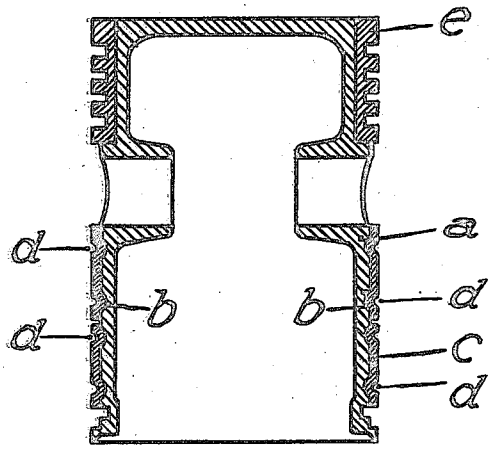
Aug. 14, 1923. 1,464,612

F. L. MÄDLER

ENGINE PISTON AND METHOD OF MAKING THE SAME

Filed April 6, 1921



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UNITED STATES PATENT OFFICE.

FRANZ LOUIS MÄDLER, OF CHARLOTTENBURG, GERMANY.

ENGINE PISTON AND METHOD OF MAKING THE SAME.

Application filed April 6, 1921. Serial No. 459,194.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, FRANZ L. MÄDLER, a citizen of the German Empire, residing at Charlottenburg, Germany, have invented certain new and useful Improvements in Engine Pistons and Method of Making the Same (for which I have filed application in Germany, February 13, 1919, Patent No. 358,074, dated June 6, 1922), of which the following is a specification.

My invention refers to engine pistons and more especially to a method of manufacturing light metal pistons reinforced with hard metals, for use in internal combustion engines. Up till now such pistons have been made by inserting reinforcing rings in the moulds in which the aluminum piston is cast. In cooling down from the casting temperature to the temperature under working conditions the above rings contract in such a manner that intervening spaces are produced between the rings and the body of the piston, disturbances in the transmission of heat from the rings to the body of the piston being the consequence, whereby the advantages gained by employing a light metal with a good coefficient of heat, are partly neutralized.

According to the present invention, the piston and the reinforcing rings or shell are joined together at a temperature almost corresponding to the working temperature, and this in such a manner that the semi-finished body of the piston is rigidly connected, either entirely or partly, with a shell of hard metal, whereafter it is subjected to the finishing work. Preferably the annular shell of hard metal is further fixed on the piston body by rolling in annular grooves.

In the drawings affixed to this specification and forming part thereof a piston according to the present invention is shown by way of example in cross-section.

Referring to the drawings, the body *a* of the piston is made of aluminum or some other light metal or alloy with the usual transverse wrist-pin apertures and its exterior surface is provided with grooves *b*. The shell *e* of steel or bronze provided with grooves for the insertion of the piston rings, is fixed at one end of the aluminum body by pressing. The other or free portion of the body *a* serving to guide the piston, is fitted with the closely fitting shell *c* as already described, by first heating the body *a* and sleeves *c* to about 220° C. and then slipping the heated sleeve *c* on to the body *a* until the forward end of the sleeve *c* is approximately in tangential registry with the wrist-pin aperture. It is preferred that more than one of the sleeves *c* be employed and that such sleeves be spaced apart from each other as shown in the drawing, whereby buckling is prevented due to the fact that the dimensions of each individual sleeve are kept within limits where buckling cannot occur. The metal of which the sleeves *c* is composed must, of course, be appropriate to the metal of the cylinder in which the piston is intended to reciprocate and for cast iron cylinders, for example, the sleeves will be of steel or similar hard metal.

After the sleeves *c* have been fastened to the body *a* as described, annular grooves *d* are rolled into the sleeves at the points of the body *a* corresponding to the grooves *b* thereon, said grooves *d* being, as illustrated, of shape and dimensions such as to serve as lubricant containers. In this manner the body of the piston is enclosed on all sides in a shell of metal which is firmly secured against shifting and which speedily conducts the heat generated by the gases of combustion. The annular grooves *d* serve to carry along and collect the lubricant and the space between adjacent sleeves *c* may readily be dimensioned, as shown in the drawing, so that it may serve a similar purpose.

