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A. J. WEST

ENGINE CYLINDER

Filed Jan. 29, 1925

Fig. 1.

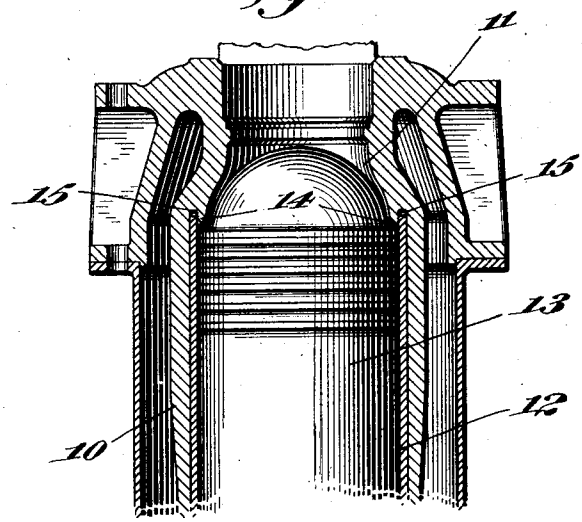
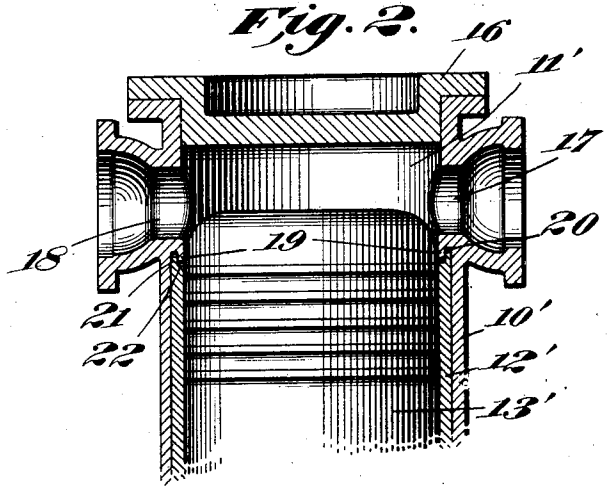


Fig. 2.



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ENGINE CYLINDER.

Application filed January 29, 1925. Serial No. 5,468.

My invention relates to internal combustion engine cylinders, particularly to that type employing cast iron liners, and it has for its object to positively anchor the heated or combustion end of a liner in place to prevent inward contraction thereof in service.

I have found, in practice, that where a cast iron liner enters the highly heated region of an engine that the heat seems to work some kind of molecular effect in the metal resulting in inward contraction of the liner with consequent binding effect with respect to the piston and an area which is a poor conductor of heat to the cooling space. This effect may take months to make itself noticeable, and the rapidity of its development seems to be a function of the maximum engine temperature. Liners have been bored out on this account to fit pistons after being in service for some time. The bad conductive condition for heat is conducive to rapid deterioration of the liner. These effects and difficulties are even more pronounced with Diesel or oil engines, where the temperatures run much higher than with ordinary gas engines, resulting in rapid deteroriation and necessary replacement of liners and in poor engine operation. To the end of overcoming this physical effect of radial contraction of the combustion end of the liner away from the cylinder, I construct the latter with a part or portion which engages within a part or portion of the liner, thereby preventing contraction of the heated end of the liner away from the cylinder.

Apparatus made in accordance with my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a fragmentary sectional view of one type of engine cylinder incorporating my improvement; and Fig. 2 is a sectional view of another type of engine cylinder having my improvement applied thereto.

Referring now to the drawings for a better understanding of my invention in Fig. 1, I show an engine cylinder 10, which may be made of material resistant to tensile stresses, such as steel, having a combustion end portion 11. A liner 12 is arranged within the cylinder and one end thereof extends to the most highly heated region of the cylinder construction and a piston 13 fits the liner. The liner 12 is made of material having the quality of resisting wear, such as cast iron.

In order the prevent inward contraction of the most highly heated end portion of the liner, due to the heat-curing effect just referred to, such portion is positively held in place by structure of the cylinder. By way of example, I show a cylinder arranged to receive the liner so that, when the liner is in place, a portion 14 of the combustion end of the cylinder will extend within the upper end of the liner. In other words, the annular lip 14 forms, with the cylinder 10, a circumferential axially extending groove 15 to receive the upper end of the liner. As shown, in assembling, the liner does not extend to the bottom of the groove 15, whereby clearance space is left to permit of relative expansion and contraction of the cylinder 10 and of the liner 12 without any binding due thereto ever taking place.

The lip or shoulder 14 positively prevents any inward contraction of the combustion end of the liner, thereby assuring the maintenance of good heat conductive relation between the liner and the cylinder and the prevention of deterioration of the liner due to overheating incident to inward contraction which would otherwise take place.

In Fig. 2, I show how my invention may be applied to a type of engine wherein the piston is removable through the end, for example, the horizontal type of internal combustion engine. In this view, I show a cylinder 10′ having a liner 12′ and a piston 13′ disposed therein. The combustion end 11′ has the same diameter as the diameter of the liner 12′ so that the piston 13′ may be removed by removal of the head 16. The cylinder is provided with openings 17 and 18 to receive inlet and exhaust valves, which structure is old and well-known in the art.

Owing to the necessity of preserving the same internal diameter for the combustion end 11′ and for the liner 12′, the mode of connecting the liner 12′ to the cylinder 10′ to prevent inward contraction must be varied. For example, I show a rabbeted connection defined by a cylindrical flange 19 which defines with the bore of the cylinder for the liner 12′ an annular groove 20 to receive the annular flange 21 of the liner, the flange 19 fitting in a counterbored por-

tion 22 which defines the flange 21. Clearance is provided in the rabbeted connection to prevent binding as heretofore referred to.

While I am aware that it is old to provide internal combustion engine cylinders with removal liners and while it is old in some cases to have the combustion ends of such liners engaged internally by axially-extending portions of head members, yet it seems to be new to provide a cylinder with an integral internal annular and axially-extending flange to overlap a liner to prevent radial contraction thereof in the manner already referred to. My invention is, therefore, characterized by the presence of a liner, which is engaged by a flange of this character located inwardly of the head-receiving portion of the cylinder.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

In an internal combustion engine, the combination of a cylinder, a liner within said cylinder, and a member extending inwardly from the wall of said cylinder and having a lipped portion adapted to engage an end of said liner to prevent, in service, radial contraction of the liner away from the cylinder, said member being spaced sufficiently from the contiguous end of said liner to normally provide a clearance space, whereby the liner is permitted to expand longitudinally with respect to said cylinder under service conditions.

In testimony whereof I hereunto affix my signature this 23rd day of January, 1925.

ARTHUR J. WEST.