Sept. 29, 1931. R. W. HARROUN 1,824,992

INTERNAL COMBUSTION ENGINE

Filed Sept. 3, 1929

Fig. 1

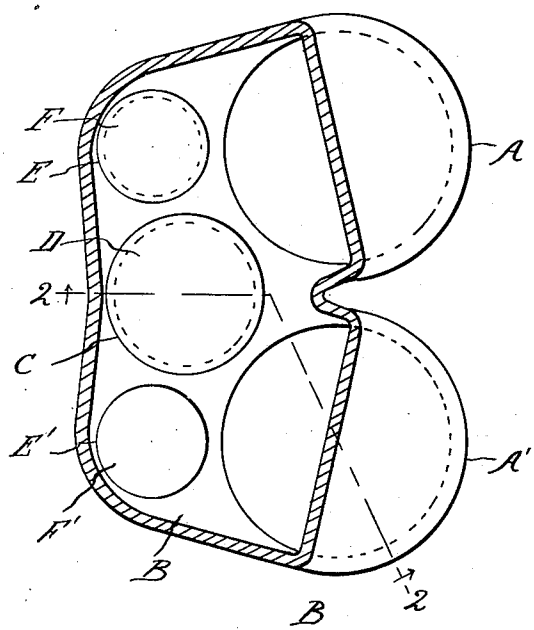


Fig. 2.

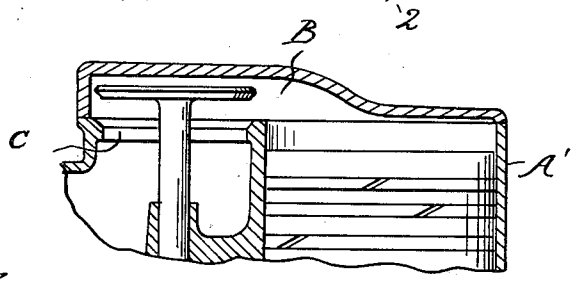
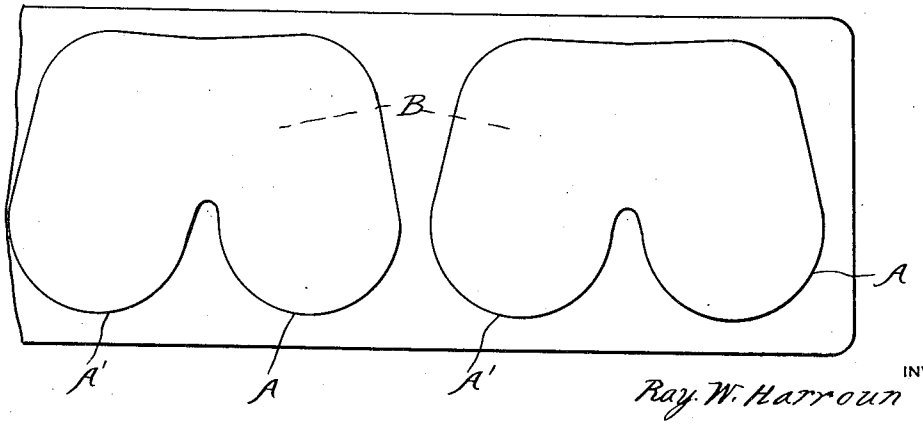


Fig. 3.



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INTERNAL COMBUSTION ENGINE

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The invention relates to internal combustion engines and more particularly to engines of a high compression type. It is the object of the invention to obtain a construction which facilitates the free introduction of the combustible mixture and exhausting of the products of combustion and which at the same time permits of high compression with the avoidance of detonation and other objectionable incidents to the use of high compression.

In the present state of the art with L-head internal combustion engines it is usual to arrange adjacent inlet and exhaust valves of substantially equal area in the L and at one side of the cylinder. In order to provide free passage for the gases the valve chamber must be made of sufficient depth not only to permit of proper valve lift but also to provide clearance over the valves for the flow of gases. Furthermore, as the gases enter and leave their respective ports on all sides of the circumference of the valve the portion of the gases on the outer side must make a quick bend to return over the valve in the direction of the cylinder. Thus with such constructions the free flow of the gases is impeded while the necessary clearance above the valves increases the volume of the compression chamber so as to reduce the height of the compression. Another difficulty encountered is the increased tendency to a detonation incident to higher compressions, particularly where the piston and exhaust valve are of relatively large diameter.

