

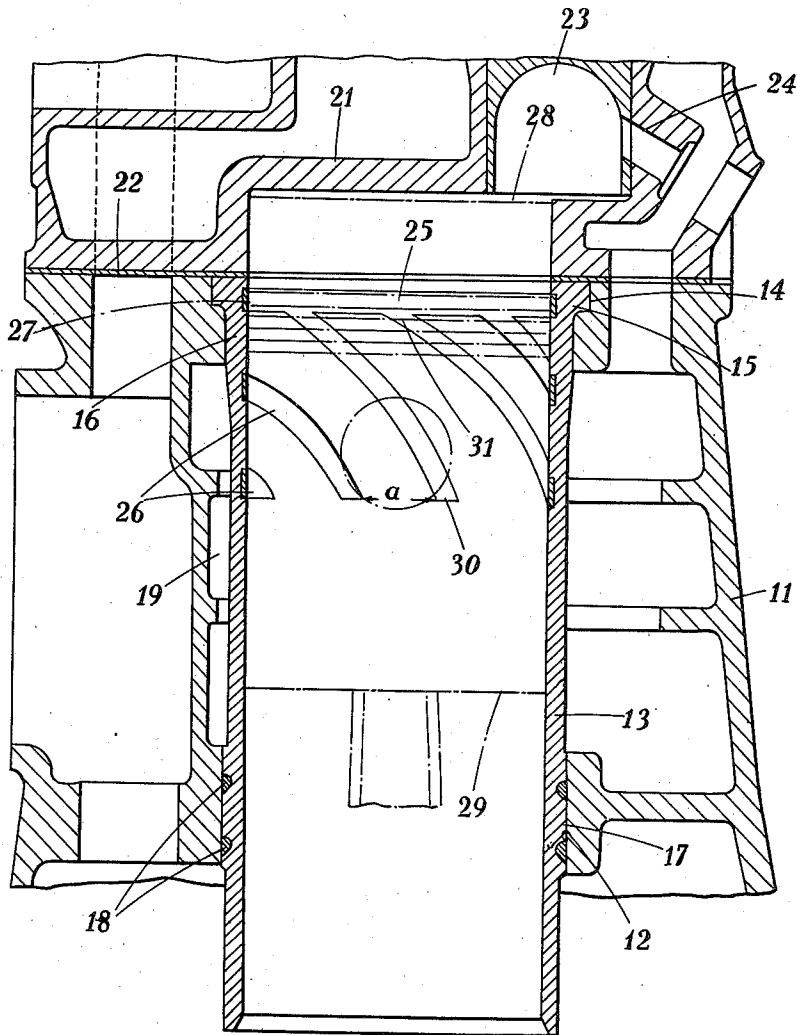
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CYLINDER LINER FOR INTERNAL COMBUSTION ENGINES

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CYLINDER LINER FOR INTERNAL-COMBUSTION ENGINES

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5 Claims. (Cl. 309—3)

This invention relates to cylinder-liners for internal-combustion engines, the main object being to provide an improved method of resisting wear of a cylinder-liner.

5 Broadly speaking, the invention consists in a cylinder-liner having in its bore an insert of a metal possessing hard-wearing characteristics.

The invention further consists in a cylinder-liner having hard-wearing inserts spaced angularly round its bore.

According to a further feature of the invention, a cylinder-liner has in its bore, only near the axially-outer end thereof, at least one insert of hard-wearing metal.

15 A cylinder-liner, according to a further feature of the invention, has in its bore angularly-spaced helical inserts of hard-wearing metal.

The invention further consists in a cylinder-liner having in its bore angularly-spaced hard-wearing metal inserts arranged so that they overlap one another (when viewing the liner along its axis).

According to a still further feature of the invention, a cylinder-liner has in its bore, near the axially-outer end thereof, a circumferential hard-wearing metal insert, and also angularly-spaced inserts (which are preferably helically arranged and may be integral with the circumferential insert) extending axially inwardly of the bore from the circumferential insert.

In one method of fitting the insert or inserts, the liner is formed with the necessary shallow groove or grooves in its bore, the insert or inserts being then welded in position. An insert of a material known under the name "Stellite" is eminently satisfactory in this case.

In an alternative method the inserts are electrically deposited in grooves in the bore, a hard-wearing material such as chromium being used in this case.

The single figure of the accompanying drawing is a part-sectional elevation of one form of liner, according to the invention, fitted in the cylinder block of a fuel-injection compression-ignition engine, the piston being indicated by chain lines.

The cylinder block 11 has a main bore 12 formed in it to receive the liner 13, the main bore being counter-bored at 14 to receive a flange 15 of the liner. The metal of the latter is of slightly enlarged thickness near its axially-outer end 16 and near its inner end 17 where it is recessed circumferentially, as shown, to receive a packing 18 making a fluid-tight joint with the metal of the cylinder-block. 19 represents the

cooling-liquid space round the liner. The latter is secured in position by the cylinder-head 21 engaging the outer radial face of the liner through a gasket 22 when clamped in position in a known manner against the cylinder-block. 23 represents the combustion chamber, and 24 an opening for the fuel-injector plug.

The inner periphery of the outer end of the liner is shown grooved to receive a circumferential hard-wearing insert 25 and a plurality of spaced, helically-arranged, axially-extending, hard-wearing inserts 26. As the major portion of the wear of the liner occurs at the outer end thereof where the top piston-ring 27 comes to rest, the inserts serve for reducing this wear. (28 indicates the axially-outer end of the piston and 29 the axially-inner end, the piston being shown with three piston-rings altogether.) When a number of angularly-spaced inserts 26 are used they support the piston-rings at a number of different points around the circumference of each of the piston-rings. The distance the inserts are from one another (i. e., the distance a) should be determined according to the stiffness of a piston-ring considered as a beam section, in order not to cause undue wear of the softer material of the liner between the inserts.

By arranging for the inserts to be of helical form, instead of longitudinal, so that the axially-inner edge 30 of one overlaps in an axial view the axially-outer edge 31 of the next, grooves will not be worn in the piston-rings.

That feature of the invention above described, where use is made of a circumferential insert 25 in combination with angularly-spaced inserts 26, is particularly adapted for those liners which are to be subjected to very heavy duty, the circumferential insert then being arranged at the place where the outer piston-ring comes to rest.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. A liner, for an internal-combustion engine cylinder, having secured in its bore, near the axially-outer end thereof, a circumferential hard-wearing metal insert, and having also angularly-spaced inserts secured in the bore and extending axially inwardly of the bore from said circumferential insert.

2. A liner, according to claim 1, characterized in that said angularly-spaced inserts are integrally joined to said circumferential insert.

3. A liner, for an internal-combustion engine cylinder, having a circumferential hard-wearing metal insert secured in its bore near the axially-

outer end thereof, and having also angularly-spaced helical inserts secured in the bore and extending axially inwardly of the bore from said circumferential insert.

- 5 4. In combination, a cylinder liner, a piston reciprocable therein, a plurality of piston-rings carried in grooves near the upper end of said piston, and a circumferential hard-wearing insert secured in the bore of the liner near the
10 upper end thereof, said insert having an axial length only just greater than the axial length of the upper of said piston-rings and being posi-

tioned so that the whole of the outer surface of the upper of said piston-rings will contact with it when said piston is at top dead centre.

- 5 5. In combination with a cylinder block, a liner having a radially-extending flange at its axially-outer end, said flange received in a recess of the cylinder block, and a narrow circumferential hard-wearing insert secured in the axially-outer end of the liner, said insert being in approximate alignment with said flange.
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