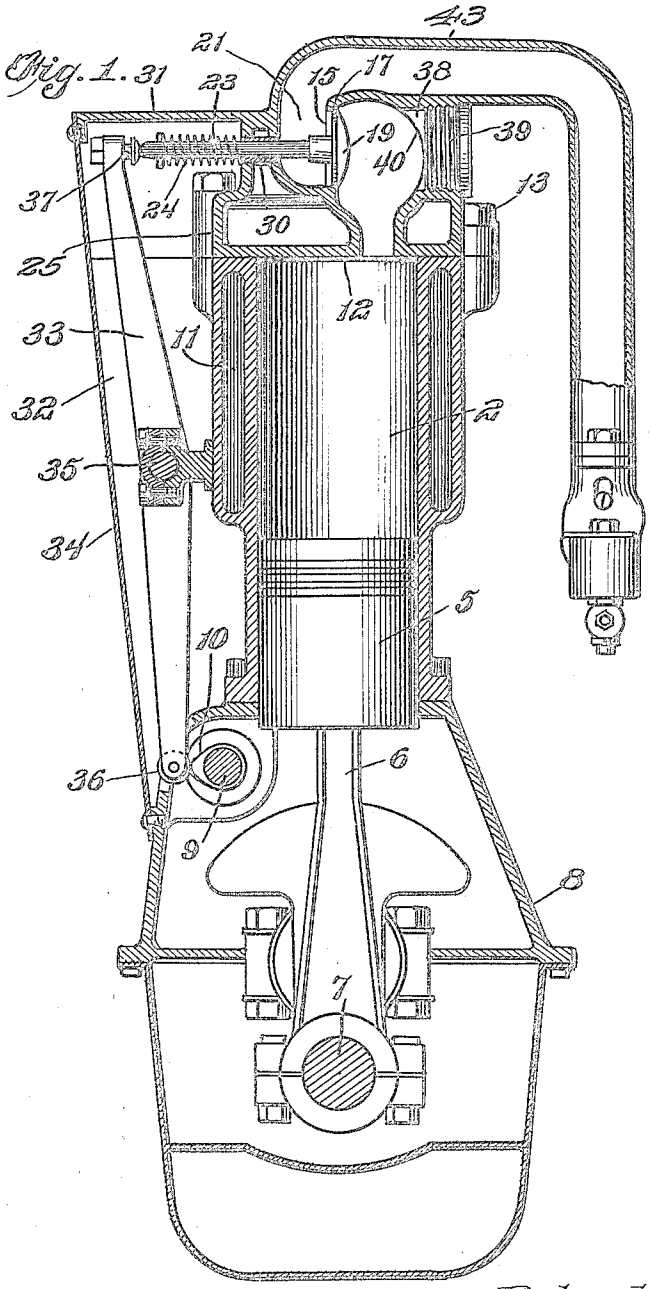
Aug. 7, 1923. 1,464,282

R. KLOSSNER

INTERNAL COMBUSTION MOTOR

Filed July 14, 1922. 4 Sheets-Sheet 1

Fig. 1.



