Jan. 3, 1928. 1,655,149

C. L. LEE

INTERNAL COMBUSTION ENGINE

Filed April 15, 1922 2 Sheets-Sheet 1

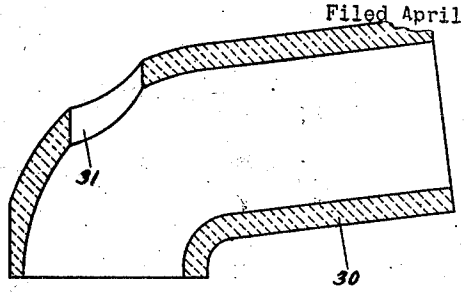


Fig. 3

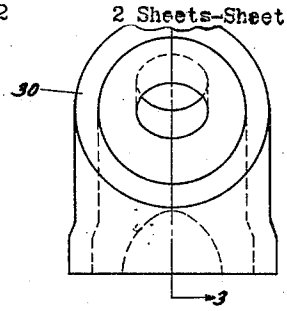


Fig. 2

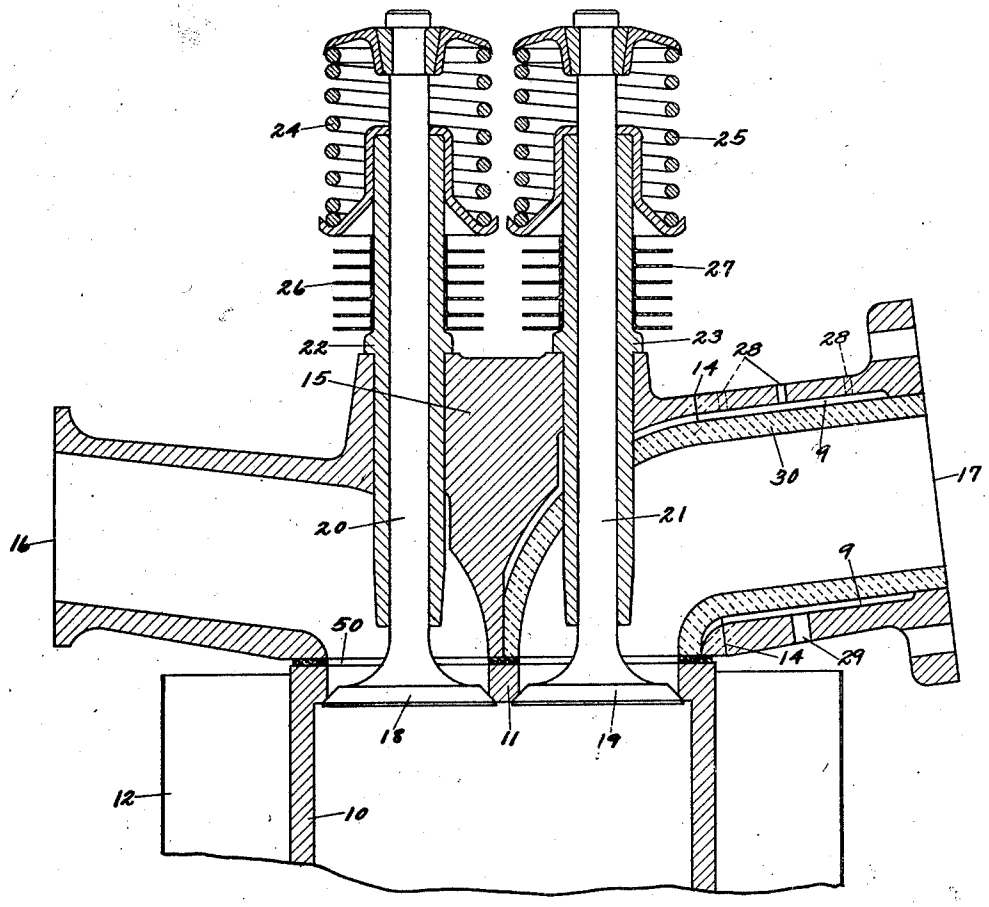


Fig. 1

Witnesses
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2 Sheets-Sheet 2

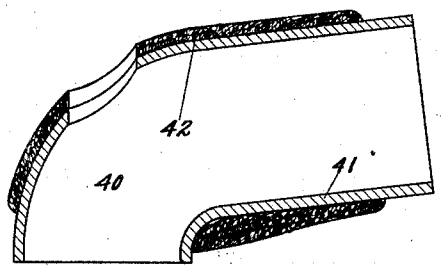


Fig. 5

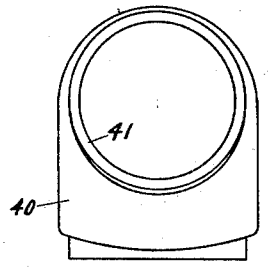


Fig. 6

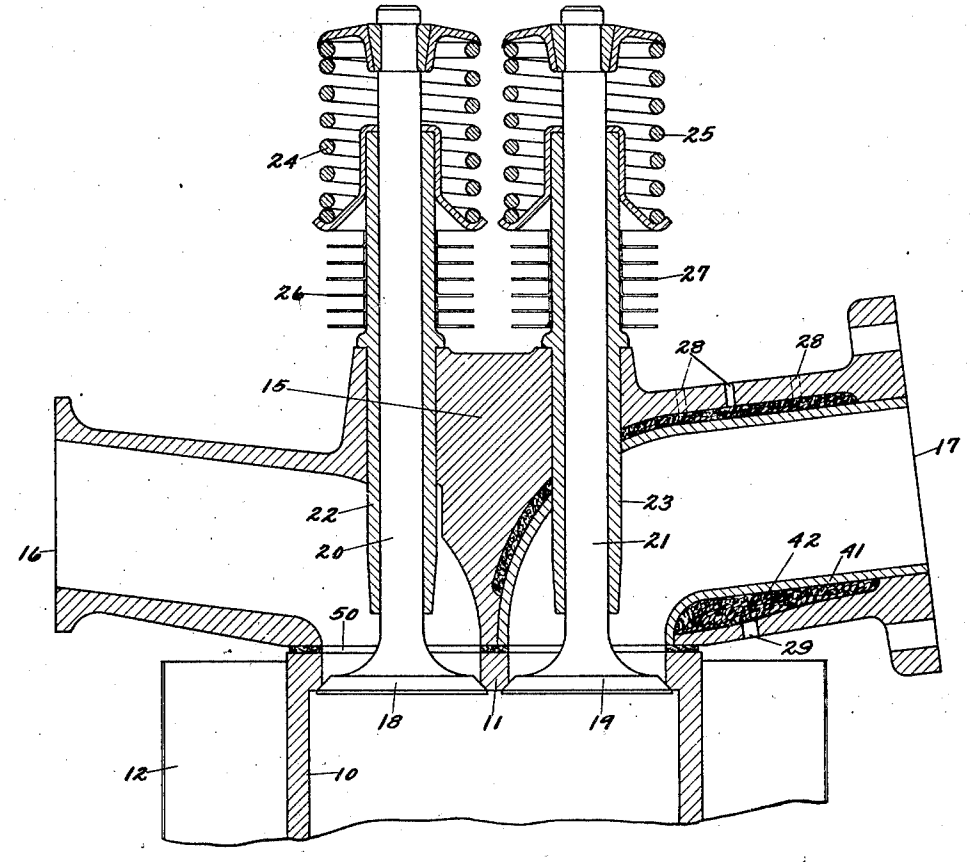


Fig. 4

Witnesses
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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

Application filed April 15, 1922. Serial No. 553,105.

This invention relates to internal combustion engines and has special reference to the cooling means therefor.

The cylinder walls and head of an internal combustion engine are heated both by the high temperature of the burning gases within the cylinder itself and by the exhaust gases which are still at a high temperature as they pass out through an exhaust passage which necessarily must be connected to the cylinder head or walls.

Among the objects of the invention is to relieve the cooling system of a part of its burden by causing a greater amount of heat to be carried out with the exhaust gases so that less will be absorbed by the parts adjacent the exhaust conduit and therefore less to pass to the cooling system.

Another object of this invention is to provide means for preventing portions of the engine immediately adjacent the exhaust passage from receiving an excessive amount of heat from the exhaust gases passing through the exhaust passage.

Another object is to provide an exhaust duct integral with the intake duct, the heat insulating means being at or near the inner surface of the walls of the exhaust duct.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred forms of embodiments of the present invention are clearly shown.

In the drawings:

Fig. 1 is a transverse section through a cylinder of an engine embodying the invention.

Fig. 2 is a detail view of the heat insulation lining shown in Fig. 1 as inserted in the exhaust passage.

Fig. 3 is a section on line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 1 but illustrating a modified form of the invention.

Fig. 5 is a section through the modified heat insulation element.

Fig. 6 is an end view of Fig. 5.

In the drawings, similar reference characters refer to similar parts throughout the several views.

