Cylinder for Internal Combustion Engines

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This invention has for its object a particular construction of the liners of internal combustion engines, the nature and purposes of which will be described in the following specification.

It is well known that by the name of liner that part of the cylinder of internal combustion engines is designated, in which the piston slides and which is subjected in its interior to the action of the hot combustion gases and is externally cooled by water. Said liner is subjected:

To mechanical stresses due to the high pressure existing in the interior of the cylinder;

To the stresses induced by the differences in temperature existing between the inner wall and the outer surface;

To the wear produced by the friction of the elastic piston rings against the inner wall and deteriorating action of the gases under high pressure and temperature.

It is therefore clear that to obtain good results the liner must be composed of a material having a high mechanical resistance and particularly apt to stand wear and tear and the gas corrosive action.

At the present state of the art such a material cannot be obtained, the tough metals and alloys possessing an insufficient hardness and resistance to wear while a great hardness is accompanied by a low mechanical strength and dangerous brittleness.

This invention solves the problem by constructing the liner of three distinct elements of different material forming a unit perfectly apt to withstand the above mentioned stresses and which is at the same time of easy and cheap construction.

The annexed drawing shows diagrammatically and by way of example a cylinder liner for an internal combustion engine embodying this invention.

The liner upper part, which is subjected to the highest pressure and temperatures, is constituted by two concentric elements, that is an outer element 1 of very tough material (for instance steel) and an element 2 of very hard and wear-proof material (for instance cast iron of special composition) coating internally the first element. The element 2 fits closely into the element 1; when the engine is working—the temperature of the element 2 being much higher than that of the element 1—the element 2 will be strongly held in this latter and therefore pressed on its whole length; therefore the tension stresses induced in the element outer fibres by the gas pressure and differences in temperature are wholly or for their greatest part taken up by said compression; it will therefore be possible to use for the element 2 a material having a very low mechanical tensile strength, while the element 1 may be constructed of a material having a low wear resistance.

Moreover the element 2 covers the element 1 only on the portion on which the elastic piston rings slide leaving the portion 1′ belonging to the combustion chamber exposed, thus facilitating the cooling of said portion where the highest temperatures occur and avoiding subjecting the material of the element 2 to said temperatures.

The lower part 3 of the liner coming into contact with gases having low temperatures and pressure is made of ordinary material (for instance ordinary cast iron) having a considerable hardness although of comparatively low mechanical strength.

The upper and lower parts constituted by the elements 1 and 2 respectively and part 3 are assembled by means of flanges 4 and bolts 5 or other suitable means, so that a whole is obtained which is perfectly similar to an ordinary liner made of a single piece.

The annexed drawing shows a cylinder liner of a two-stroke single acting engine; it is however evident that the invention may be used in connection with four-stroke engines and double acting two-stroke or four-stroke engines.

What I claim is—

A cylinder for internal combustion engines, comprising a lower portion made of a metal of low mechanical strength such as ordinary cast iron, a central portion, made of a hard wear-resisting material of low tensile strength, extending through the zone traversed by the resilient rings of a piston operable in the cylinder, and an upper portion...
made of steel embracing the central portion throughout its length thereby constituting a reinforcement for said central portion, said upper portion extending above the latter forming the combustion chamber of the cylinder and constituting a cooling medium for said central portion.

In testimony that I claim the foregoing as my invention, I have signed my name.

VITTORIO VALLETTA.