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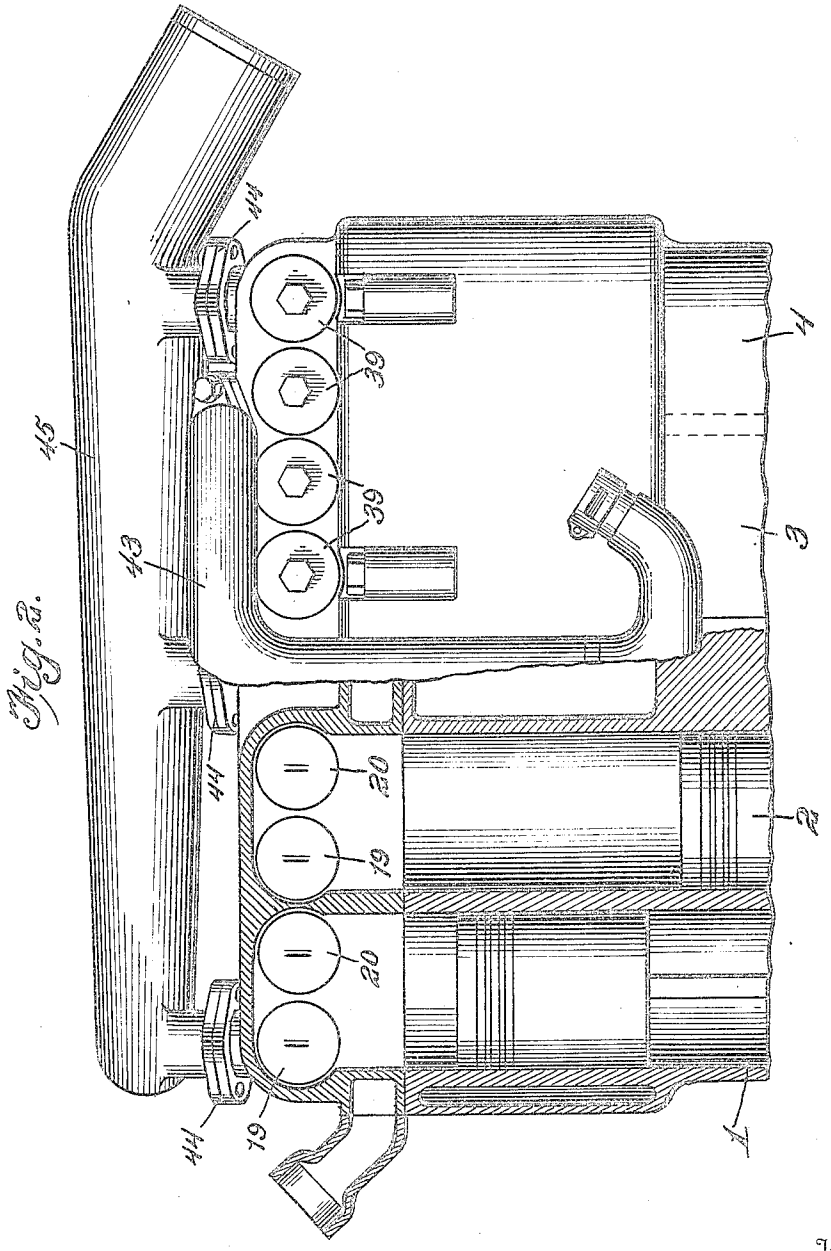


Fig. 2.

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INTERNAL COMBUSTION MOTOR

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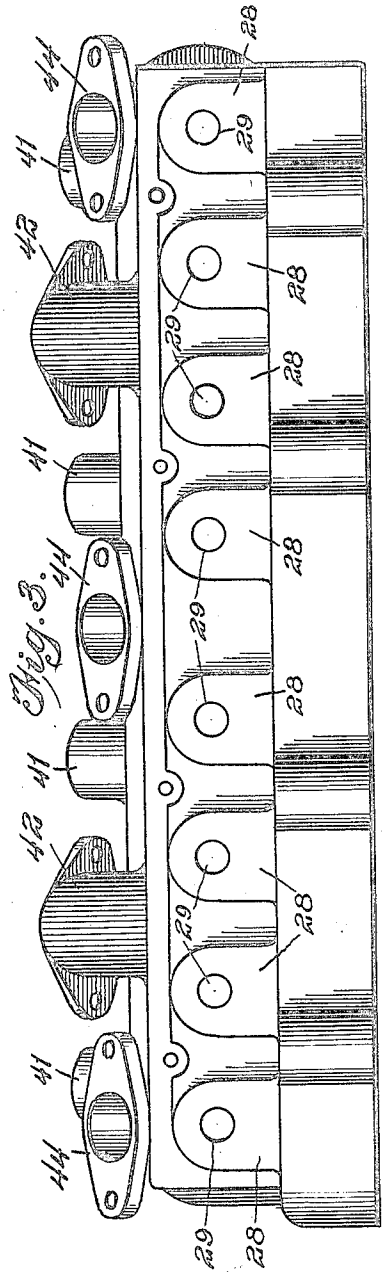


Fig. 3.

