F. A. LAGERSTEN.

WATER COOLED WORKING CYLINDER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED APR. 15, 1919.

1,342,633. Patented June 8, 1920.

Fig. 1.

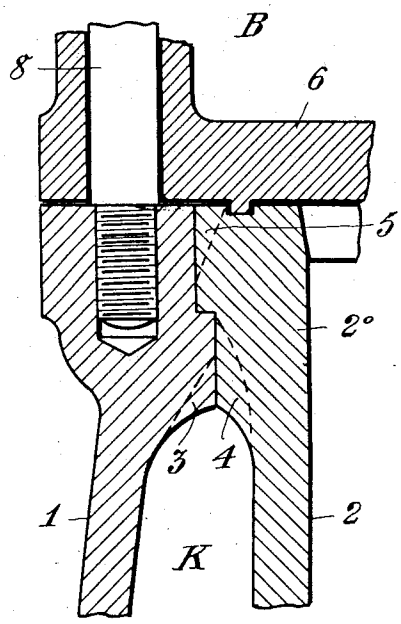


Fig. 2.

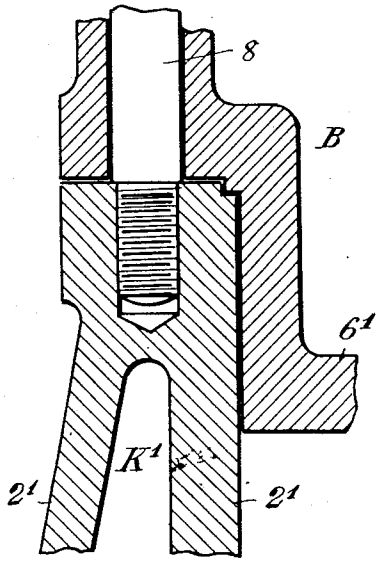


Fig. 3.

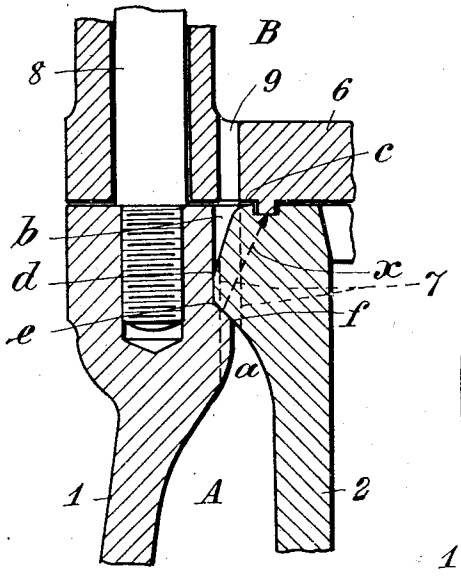
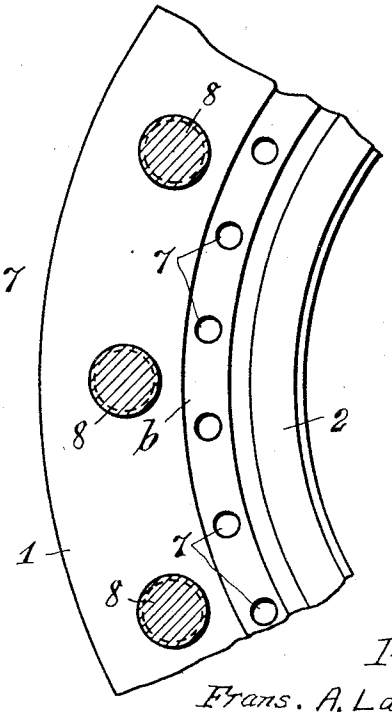


Fig. 4.



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WATER-COOLED WORKING CYLINDER FOR INTERNAL-COMBUSTION ENGINES.

1,342,633. Specification of Letters Patent. Patented June 8, 1920.

Application filed April 15, 1919. Serial No. 290,354.

To all whom it may concern:

Be it known that I, FRANS AXEL LAGERSTEN, subject of the King of Sweden, residing at Nynäshamn, Sweden, have invented certain new and useful Improvements in Water-Cooled Working Cylinders for Internal-Combustion Engines, of which the following is a specification.

The object of the present invention consists of a working cylinder for internal combustion engines composed of an inner shell and a water-jacket inclosing this shell the said working cylinder being constructed so that the head pieces of the inside shell, or those parts of it which are located at the joint will be effectively cooled.

In the drawing annexed, Figures 1 and 2 illustrate a cylinder construction such as has been generally used up to the present time, the same being shown in longitudinal section, while Figs. 3 and 4 show an embodiment of the invention in longitudinal section and a plan view respectively.

