

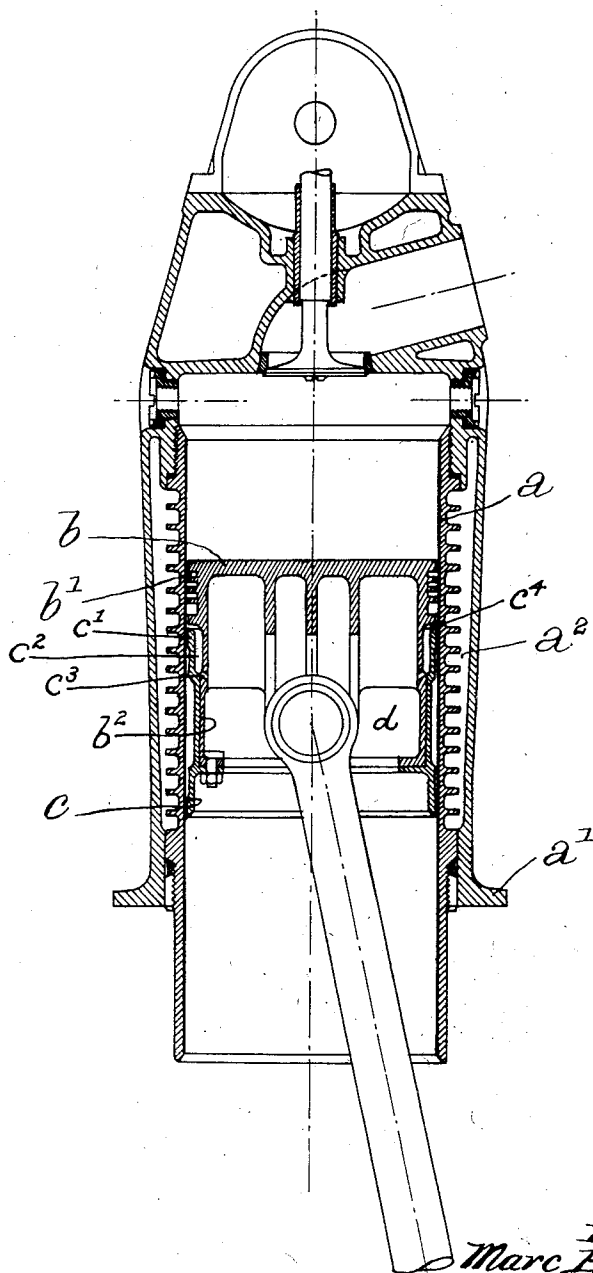
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PISTON AND CYLINDER ASSEMBLY

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PISTON AND CYLINDER ASSEMBLY

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6 Claims. (Cl. 309-3)

The present invention relates to piston and cylinder assemblies and more particularly to those adapted for use in internal combustion engines.

One of the objects of the invention is to provide an assembly capable of withstanding long use without appreciable wear of the surfaces in frictional contact.

Further objects will appear in the course of the detailed description which will now be given with reference to the single figure of the accompanying drawing which shows a section through a cylinder and piston assembly constructed in accordance with the invention.

α is a cylindrical shell formed with proper reinforcing ribs and mounted inside a shell α' . Shells α and α' define a chamber α^2 capable of receiving a cooling fluid. Cylinder α is, preferably made of steel or similar nitridable material and has an internal surface which has been superficially hardened by treatment with a nitrogen-liberating material. The piston sliding in contact with cylinder α is, preferably, made in two parts; i. e., an upper non-frictional part b of aluminium, duralumin or similar light metal having annular piston ring recesses b^1 (the piston rings themselves are not shown) formed therein, and a skirt portion c , preferably of steel which has been surface hardened in the same or in a similar manner to cylinder α . It will be noted that skirt c has an external diameter corresponding to that of the cylinder only at each extremity and that the intermediate portions are of lesser diameter, so as to diminish the wear to a minimum.

As illustrated in the figure of the drawing, the head b has a reduced portion b^2 which fits snugly and telescopically within the skirt c . The upper part of the skirt c is flared somewhat, as at c^1 , thereby forming with b^2 an annular chamber c^2 opening outwardly through an annular aperture c^4 . Apertures c^3 provide communication between the annular chamber c^2 and the interior d of the piston.

In proceeding to construct the assembly above described, it is well to start with steel forgings or the like corresponding in form to the cylinder and the piston skirt and to machine each of the latter to a proper fit. The cylinder and the skirt may then be surface-hardened and then re-finished to final working dimensions. Aluminium head b may be telescopically fitted into the skirt in the manner shown in the drawing or may be rigidly attached thereto in any other manner desired.

In operation it is found that the combination of two surface-hardened frictional surfaces reduces the frictional loss, permits high speed operation, reduces lubrication and wear, and, since metals of equal coefficient of expansion are used, minimizes piston "slap".

The present invention, in certain of its broader phases, as above indicated, includes in a piston and cylinder assembly the combination of two mutually contacting friction surfaces of which either one or both have a thin, hard, wear-resisting case or skin backed by softer metal, which skin is formed of ferrous metal that has been treated upon the wearing surface to incorporate with the metal thereof to an appreciable and effective depth nitrogen in the form of nitrides according to known nitriding processes, and particularly according to the process described in U. S. Patent No. 1,487,554.

What I claim is:—

1. In an internal combustion engine, a cylinder having a hardened wearing surface portion containing nitrogen in the nitride form.
2. In an internal combustion engine, a cylinder and a piston, having surface-hardened, mutually contacting friction surfaces containing nitrogen in nitride form.
3. In an internal combustion engine, a cylinder having a surface-hardened, wear-resisting ferrous metal surface such as may be produced by heating such surface in the presence of nascent nitrogen at about the peritectoidal transformation temperature of said metal.
4. An element of a piston and cylinder assembly for an internal combustion engine having a surface-hardened, wearing surface containing nitrogen in nitride form.
5. An element of a piston and cylinder assembly for an internal combustion engine having a surface-hardened, wear-resisting ferrous metal surface such as may be produced by heating such surface in the presence of nascent nitrogen at about the peritectoidal transformation temperature of said metal.
6. A piston and cylinder assembly for an internal combustion engine having surface-hardened, mutually contacting, wear-resisting ferrous metal surfaces such as may be produced by heating such surfaces in the presence of nascent nitrogen at about the peritectoidal transformation temperature of said metal.

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