With my improved construction I have avoided the difficulties as above outlined, first by substituting for a single cylinder and its compression chamber a pair of cylinders of smaller diameters but of combined equal area and a single compression chamber communicating with both cylinders: second, by a construction and arrangement of valves such that the gases are free to pass between the cylinders and the valve ports without any sharp change in direction or the necessity of the intake gases passing over the top of the inlet valve; third, by the use of a single inlet valve for both cylinders, said valve being arranged centrally within the combustion chamber intermediate said cylinders; fourth, by the use of a pair of exhaust valves on opposite sides of the inlet valve and so located as to be bathed by the flow of inlet gases to the cylinder, thereby facilitating the dissipation of heat. This arrangement permits of considerably reducing the volume of the compression chamber while still providing the requisite clearance for valve lift. My invention therefore consists in this improved construction and further in various specific features as hereinafter set forth.

In the drawings:

Figure 1 is a horizontal section through the combustion chamber of an internal combustion engine of my improved construction;

Figure 2 is a vertical cross section on line 2—2 of Figure 1;

Figure 3 is a plan view of a multi-cylinder block embodying my improvement.

As illustrated, A and A′ are two adjacent engine cylinders which have a combined volume equal to that of the single cylinder for which they are substituted. B is a combustion chamber formed in an L-head on one side of the pair of cylinders A, A′. Within this combustion chamber are arranged a single inlet port C controlled by the poppet valve D and a pair of exhaust ports E, E′, controlled by poppet valves F and F′. The port C is arranged centrally between the cylinders A and A′ so as to overlap the same, thereby shifting its axis nearer to the plane of the axes of said cylinders. The exhaust ports E and E′ are arranged on opposite sides of the port C and preferably directly opposite their respective cylinders, but as these ports are of smaller diameter than the port C they require no further extension of the L-head. The port C which is of an area sufficient for the combined areas of the cylinders A A′ is so arranged that the gases passing from said port half way around its perimeter are free to flow in the general direction of one of the cylinders and without any sharp bend, while the gases passing out on the opposite side of the perimeter flow in the general direction of the other cylinder. This dispenses with the necessity for any clearance above the

port C greater than required for the lift of the valve. On the other hand the exhaust valves lie in the path of the flow of the intake gases and are more rapidly cooled thereby.

In operation the two cylinders A A′ act as a unit, both simultaneously receiving the combustible charge upon the lifting of the valve D and simultaneously exhausting the products of combustion upon the lifting of the valves F and F′. By reason of the more compact arrangement of the valve ports the area of the combustion chamber in horizontal cross section need be no greater than would be required with a single cylinder of equal volume and having one inlet and one exhaust valve and inlet and exhaust valves. Also due to the fact that only mechanical clearance is required above the valves and further due to the increased perimeter of the two exhaust valves, the depth of the explosion chamber may be reduced. This results either in higher compression without impedance to the flow of gases between the cylinders and ports or the same compression with larger port areas. A further advantage is that the cross sectional area of the connection between the cylinder and the combustion chamber is restricted which increases the turbulence in the combustible gases.

What I claim as my invention is:

1. An internal combustion engine comprising a pair of adjacent cylinders with parallel axes, a common combustion chamber having a restricted area connecting the same with said cylinders and provided with a single valve controlled inlet port arranged between and overlapping said cylinders and a pair of exhaust ports of smaller diameter arranged on opposite sides of said inlet port.

2. An internal combustion engine comprising a pair of cylinders, a common laterally off-set combustion chamber connected with said cylinders and provided with a single inlet port arranged centrally between and overlapping said cylinders, and a pair of exhaust ports laterally opposite the respective cylinders, the depth of said combustion chamber being restricted to provide merely mechanical clearance for movement of the valves, and poppet valves for said inlet and exhaust ports.

3. In an internal combustion engine of the L-head type, a pair of cylinders having parallel axes, a common combustion chamber for said cylinders provided with a single valve controlled inlet port, arranged between and overlapping said cylinders and a pair of exhaust ports of smaller diameter arranged on opposite sides of said inlet port.

4. In an internal combustion engine of the L-head type, a pair of closely arranged cylinders having parallel axes, a common laterally offset combustion chamber connected with said cylinders, provided with a single relatively large inlet port arranged centrally therein and overlapping said cylinders, a pair of exhaust ports of smaller diameter arranged laterally opposite the respective cylinders, and poppet valves for said inlet and exhaust ports.

5. In an internal combustion engine of the L-head type, a pair of closely arranged cylinders having parallel axes, a common laterally offset combustion chamber connected with said cylinders provided with a single relatively large inlet port arranged centrally therein and overlapping said cylinders.

In testimony whereof I affix my signature.

RAY W. HARROUN.