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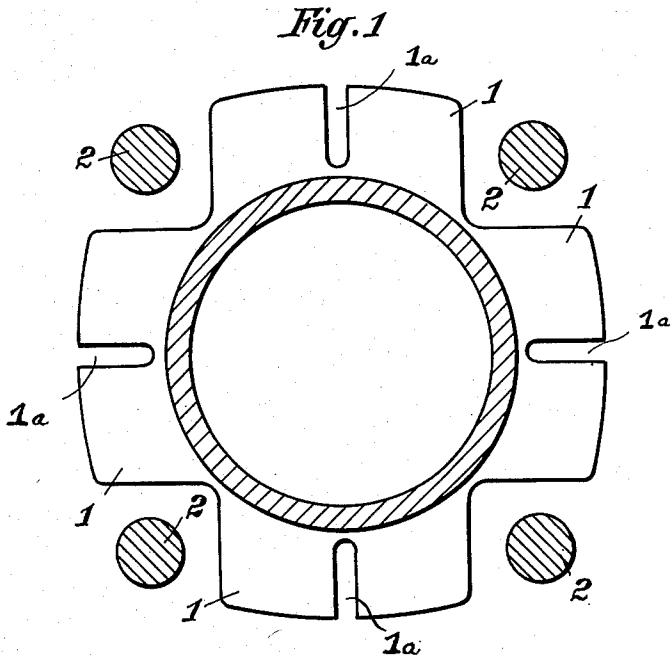
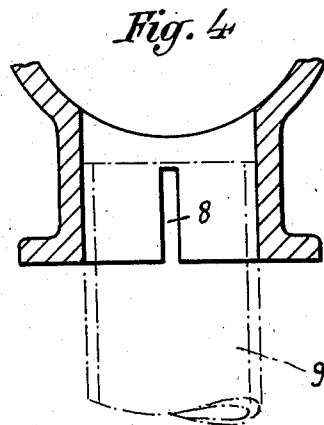
R. KLOSS ET AL

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WORKING CYLINDER FOR AIR-COOLED COMBUSTION ENGINES

Filed April 2, 1951

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

Fig. 2

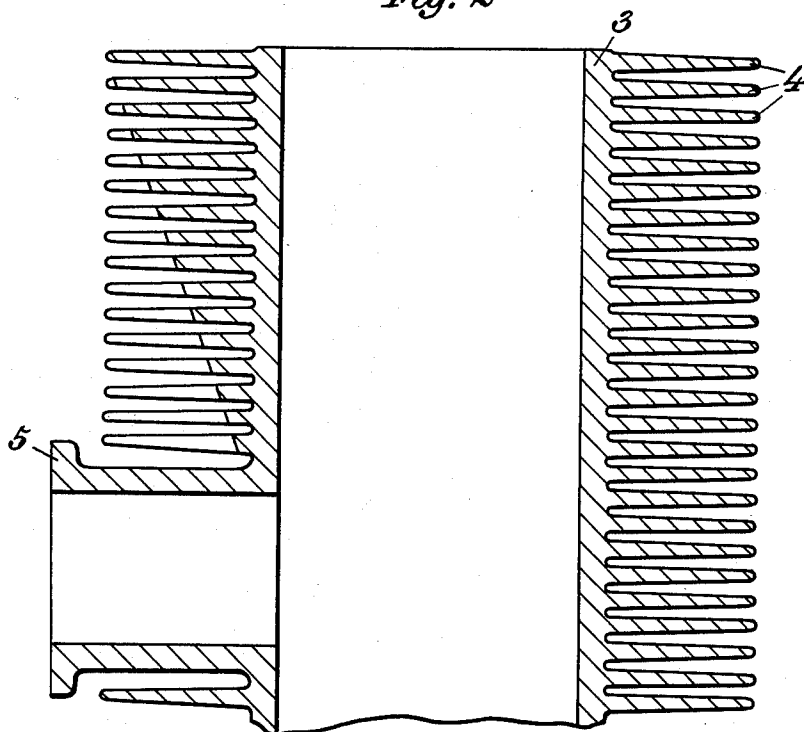
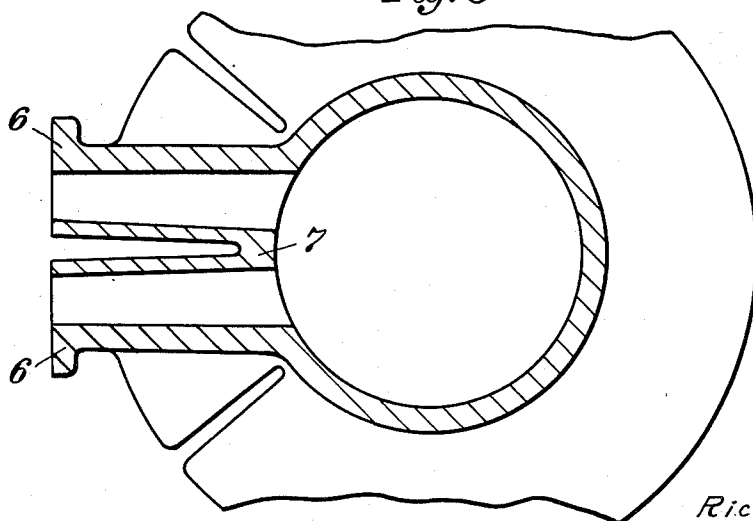