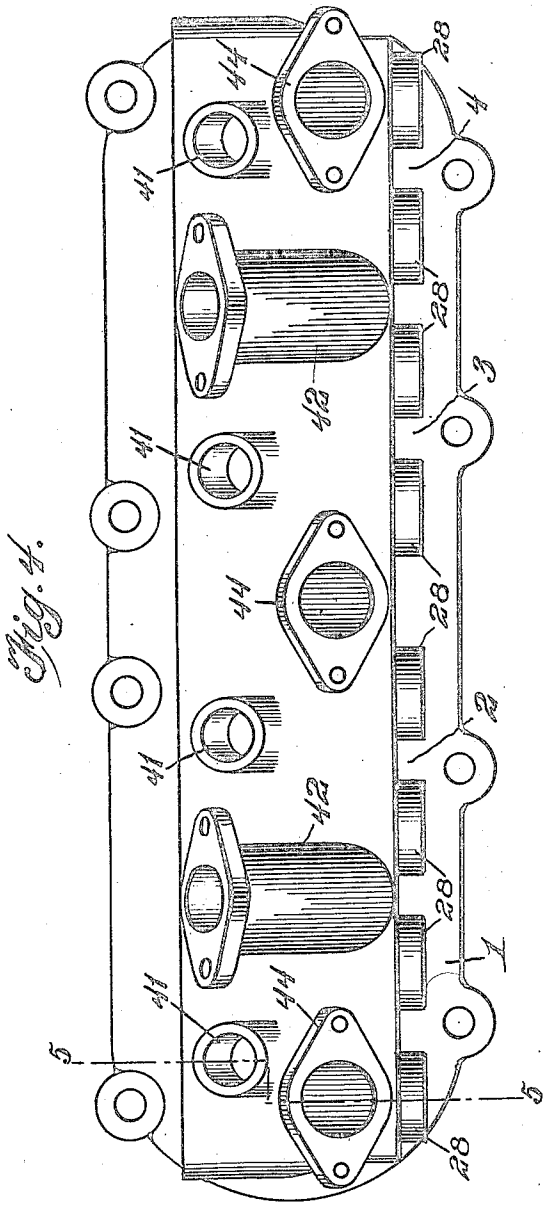


Fig. 4.

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INTERNAL COMBUSTION MOTOR

Filed July 14, 1922 4 Sheets-Sheet 4

Fig. 5.

