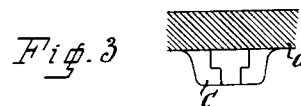
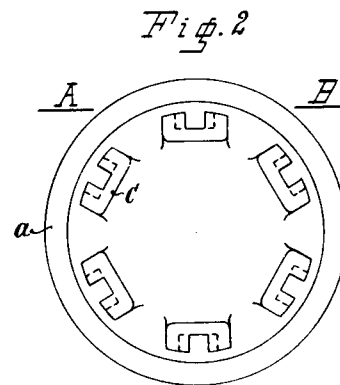
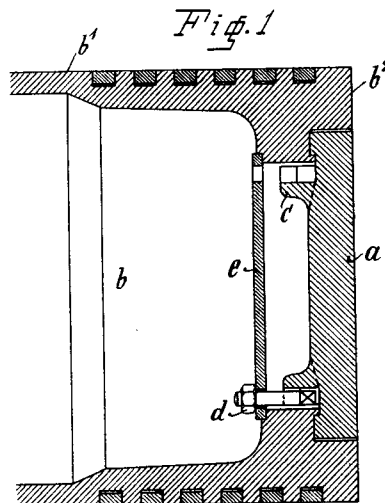


A. WILLMER.
 PISTON FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED DEC. 14, 1912.

1,065,289.

Patented June 17, 1913.



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UNITED STATES PATENT OFFICE.

ARNOLD WILLMER, OF HANOVER-KLEEFELD, GERMANY.

PISTON FOR INTERNAL-COMBUSTION ENGINES.

1,065,289.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed December 14, 1912. Serial No. 736,863.

To all whom it may concern:

Be it known that I, ARNOLD WILLMER, a citizen of the German Empire, residing at Hanover-Kleefeld, Germany, have invented certain new and useful Improvements in Pistons for Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in pistons especially the pistons of internal combustion engines of the type in which the fuel is sprayed, with the aid of compressed air, against the end of the piston. The invention is thus especially adapted for the pistons of Diesel oil engines. The temperature of the center part of the piston in such cases rises to a higher degree than the outer parts and owing to unequal expansion and cooling, internal strains of a complicated and serious character are set up. A central valve plate has also been found disadvantageous as the internal strains in this valve plate cause its edges to warp. According to the present invention these objections and others are overcome by employing a cover plate on the piston which is held near its periphery by members which permit of relative expansion between the cover and the end plate without straining the parts. To this end the cover plate is provided near its periphery with engaging members conveniently in the form of lugs in which holding members loosely engage, and a pressure in the direction of the axis of the piston is applied to these holding members. A simple method is to employ engaging lugs on the cover plate near its periphery into which there fit the heads of T-headed bolts. These bolts may pass through plates within the piston and be fastened down in the ordinary way.

The invention will be more readily understood from the following description of one convenient form illustrated by way of example in the accompanying drawings in which:—

Figure 1, is a cross sectional elevation through the end of a piston constructed according to the present invention. Fig. 2, is an elevation looking on the interior surface of the cover plate used. Fig. 3, is a detailed sectional view on the line A—B of Fig. 2 and shows the shape of the lugs employed.

In carrying the invention into effect according to the form shown the piston *b*, has the usual cylindrical side walls *b'* and end wall *b''*. In the end wall *b''* there is pro-

vided a central opening which is in turn closed by the cover plate *a*. The cover plate *a*, is a loose fit in a recess formed in the end wall *b''*. This cover plate is held tightly against its closing surface and the end wall *b''*, by members adapted to exert axial pressure at a plurality of points near the periphery of the cover plate *a*. These holding members are adapted to loosely engage with the cover plate *a*, so as to allow of relative radial expansion and contraction between the cover plate *a*, and the end wall *b''*, of the piston. In the form shown the cover plate *a*, is provided on its inner side and near its periphery with a plurality of lugs *c*. These lugs in the form shown are of the kind used for taking T-headed bolts. T-headed bolts *d*, fit with their heads in the lugs and pass through and are fastened on to an internal plate *e*, located within the piston. With this device the T-headed bolts *d*, do not interfere with the radial or relative expansion of the parts while at the same time they hold the cover plate *a*, at all points around its circumference tightly against the closing face on the end *b''* of the piston.

I claim:

1. A piston having a cylindrical body and an end part having a central opening, a cover plate loosely fitting in said opening, and means between the cover plate and the interior of the piston to hold the cover plate in position, said means and the loose fitting of the cover plate permitting relative radial expansion of the cover plate and the end part.

2. A piston having a cylindrical body and an end part formed with a central opening, a cover plate loosely fitting in said opening, lugs extending from the inner surface of the cover plate, said lugs being wholly inside the piston, interlocking means between said lugs and the piston, the interlocking means fitting loosely in the lugs, whereby to permit a relative radial expansion between the cover plate and the end part of the piston.

3. A piston having a cylindrical body and an end part formed with an opening, a cover plate fitting in the opening, lugs extending from the inside of the cover plate, each of said lugs having a T shaped slot, and T shaped bolts fitting loosely in the T shaped slots for securing the cover plate to the piston, the loose fitting bolts and cover

plate permitting of relative radial expansion between the end part of the piston and the end plate.

4. A piston having a cylindrical body an
5 end part having an opening therein, a cover
on said opening, means located near the pe-
riphery and allowing of relative expansion
of said cover and end part for fixing said
cover to said end part comprising lugs on
10 the cover, T-headed bolts engaging in said
lugs and a plate located within the piston.
5. A piston having a cylindrical body, an
end part having an opening approximately
in the center thereof, an annular shoulder

within the piston body adapted to receive 15
said cover, depending lugs upon said cover,
bolts in said lugs, a plate within the piston
body adapted to receive the bolts, and a
shoulder in the said piston body adapted to
receive said plate.

In testimony whereof I have signed my 20
name to this specification in the presence of
two subscribing witnesses.

ARNOLD WILLMER.

Witnesses:

MARIE BEHNE,
FRAU RÖSELER.