According to Fig. 1, the working cylinder consists of the jacket 1, the inner shell 2 and the cover 6, which parts are interconnected by means of the bolts 8. As will be seen from the drawing, the lower part of the inner shell denoted by 2° will not be cooled on account of the water chamber K not touching the same. The said part, however is being heated severely the same forming the boundary surfaces of the combustion chamber and consequently it should of course, be effectively cooled, that this construction does not answer to the practical requirements is proved by the fact that with great cylinder diameters and particularly in cylinders of two-cycle engines not only the inner shells but also the water jackets are apt to rupture at the said joints on account of the great difference in temperature occurring in the adjacent parts. This inconvenience in the cylinder construction described is well known by those skilled in the art, and endeavors have been made to avoid it by introducing the cylinder cover so far into the cylinder that the water chamber K^1 extends over the walls of the combustion chamber, as illustrated in Fig. 2 of the drawing. This construction, however, leads to a considerable extension of the cylinder, and consequently to a corresponding increase of the space requisite for the motor. Then, too, a still more important circumstance must be considered, namely that a working cylinder 2′ made in one single piece has to be used which entails very great disadvantages of well known character.

According to the present invention an effective cooling is attained also for the head pieces of the working cylinder by slight alterations of the cylinder construction shown in Fig. 1. If Fig. 1 be examined closely, it will be found that the annular sections 3, 4 and 5 of the material of the jacket 1 and the inner shell 2 separated by the dotted lines are entirely unnecessary from a pure mechanical point of view, and thus they may be removed without interfering with the strength of the material. If this be done, (1) a considerable extension of the cooling water space between the cylinder jacket 1 and the inner shell 2 is obtained at *a*, and further, (2) an annular chamber is formed at *b* between the ends of the said parts 1 and 2 of the cylinder and the cover 6 thereof. This annular chamber *v* may communicate with the water chamber B in the cylinder cover 6 by means of parts 9 or with the water chamber A in the cylinder cover 1 by means of the parts 7, or it may communicate simultaneously with both chambers A and B. Notwithstanding the beveled surface *c*—*d* a sufficient guiding and centering surface *d*—*e* will remain on the inner shell under all circumstances. The contact surface *e*—*f* may be beveled so that the pressure of the jacket on the inner shell is transmitted in the direction of the arrow *x*. Hereby the relative power of the parts pressed together is increased, and further the sudden changes in the curvature of the contact surfaces disposed to ruptures are avoided.

If the annular chamber *b* communicate with the two chambers A and B the same forms a flow-through chamber for the cooling water, the cooling of the head pieces of the inner shell 2 being thus very effectively accomplished. By the arrangement of a plurality of bore-holes 7 (Fig. 4) or by a corresponding construction of these connecting passages, almost the whole surface of the head parts of the inner shell will be in direct contact with the cooling water.

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

1. In internal combustion engine having water-cooled cylinders consisting of an in-

ner shell, a water jacket and a cover, the provision of an annular cooling chamber inclosed between said shell, jacket and cover, and formed by chamfering the outer edge of the inner shell.

2. In internal combustion engine having water-cooled cylinders consisting of an inner shell, a water jacket and a cover, the provision of an annular cooling chamber, inclosed between said shell, jacket and cover, and passages connecting said chamber with the cooling chamber of the cover.

3. In internal combustion engine having water-cooled cylinders consisting of an inner shell, a water jacket and a cover, the provision of an annular cooling chamber inclosed between said shell, jacket and cover, and passages connecting said chamber with the cooling chamber of the water-jacket.

4. In internal combustion engine having water-cooled cylinders consisting of an inner shell, a water jacket and a cover, the provision of an annular cooling chamber inclosed between said shell, jacket and cover, and passages connecting said chamber with the cooling chambers of the cover and the water jacket.

5. In internal combustion engine having water-cooled cylinders consisting of an inner shell, a water jacket and a cover, the provision of an annular cooling chamber inclosed between said shell, jacket and cover in combination with an extension of the cooling chamber of the water jacket toward the end of the cylinder formed by annular sections of material being removed from the jacket and the inner shell at the joint between them.

6. In internal combustion engine having water-cooled cylinders consisting of an inner shell, a water jacket and a cover, the provision of an annular cooling chamber inclosed between said shell, jacket and cover in combination with a joint between said shell and jacket comprising conical surfaces bearing against each other so as to transmit the pressure in an inclined direction toward the axis of the cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

FRANS AXEL LAGERSTEN.

Witnesses:

OSCAR GRAHN,

GRETA PRIEN.