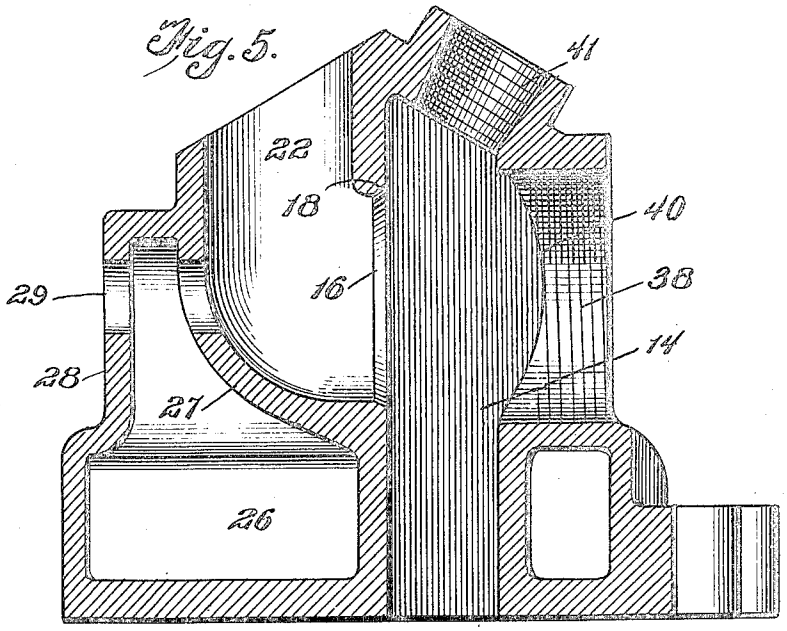
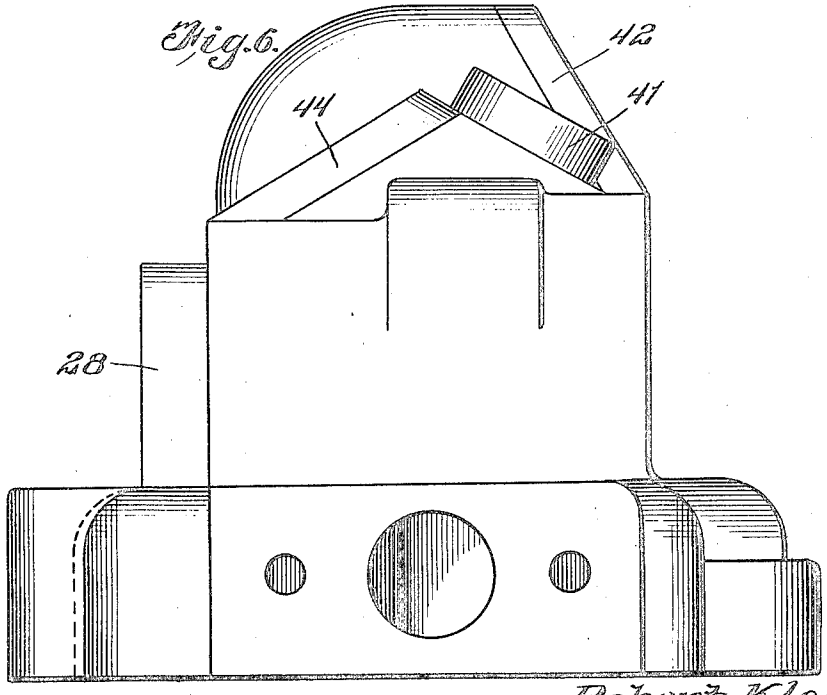


Fig. 6.



Inventor

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Patented Aug. 7, 1923. 1,464,282

UNITED STATES PATENT OFFICE.

ROBERT KLOSSNER, OF ALLIANCE, OHIO.

INTERNAL-COMBUSTION MOTOR.

Application filed July 14, 1922. Serial No. 575,024.

To all whom it may concern:

Be it known that I, ROBERT KLOSSNER, a citizen of the United States, residing at Alliance, in the county of Stark and State of Ohio, have invented new and useful Improvements in Internal-Combustion Motors, of which the following is a specification.

This invention relates to improvements in internal combustion motors, and particularly to vertical internal combustion motors of that type having preliminary combustion chambers above and communicating with the tops of the cylinders, so as to effect the ignition of the combustible charge prior to its entrance to the cylinder, combined with horizontally arranged and movable inlet and exhaust valves for admitting the combustible charges to and exhausting the spent gases from the preliminary combustion chambers.

One object of my invention is to provide a construction and arrangement of parts which enables the arrangement and use of preliminary combustion and exhaust chambers and horizontal admission and exhaust valves in a detachable head structure, whereby all the advantages and conveniences of such chambers and valves may be secured and other desirable and important advantages gained, as hereinafter fully described. Further objects of and advantages gained by my invention will also appear in the course of the subjoined description.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:

Figure 1 is a vertical transverse section through one of the cylinders, crank-case, and associated preliminary combustion and exhaust chamber (at the inlet point) and a portion of the valve mechanism, of an internal combustion motor, in this instance a four-cylinder motor, embodying my invention.