It will be understood that the shells or sleeves *e* may be initially formed in any suitable or preferred manner and that the scope of the claims generally, is intended to embrace equivalents.

I claim:

1. The method of making pistons which consists in placing on a semi-finished light metal piston body a closely fitting metal sleeve, both heated at the time of their assembly to a temperature approaching the working temperature of the piston and then finishing the combined piston and sleeve by interposing between the said two elements means to prevent axial movement of one with respect to the other.

2. The method of making pistons which consists in providing grooves upon the exterior surface of a semi-finished light metal

piston body, then placing upon said body a closely fitting metal sleeve, both heated at the time of their assembly to a temperature approaching the working temperature of the piston and then, by rolling, forming annular grooves upon the sleeve at those parts thereof corresponding to the grooves in the piston body.

3. The method of making pistons which consist in providing grooves upon the exterior surface of a semi-finished light metal piston body, then placing upon said body a closely fitting metal sleeve, both heated at the time of their assembly to a temperature approaching the working temperature of the piston and then, by rolling, forming annular grooves of lubricant carrying capacity and dimensions upon the sleeve at those parts thereof corresponding to the grooves in the piston body.

4. The method of making pistons which consists in placing on a semi-finished light metal piston body, a plurality of closely fitting metal sleeves, the edges of adjacent sleeves being close together but out of contact with each other, heating the piston and sleeves at the time of their assembly to a temperature approaching the working temperature of the piston and then interposing between the piston body and each of these sleeves means to prevent axial movement of one with respect to the other.

5. The method of making pistons which consists in providing grooves upon the exterior surface of a semi-finished light metal piston body, then placing upon said body a plurality of closely fitting metal sleeves, the edges of adjacent sleeves being close together but out of contact with each other, heating the piston and sleeves at the time of their assembly to a temperature approaching the working temperature of the piston and then by rolling, forming annular grooves upon each of the sleeves at those parts thereof corresponding to the grooves in the piston body.

6. The method of making pistons which consists in placing on a semi-finished light metal piston body, means to carry piston rings and then covering practically the entire remaining surface of the piston body from the other end thereof up to the immediate vicinity of the recessed pin apertures of said body with a closely fitting casing of metal, heating the metal constituting the casing and the piston body at the time of their assembly to a temperature approaching the working temperature of the piston and then finishing the combined piston and casing by interposing between the said two elements means to prevent axial movement of one with respect to the other.

7. A piston comprising a light metal body, wrist-pin apertures, means at one end of the body adapted to accommodate piston rings, grooves extending circumferentially around the other end of said body and means at said end of said body adapted to slide smoothly over the inner walls of a piston cylinder, said means comprising an annular metallic member whose entire inner surface is in close and intimate contact at all points with the corresponding outer surface of the piston body, one edge of said member being closely adjacent to the wrist-pin apertures of the piston body and grooves circumferentially located upon said member at the points corresponding to the grooves in the piston body and of lubricant-carrying capacity and dimensions, the metal displaced by the formation of said grooves being driven into the grooves on the piston and serving to firmly hold the sleeve and the piston against relative axial displacement.

8. A piston comprising a light metal body, wrist-pin apertures, means at one end of the body adapted to accommodate piston rings, grooves extending circumferentially around the other end of said body and means at said end of said body adapted to slide smoothly over the inner walls of a piston cylinder, said means comprising a plurality of annular metallic members whose entire inner surface is in close and intimate contact at all points with the corresponding outer surface of the piston body, the edges of adjacent members being close together but out of contact with each other and grooves circumferentially located upon the surface of each of said members at the points corresponding to the grooves in the piston body and of lubricant-carrying capacity and dimensions, the metal displaced by the formation of said grooves being driven into the grooves on the piston and serving to firmly hold the sleeve and the piston against relative axial displacement.

In testimony whereof I affix my signature.

FRANZ LOUIS MÄDLER.