Numeral 10 designates the cylinder having the head 11 and the cooling fins 12 attached thereto. A casting 15, which has integral therewith the intake duct 16 and the exhaust duct 17 is attached to the cylinder head 11 by any suitable means. The intake valve 18 and the exhaust valve 19 have their valve stems 20 and 21 respectively extending upwardly through the casting 15 through the bushings 22 and 23. The valve springs 24 and 25 are mounted upon the upper ends of the bushings 22 and 23 as clearly illustrated. Air cooling fins 26 and 27 may be provided, if desired, to prevent the valve springs becoming too hot from heat conducted by the valve stems and bushings.

A heat insulation element 30, which may be composed of lava, porcelain, mica or asbestos composition, or any suitable heat insulating material, is inserted in the exhaust duct 17 as a lining. In the embodiment shown the element 30 is preferably made in one piece and the exhaust duct 17 is cut in two at 14 to permit the insertion of element 30 after which the parts of duct 17 are reunited by any suitable means, such as welding. If desired the element 30 may be made in parts so it may be inserted without cutting off the elbow 17. Instead of cutting the exhaust duct 17 in two transversely as shown at 14, it may be cut in two down its center line by a plane perpendicular to the paper in Fig. 1 in order to permit the insertion of the element 30 and the bottom half of duct 17 again reunited by welding or by other suitable means. Of course this bottom half of duct 17 can also be originally made separate from the rest of casting 15 and be later suitably fastened thereto after the insertion of the heat insulating element, such as by registering lugs on the top and bottom halves and bolts or screws extending through the lugs to hold the halves together. The valve stem bushing 23 is of course inserted through the hole 31 Fig. 3 in the insulating element 30 after it has been inserted in the exhaust passage 17 and aids in holding it in place.

The annular space 9 between the insulating element 30 and the pipe 17 forms an air gap and thus aids in the heat insulation. Preferably this space 9 is provided with a plurality of small air holes 28 and 29 to permit a certain amount of air circulation through space 9.

In the modification shown in Fig. 4 the

heat insulating element represented in its entirety by numeral 40 is cast in the casting 15. There is first formed a tube or pipe 41, having the desired shape of the exhaust duct 17, of pressed steel or michrome or other suitable metal. Around this tube 41 is wrapped asbestos 42 to within a short distance of the ends, this asbestos being held in place by wire or other suitable means. The insulating element 40 thus formed is then used as a core which is inserted in a suitable mould into which metal is poured for forming the casting 15. The metal of casting 15 welds to the tube 41 at the ends which are not covered with asbestos and thus the element 40, is firmly fixed in casting 15. In this modification also the pipe 17 may be provided with small circulating or breather holes 28 and 29 at the top, or bottom, or both as illustrated.

In both forms of embodiment above described an additional heat insulating element or plate 50 may be inserted between the top of the cylinder head 11 and the casting 15. This plate 50 may be formed of asbestos or any other well known heat insulating material, its function being to prevent the high temperature of the cylinder head from reaching the casting 15 and from thence being conducted to the valve stems, bushings and springs. It is obvious that the exhaust gases within passages 17 are also heat insulated from the casting 15 and hence the entire casting 15 will remain relatively cool compared to the cylinder head 11. The valve stems 20, 21 and bushings 22, 23 since they remain comparatively cool will aid in cooling the valves 18 and 19.

While the forms of mechanisms herein shown and described, constitute preferred forms of embodiments of the present invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What I claim is as follows:

1. In combination in an internal combustion engine having a cylinder and an exhaust valve, and with a passage leading from said cylinder and controlled by said valve; a tubular member arranged within said passage and extending along the same from said exhaust valve; and a heat insulating member surrounding said tubular member and adapted to restrain the flow of heat from exhaust gases flowing along said tubular member to the surrounding wall of said exhaust passage.

2. In combination in an internal combustion engine having a cylinder, a head therefor, intake and exhaust passages in said head and intake and exhaust valves carried by said head and adapted to control the flow of combustible mixture and of exhaust gases through said passages, and with the exhaust passage aforesaid; a tubular member arranged within said exhaust passage and extending along the same from said exhaust valve; and a heat insulating member interposed between said tubular member and the inner surface of said exhaust passage.

3. In combination in an internal combustion engine having a cylinder, a head therefor, an exhaust passage in said head, and an exhaust valve controlling the flow of burned gases through said passage; a continuous tubular member arranged within said passage and extending along the same from said exhaust valve, and which member is spaced apart from the wall of said exhaust passage so as to provide an annular chamber surrounding said tubular member.

In testimony whereof I hereto affix my signature.

CHARLES L. LEE.