Figure 2 is a fragmentary sectional side elevation looking toward one side of the motor.

Figure 3 is a side elevation of the removable head looking toward the opposite side from that shown in Figure 2.

Figure 4 is a top plan view of the removable head.

Figure 5 is a cross-section therethrough taken substantially on line 5—5 of Figure 4.

Figure 6 is an end view of the head.

Referring now more particularly to the drawings, 1, 2, 3 and 4 designate the cylinders of a four-cylinder motor, to which the invention is in the present instance shown applied. Within each cylinder operates a piston 5 coupled by a connecting rod 6 to a crank shaft 7 arranged within the crank casing 8. Also arranged within the crank casing 8 is a cam shaft 9, provided with cams 10, one of which is shown, there being one of such cams for each inlet and exhaust valve. The body portions of the cylinders are, as shown, preferably cast en bloc, and the casting is suitably cored to provide a water jacket 11, portions of which surround the cylinders, and through which water circulates in the usual and well known way. It is to be understood that any suitable type of lubricating system may be employed for supplying lubricating oil to the working parts of the motor.

The upper open ends of the cylinders 1, 2, 3 and 4 are closed by a detachable head 12, which head is common to all of said cylinders. This head may be detachably secured in position in any suitable manner, as by means of bolts or screws 13. The head is provided in line with each cylinder with a preliminary combustion and exhaust chamber 14 communicating at its base with the top of the cylinder. The base of this chamber extends from side to side of the cylinder, in a longitudinal direction, that is, in the direction of length of the cylinder block or group of cylinders, and is therefore of a length coextensive with the diameter of the cylinder but of materially less width than the diameter of the cylinder in the transverse direction. The said base portion of the chamber 14 is therefore in the form of a comparatively long and narrow slot, but is modified, as hereinafter described, at points in line with the fuel admission and exhaust valves. Communicating with the chamber 14, at one side thereof, are the fuel admission and spent gas exhaust ports 15 and 16 having seats 17 and 18, respectively, against which close the inlet and exhaust valves 19 and 20. The port 15 communicates with a fuel inlet passage 21 and the port 16 communicates with an exhaust passage 22.

The valves 19 and 20 are of similar construction, and mounted for horizontal sliding movement in a direction transversely of the cylinder, each valve comprising a valve body proper having an outwardly extending stem 23 associated with a spring 24 under the action of which the valve is normally held closed.

The head 12 is provided at that side in which the passages 21 and 22 are formed with bosses or enlargements 25, giving increased area for the formation therein of a water jacket space 26 communicating with the cylinder jacket 11, said jacket 26 extending well around the major portion of the chamber 14 and the full depth thereof if desired. The portion of the water jacket 26 adjoining the passages 21 and 22 is separated therefrom by a partition wall 27, and the boss 25 is provided with an outer wall 28 spaced from the wall 27 to form a continuation therebetween of the water jacket. These walls 27 and 28 are provided with registering pairs of openings 29 receiving bushings 30 in which the valve stems 23 are slidably mounted and through which they project outwardly beyond the line of the cylinder wall, the arrangement being such as to provide for the proper mounting and support of the valve and the cooling of the bushings and valve stems. Also formed upon the head is an outwardly extending flange 31 projecting beyond the line of the bosses 25 across the top and at the ends of the head and cooperating with vertical flanges 32 formed upon the cylinder block to provide a compartment for the valve actuating arms or levers 33. A removable cover plate 34 is provided to close said chamber or compartment 32 and is detachably secured to the cooperating parts of the engine structure. Each valve actuating arm or lever 33 is centrally mounted for rocking movement, as at 35, and has a lower arm carrying a roller 36 for cooperation with the coacting cam 10 and an upper arm carrying a head or stud 37 engaging the outer end of the associated valve stem 23. With this construction it will be understood that at proper times the lever 33 is actuated by the cam to force the valve controlled thereby inwardly for opening movement, and then as the cam leaves the contact roller 36 the spring 24 will return the valve to closed position.