Fig. 3



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UNITED STATES PATENT OFFICE

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WORKING CYLINDER FOR AIR-COOLED
COMBUSTION ENGINES

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7 Claims. (Cl. 123—41.69)

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The present invention relates to working cylinders of engines and, more particularly, to working cylinders of air cooled internal combustion engines.

Wherever the cooling fins of a cylinder of the above-mentioned type is provided with recesses or perforations, e. g. to allow the passage of connecting screws, the cylinder is less rigid than at other spots. Therefore, when the cylinder gets hot during the operation of the engine, it assumes an angular shape, the corners being located at those cylinder portions where the cooling fins are interrupted and the cylinder, therefore, receives its greatest bending stresses. This fact results in the great disadvantage that the piston does not any longer completely bear with all points of the cylinder, and this all the less, the less interruptions are provided and the more irregularly these interruptions are distributed over the periphery of the cylinder.

It is, therefore, an object of this invention to provide a working cylinder for air cooled internal combustion engines which will, at least to a great extent, overcome the above-mentioned drawback.

It is another object of this invention to provide a working cylinder having cooling fins interrupted by passages for connecting bolts which will be characterized by the fact that any deformation of the cylinder due to heat will be such that the cross-section of the cylinder will have the approximate shape of a regular polygon.

It is also an object of this invention to provide a cylinder having cooling fins interrupted by an outlet stud, in which the cooling fins are so shaped that, when the cylinder deforms due to heat expansion, such deformation will not or not materially be harmfully affected by the said stud.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings in which:

Figure 1 is a cross-section through a cylinder provided with cooling fins shaped according to the present invention.

Figure 2 is a longitudinal section through a cylinder having an outlet stud and having cooling fins extending transverse to the longitudinal axis of the cylinder and shaped according to the present invention.

Figure 3 shows the principle of the present invention applied to an air cooled cylinder, the discharge stud of which is provided with a web.

Figure 4 represents a modified way of applying the principle of the present invention to a normal discharge stud of an air cooled cylinder.

General arrangement

In order to avoid an irregular heat deformation of an air cooled cylinder provided with cool-

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ing fins having passages therethrough for connecting bolts, discharge conduit means, or the like, the cooling fins are according to the present invention provided with incisions substantially evenly distributed over the circumference of the cylinder and extending over at least a portion of the length of said cylinder. More specifically, with air cooled cylinders in which the fins have passages of the above-mentioned type, those portions of the fins which are located between two adjacent passages are preferably subdivided into two fin sections of possibly the same width and/or length. Preferably the depth of all incisions is the same.

In this way the actual number of passages is increased but the total number of passages is now distributed over the entire cylinder in such a manner that when the heat deforms the cylinder, the deformation will be substantially even so that the expanded cylinder will have a cross-section of a substantially regular polygon.

With cylinders of piston controlled two stroke internal combustion engines, the outlet stud as a rule represents a rather great transverse reinforcement of the cylinder. Such reinforcement has a particularly unfavorable effect when the stud is subdivided by a web extending in longitudinal direction of the stud, in as much as in such an instance expansion due to heat will cause the web to grow toward the interior of the cylinder. Therefore, in order to overcome the drawbacks inherent to such web reinforced studs, the fins above and, if desired, also the fins below the stud are, according to the present invention, incised or notched so that in longitudinal direction of the cylinder the depth of the incisions or notches decreases with increasing distance from the said stud, while the said stud in longitudinal direction of the cylinder is subdivided into two parts. As a result thereof, the cylinder will within the area of said outlet stud become sufficiently yielding to secure an elastic deformation within the meaning of the present invention, while the expansion of the web is compensated for by the change in the shape of the cylinder.

With two stroke engines without web in the discharge stud, the stud is preferably notched in longitudinal direction of the cylinder, while the exhaust pipe is inserted into the stud to such an extent that it will overlap the notch.

