

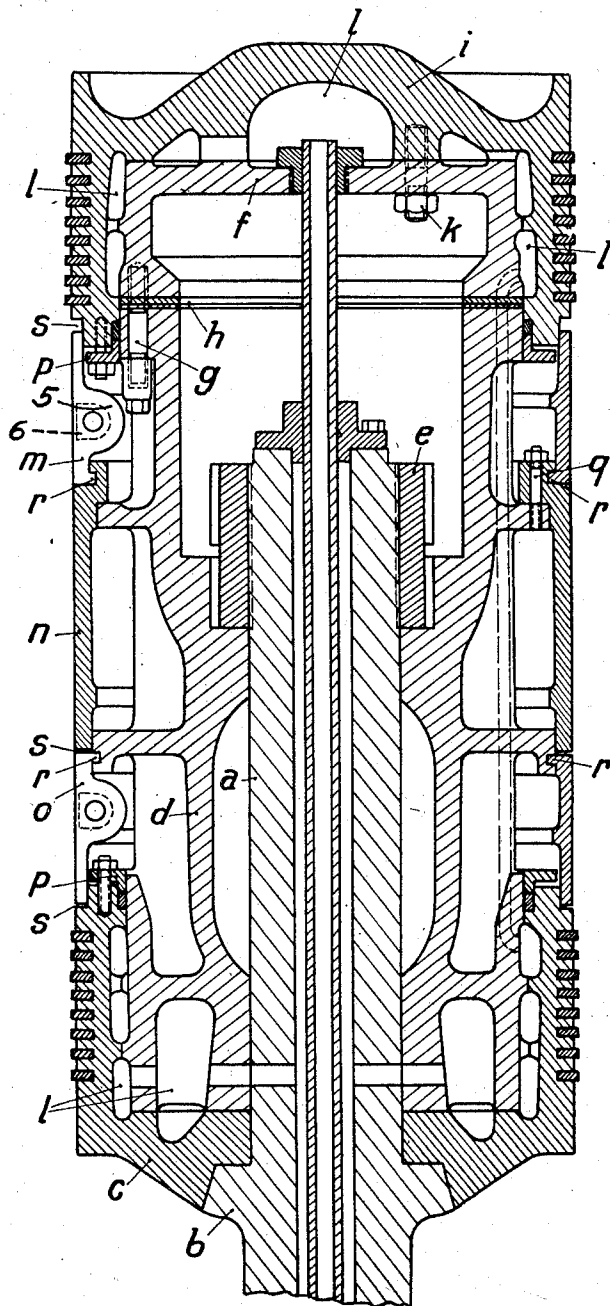
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J. RADLOFF

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PISTON FOR INTERNAL COMBUSTION ENGINES

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*Inventor:*  
Johannes Radloff,  
by *Charles V. Tuller*  
His Attorney.

# UNITED STATES PATENT OFFICE

JOHANNES RADLOFF, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

## PISTON FOR INTERNAL-COMBUSTION ENGINES

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The present invention relates to pistons for double acting internal combustion engines, and especially to such pistons wherein the upper and lower piston caps or heads are connected to the piston rod through an intermediate supporting body which transmits the piston forces to the piston rod.

The object of the invention is to provide an improved construction and arrangement in a piston of the above referred to type, which can be readily assembled and dismantled and wherein the parts subjected to high temperature are free to expand and contract without setting up excessive strains.

For a consideration of what I believe to be novel and my invention, attention is directed to the following specification and claims appended thereto.

In the drawing the figure is a longitudinal sectional view through a piston embodying the invention.

Referring to the drawing, *a* indicates a piston rod which is provided with a flange *b* with which engages the lower piston head or cap *c*. Surrounding the piston rod is a supporting body or frame *d* which at its lower end engages head *c* and serves to hold it in position, the supporting body being fixed in place by a nut *e* which threads onto the upper end of piston rod *a*. In order to make the nut *e* accessible the upper part *f* of the supporting body is not made in one piece with the lower part *d* but is connected with the lower part by means of the bolts *g*. The variations in the length of the piston are taken care of by means of a packing *h*. Connected to the upper end of the supporting body is the upper piston head or cap *i*, the same being fastened to the portion *f* of the supporting body by means of bolts *k*. In connection with the piston head *i* and also the piston head *c* it will be noted that they are fixed in position only at one end, the other ends which comprise the flange portion of the piston heads which carry the piston rings being unattached so that they can expand freely. In other words, each piston head comprises an end wall and a flange and in each case the end wall is attached to the rod and the supporting body, the flange being left free to expand.