The chamber 14 is provided in its side opposite the ports 15 and 16 with openings 38 normally closed by suitable closure members, such as screw plugs 39. Through these openings 38 the valves are introduced for the purpose of fitting them in position, and through said openings, upon removal of the plugs 39, the valves may be removed for regrinding without disturbing the cylinder head and the valve seats may similarly be reground on removal of the valves without disturbing the cylinder head. As shown, the chamber 14 is transversely enlarged or widened in line with the openings 38 by providing the walls of said openings 38 with hemispherical recesses 40 to receive the valves 19 and 20, on their opening movement, thus allowing the valves to lie, when in open position, beyond the line of the inner surface of the wall of the chamber 14 in which said openings 38 are formed, giving maximum space for the inflow of the fuel mixture and its explosion and expansion into the alined motor cylinders. At the points where the valve ports and plug receiving openings are formed, it will also be seen that, in addition to the curvature of the valve receiving surfaces 40 on a hemispherical arc, this curvature is continued with respect to the formation of the top wall of the valve chamber and the portions of the bottom wall thereof leading to the underlying portion of the fuel intake and exhaust slot or passage at the base of said chamber. Each valve chamber, at such point, is nearly hemispherical form, being curved at top, bottom and at the side where the recesses 40 are formed on a spherical arc, and being straight and vertical only at the side where the port 15 is formed. This construction of substantially spherical chamber not only provides a properly shaped recess, such as at 40, in which the valve may be fully received beyond the line of the admission and exhaust slot when said valve is open, but also provides for the free and unimpeded flow of the fluid around the valve during the opening movement of the latter, thus preventing any material resistance to the flow of the fluid and any tendency to chattering movements of the valve. Furthermore such construction of nearly spherical chamber, in addition to allowing smoother and freer flow of the fluid, provides a chamber of maximum area in which expansion can take place and in such a manner as to be directed fully upon the head of the piston, thus preventing pressure losses and enabling greater power and flexibility to be obtained.

The head is provided with openings 41 communicating with the tops of the respective chambers 14, which openings receive the spark plugs, the fuel mixture thus being ignited at the tops of the chambers 14. As such fuel mixture is ignited in said chambers 14 prior to its admission to the engine cylinder, provision is made for securing expansion of the gas during the entire range of travel of the piston in the cylinder, with a consequent increase of power proportionate to the use of all the available expansive power of the fuel charge. It will be observed that the chambers 14 communicate with the tops of the cylinders, ad-

jacent to the center of the cylinder, but to one side thereof, as a result of which the expansive force of the fuel charge is at all times, from the outside, upon the top of the cylinder and slightly to one side thereof, so as to substantially counteract and to a very large extent prevent piston slap and troubles due thereto. By this means I combine with the advantages of a detachable cylinder head having horizontal valves the advantages resulting from the ignition of the charge in the cylinder head prior to its admission to the cylinder, the action of the charge directly upon the top of the piston and sufficiently to one side thereof to counteract piston slap, and the free and unimpeded admission of the fuel charge to the preliminary combustion chamber and thence to the cylinder and exhaust of the spent gases from the cylinder to the preliminary combustion chamber and their exhaust therefrom to the atmosphere. It will be observed that with all the foregoing advantages, I further combine the advantage of the use, in an engine of the type described, of a detachable head which is bodily removable from the cylinders to permit of the ready and most convenient removal of the carbon or making of repairs when needed.

