem of the intake valve being combined and arranged as shown, the sleeve being maintained in the thickened or guide-way portions of the partition and of the chest wall, and the stem of the intake valve being maintained by the guide head 19 and head 22, these valves will operate in perfect alinement and will

wear uniformly under the heaviest duty; the head 22 performing the function of a closure for the valve sleeve, a guide-head for the valve stem, and a head against which actuating force may be imparted from any form of actuating means. Other advantages are that the exhaust outlet opens out of the chest at a location above the intake; the result being that the exhaust conduit of the engine is entirely out of the way of the intake conduit and its connected and adjacent parts. Moreover, the intake chamber being remote from the exhaust valve opening, the fuel is protected or shielded against becoming overheated before its entry into the ignition chamber or port. Obviously these advantages contribute to the smooth, dependable and quiet running of the engine.

I am aware that in carrying out my invention, minor changes of form and detail, within the scope defined by the claims, may be made without departing from the spirit of my invention or sacrificing any of its advantages.

What I claim as my invention and desire to secure by Letters Patent, is—

1. In a valve mechanism of the kind described, the combination of a valve chest having an exhaust chamber and an inlet chamber separated by a partition, a port from the said exhaust chamber, a sleeve adapted to pass through the said chambers and the said partition and having openings in the portion thereof that is surrounded by the intake chamber the inner end of said sleeve being flared to form a valve for said port, a removable flange on the bottom of said sleeve, a spring between the said flange and the wall of the valve chest, a valve at the inner end of said sleeve having on its stem a head to move slidably in the interior of said sleeve, a guide member carried on the inside of the sleeve and in which the valve stem may move slidably, a spring between the said head and the valve head.

2. In a gas engine, a valve mechanism, including a valve chest, a partition in said valve chest having a thickened portion, a bore in said thickened portion, a machined sleeve slidably disposed in said bore and whose ends pass through the walls of the valve chest a chamber being thereby formed on each side of said partition, an intake into one and an exhaust from the other of said chambers, a port leading into the engine cylinder and having an annular seat in the top wall of the exhaust chamber, an opening in the top wall of the valve chest of diameter larger than the diameter of the port opening, a removable cap to close the opening in the top wall of the valve chest, openings in the portion of the aforesaid sleeve that is surrounded by the intake chamber and the upper end of said sleeve being flared and machined to fit said annular

seat, a flange member removably secured to the bottom of said sleeve, a coil spring between the said flange member and the wall of the valve chest, a valve at the upper end
 5 of the said sleeve, a guide head carried on the interior of said sleeve and in which guide head the stem of the said valve is slidingly maintained, a head secured on the lower end of the said stem and slidingly dis-
 10 posed in said sleeve, a coil spring between the said head and the said guide head.

3. In a gas engine, a valve mechanism including a valve chest, a partition in said valve chest having a thickened portion, a
 15 bore in said thickened portion, a thickened portion in the wall of the valve chest, a bore therein, a machined sleeve slidingly disposed in said bores a chamber being thereby formed on each side of said partition,
 20 an intake into one and an exhaust from the other of said chambers, a port leading into the engine cylinder and having an annular seat in the top wall of the exhaust chamber,
 25 of diameter larger than the diameter of the

port opening, a removable cap to close the opening in the top wall of the valve chest, openings in that portion of the sleeve that is surrounded by the intake chamber and the upper end of said sleeve being flared and
 30 machined to fit said annular seat, a flange member removably secured to the bottom of the said machined sleeve, a spring between the said flange member and the wall of the valve chest, a valve at the upper end of said
 35 sleeve, a guide head on the interior of said sleeve, and in which guide head the stem of the said valve is slidingly maintained, a head screwed on the lower end of said stem and which will fill but will move slidingly
 40 in said sleeve, a spring between the said head and the said guide head.

In testimony whereof I sign my name to this specification in the presence of two subscribing witnesses.

ROBERT M. ROOF.

Witnesses:

FRANK E. HILL,
 THOMAS L. RYAN.

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