The cooling chambers *l* in the piston heads or caps *c* and *i* are directly inter-connected by suitable passages so that cooling medium may circulate through them and they are sealed against the space between the supporting body and the piston shell, which shell comprises the piston elements *m*, *n*, *o*, by means of packing boxes *p*. The piston shell comprising elements *m*, *n*, *o*, is located between the two piston heads *c* and *i*; the middle part *n* of the piston shell is in the form of a continuous ring, the same not being divided longitudinally, and it is fastened to the middle portion of the supporting body *d* by means of the screws *q*. The piston shell elements *m* and *o* are divided longitudinally into two or more arcuate sections, so that they can be removed to give access to the bolts *g* and the packing boxes *p*. The elements *m* and *o* are held in place by the projecting flanges *r* which engage corresponding grooves in the piston shell element *n* or in the supporting body *d*. The sections of the piston shell elements *m* and *o* are connected to each other in any suitable manner; for example, the adjacent sections may be provided with abutting ears 5 provided with openings for the reception of suitable bolts, the bolts being rendered accessible through the openings indicated at 6.

In connection with the construction, it will be noted that clearances *s* are provided between the individual parts of the piston shell and between the piston shell and the cylinder heads or caps *c* and *i*. These clearances are made sufficiently large to permit of free expansion of the cylinder heads as well as of the individual parts of the piston shell.

By the above described arrangement it will be seen that I have provided a piston

structure for use in a double-acting internal combustion engine which is comparatively simple in structure, can be readily assembled and dismantled and one wherein ample provision is made to permit of the free expansion and contraction of the parts which are especially subjected to high temperatures.

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

1. In a piston structure for double-acting internal combustion engines, the combination of a piston rod, a supporting body on the rod, piston heads adjacent the upper and lower ends of and positioned by said supporting body, said piston heads comprising end walls which are fixed to said supporting body and integral flanges which are free to expand and contract, and a piston shell carried by the supporting body and located between the integral flanges, said piston shell being connected to the supporting body at only one point whereby it is free to expand in an axial direction.

2. In a piston structure for double-acting internal combustion engines, the combination of a piston rod, a supporting body on the rod, piston heads adjacent the upper and lower ends of and positioned by said supporting body, said piston heads comprising end walls which are fixed to said supporting body and integral flanges which are free to expand and contract, and said piston heads and supporting body having engaging walls which define cooling chambers, and packing means arranged between the free ends of the integral flanges and said supporting body to prevent leakage from said cooling chambers.

3. In a piston structure for double-acting internal combustion engines, the combination of a piston rod, a supporting body on the rod, piston heads adjacent the upper and lower ends of and positioned by said supporting body, said piston heads comprising end walls which are fixed to said supporting body and integral flanges which are free to expand and contract, and a piston shell carried by the supporting body and located between the integral flanges, said piston shell being divided transversely into a plurality of sections, some of said sections being divided longitudinally into a plurality of parts, and means for fastening said parts into position.

4. In a piston structure for double-acting internal combustion engines, the combination of a piston rod, a supporting body on the rod, piston heads adjacent the upper and lower ends of and positioned by said supporting body, said piston heads comprising end walls which are fixed to said supporting body and integral flanges which are free to expand and contract, and a piston shell carried by the supporting body and located between the integral flanges, said shell being divided transversely into a plurality of sections, some

of said sections being divided longitudinally into a plurality of parts, means for fastening said parts into position, and projecting flanges on said divided sections which engage adjacent parts for holding the divided sections in position.

5. In a piston structure for double-acting internal combustion engines, the combination of a piston rod, a supporting body on the rod, piston heads carried by said rod and supporting body, each head comprising an end wall and an integral flange, and a piston shell carried by the supporting body and located between the ends of said flanges, adjacent ends of said flanges and shell being spaced axially whereby such parts are free to expand.

6. In a piston structure for double-acting internal combustion engines, the combination of a piston rod, a supporting body on the rod, piston heads carried by said rod and supporting body, each head comprising an end wall and an integral flange, and a piston shell carried by the supporting body and located between the ends of said flanges, said piston shell being divided transversely into a plurality of sections, and said sections being spaced axially from each other and from the adjacent ends of said flanges whereby said parts are free to expand.

In witness whereof, I have hereunto set my hand this 3rd day of November, 1928.

JOHANNES RADLOFF.