The head 12 is provided with two intake necks 42 connecting the passages 21 with the intake manifold 43, and with three exhaust necks 44 connecting the passages 22 with the exhaust manifold 45. Each neck 42 supplies two adjoining cylinders, the inlet passages 21 of which communicate therewith, while the two outer exhaust necks 44 communicate with the chambers 14 of the respective end chambers of the series and the intermediate exhaust neck 44 communicates with the exhaust passages 22 of the chambers 14 of the two intermediate series, thus simplifying the arrangement of the inlet and exhaust connections with a reduction of the number of connections within good working limits. By the described arrangement the exhaust outlets are made of some considerable length, thus eliminating all back pressure, while, as shown, the intake passage associated with each chamber 14 arches over said chamber, which results in a full admittance of the fuel charge and allows the intake manifold to be filled with gas at all times ready for the immediate admission to the chambers 14. In addition to the advantage stated with reference to my improved construction of the detachable head and horizontal valve mountings, it will be observed that the horizontal arrangement of the valves allows of the use of valves of large area and of the lubrication of the valves in an effective manner for quick operation, giving all the advantages of an overhead cam shaft motor while eliminating the use of valve gear trains and the noises produced thereby.

Having thus fully described my invention, I claim:

1. In an internal combustion motor, the combination with upright cylinders, and pistons operating in said cylinders, of a detachable head common to said cylinders, said head having a combined combustion and exhaust chamber for each cylinder, said chamber comprising a narrow cavity having substantially parallel and vertical side walls, said cavity being of a length equal to the diameter of the cylinder and of a width less than the diameter of the cylinder and having a slot-like base portion communicating with the top of the cylinder between the center and one side thereof, one side wall of said chamber having horizontal inlet and exhaust passages communicating therewith and the other side wall of said chamber having openings arranged opposite said passages, said chamber being provided with hemispherical recesses intersecting said openings and having its top and bottom walls curved on arcs continuous with said recesses and providing a chamber of nearly spherical form broken in spherical outline contour by the vertical wall in which said inlet and exhaust passage is formed, horizontal inlet and exhaust valves controlling said passages and slidably mounted in the first-named side wall and insertable and removable through the openings in the second-named side wall, the latter-named wall being provided with recesses located within the plane of the openings to receive and allow the valves to lie when in fully open position within the plane of said wall, the said passages extending downwardly from the top of the head outwardly beyond the vertical plane of the first-named side wall and thence opening laterally therethrough into said chamber, detachable closures for said openings, means for operating said valves, and intake and exhaust manifolds superimposed upon the heads and having neck portions communicating with said passages.

2. In an internal combustion motor, the combination with upright cylinders, and pistons operating in said cylinders, of a detachable head common to said cylinders, said head having a combined combustion and exhaust chamber for each cylinder, said chamber comprising a narrow cavity having substantially parallel and vertical side walls, said cavity being of a length equal to the diameter of the cylinder and of a width less than the diameter of the cylinder and having a slot-like base portion communicating with the top of the cylinder between the center and one side thereof, one side wall of said chamber having horizontal inlet and exhaust passages communicating therewith

and the other side wall of said chamber having openings arranged opposite said passages, said chamber being provided with hemispherical recesses intersecting said openings and having its top and bottom walls curved on arcs continuous with said recesses and providing a chamber of nearly spherical form broken in spherical outline contour by the vertical wall in which said inlet and exhaust passage is formed, horizontal inlet and exhaust valves controlling said passages and slidably mounted in the first-named side wall and insertable and removable through the openings in the second-named side wall, the latter-named wall being provided with recesses located within the plane of the openings to receive and allow the valves to lie when in fully open position within the plane of said wall, the said passages extending downwardly from the top of the head outwardly beyond the vertical plane of the first-named side wall and thence opening laterally therethrough into said chamber, detachable closures for said openings, means for operating said valves, and intake and exhaust manifolds superimposed upon the heads and having neck portions communicating with said passages, the intake manifold necks arching transversely over the inlet passages.

In testimony whereof I affix my signature.

ROBERT KLOSSNER.