Referring now to the drawings and Figure 1 thereof in particular, the structure shown therein illustrates a cylinder provided with cooling fins 1. These cooling fins are recessed or interrupted in order to allow the passage of connecting screws 2. As will be seen from the drawings, there are four of such recesses and four of such connecting screws 2. In view of these four recesses, the cylinder, when expanding due to heat, would deform so that the cross-section of the cylinder

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will be approximately square shaped. This is due to the fact that at the four recesses the cylinder will bend materially more than at any other place of the circumference. In order to change the deformation from a square into a regular octagon, the sections of the cooling fins lying between two adjacent connecting screws 2 are, according to the present invention, notched in the center portion thereof, i. e. at 1a. The depth of said notches is preferably the same as the depth of the recesses through which the screws 2 pass.

The arrangement shown in Figure 2 concerns a cylinder 3 shown in longitudinal section which is intended for a piston controlled two stroke internal combustion engine. In order to make the cylinder 3 more yieldable within the area of the discharge stud 5, according to the present invention, a cooling fin 4 above the stud 5 and if desired also below the stud 5 is so notched that the depth of the notches, starting from the fins remotest from the stud, increases toward the stud.

Figure 3 shows a cross-section of a cylinder for a piston controlled two stroke internal combustion engine. The discharge stud 6 of this cylinder is subdivided in longitudinal direction of the cylinder by means of a web 7. In order to prevent that this web due to heat expansion of the cylinder grow toward the interior in view of the great rigidity of the stud 6, the stud and also the web 7 has according to the present invention been subdivided. Due to this arrangement, the expansion of the web is compensated for by deformation of the cylinder.

Figure 4 shows a cross-section through the discharge stud of a piston controlled two stroke internal combustion engine in which the stud is not provided with a reinforcing web. In order to reduce the rigidity of the discharge stud, in this instance the stud is notched at 8 in longitudinal direction of the cylinder according to the present invention. Into the stud the exhaust pipe 9 is inserted to such an extent that it will cover the notch 8. The exhaust pipe 9 is indicated by dot dash lines.

It is of course understood that the present invention is by no means limited to the particular constructions shown in the drawings but also comprises any modifications within the scope of the impended claims.

What we claim is:

1. A working cylinder for air cooled internal combustion engines provided with cooling fins having their major surfaces located in planes transverse to the longitudinal axis of said cylinder, said cooling fins being provided with recesses to allow the passage of connecting means and being substantially equally subdivided between two adjacent recesses by an elongated notch.

2. A working cylinder for air cooled internal combustion engines provided with cooling fins having their major surfaces located in planes transverse to the longitudinal axis of said cylinder, said cooling fins being provided with recesses to allow the passage of connecting means and being substantially equally subdivided between two adjacent recesses by an elongated notch having that area which is immediately adjacent the outer cylinder wall, spaced therefrom by approximately the same distance as those areas of said recesses which are closest to said cylinder wall.

3. A working cylinder for air cooled internal combustion engines provided with cooling fins having their major surfaces located in planes transverse to the longitudinal axis of said cyl-

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inder and also provided with a discharge stud, at least the majority of the cooling fins located on one side of said stud being provided with relatively long and narrow notches having their greatest depth adjacent said stud and decreasing in depth away from said stud.

4. A working cylinder for air cooled internal combustion engines provided with cooling fins having their major surfaces located in planes transverse to the longitudinal axis of said cylinder and also provided with a discharge stud, at least the majority of the cooling fins located on a level higher and lower than said stud being provided with relatively long and narrow notches having their greatest depth adjacent said stud and decreasing in depth away from said stud.

5. A working cylinder for air cooled internal combustion engines provided with cooling fins having their major surfaces located in planes transverse to the longitudinal axis of said cylinder and also provided with a discharge stud subdivided by a web extending in longitudinal direction of said cylinder and having a slit-like passage therethrough extending in longitudinal direction of said cylinder and through said stud, at least the majority of the cooling fins located on one side of said stud being provided with relatively long and narrow notches having their greatest depth adjacent said stud and decreasing in depth away from said stud.

6. A working cylinder for air cooled internal combustion engines according to claim 5 in which the passage in the web extends from the outside of said stud to a point spaced from the inner cylinder wall by approximately the same distance as the outer cylinder wall.

7. A working cylinder for air cooled internal combustion engines provided with cooling fins having their major surfaces located in planes transverse to the longitudinal axis of said cylinder and also having a discharge stud, at least the majority of the cooling fins located at a higher level than said stud being provided with relatively long notches substantially evenly distributed over the circumference of said cylinder and having their longitudinal extension substantially at a right angle to the longitudinal axis of said cylinder, two oppositely located wall portions of said stud being respectively provided with relatively deep and narrow notches having their major surfaces located in planes parallel to the longitudinal axis of said cylinder, the depth of said notches being such that the notches will be covered up by an exhaust pipe properly located in said stud.

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