

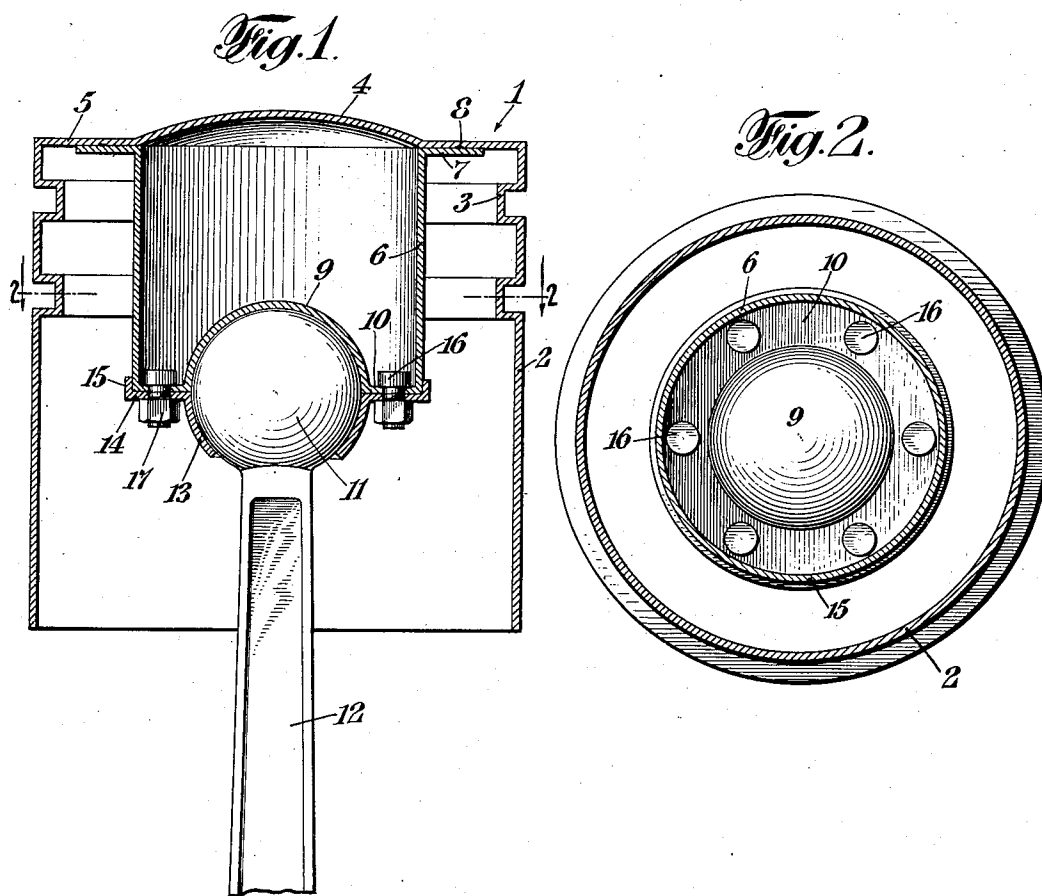
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PISTON CONSTRUCTION

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## UNITED STATES PATENT OFFICE.

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## PISTON CONSTRUCTION.

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*To all whom it may concern:*

Be it known that I, FREDERICK R. SUNDERMAN, a citizen of the United States, and resident of Newburgh, in the county of Orange and State of New York, have invented certain new and useful Improvements in Piston Constructions, of which the following is a specification.

The invention relates to piston constructions and particularly to the construction of a sheet metal piston and the connection between the same and a connecting rod. An object of the invention is to provide an efficient, light and comparatively inexpensive piston construction in which the thrust of the connecting rod will be transmitted directly to the head of the piston without subjecting the side wall or skirt portion of the piston to stresses which might deform the same, or affect the sliding fit of the same within a cylinder. Other objects of the invention comprise the provision of improved combinations of parts and details of construction, all as will be more fully set forth in the following specification and be particularly pointed out in the appended claims.

The production of a piston from comparatively thin pressed steel, or other sheet metal, as contemplated herein, requires the consideration and provision for taking care of stresses and strains which might tend to deform the parts or prevent proper alignment thereof to a much greater extent than is the case where a cast metal construction having comparatively thick walls is under construction. The present invention is particularly intended to provide a pressed metal construction in which adequate provision is made for the factors referred to.

In order that a clearer understanding of the invention may be had attention is hereby directed to the accompanying drawings forming part of this application and illustrating one embodiment of the invention. In the drawings

Fig. 1 represents a vertical section through a piston and connecting rod connection embodying the invention, the end portion of the connecting rod being shown in side elevation, and

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Referring to the drawings, the piston is shown as formed of a sheet of metal, preferably steel, pressed to a shape to provide a

closed upper end, or head, 1 and a hollow cylindrical wall or skirt 2. Annular grooves 3 are preferably pressed inwardly of the skirt 2, which are adapted to receive the usual piston rings, these grooves further serving to stiffen the construction. The head, which is referred to generally by the reference character 1, is preferably formed with an outwardly arched central portion 4 surrounded by an annular plane portion 5.

Means for so connecting the connecting rod to the piston that the thrust of the rod will be transmitted directly to the head of the piston are provided. Accordingly, in the preferred embodiment of the invention, a cylindrical housing 6 is provided having an annular outwardly extending flange 7 at its upper end which flange is secured to the under side of the piston head, the flange being secured to the annular portion 5 of the head surrounding the outwardly arched portion 4 thereof. Preferably flange 7 is secured to the piston head by spot welding, as is indicated at 8. The downwardly extending cylindrical portion 6 of the housing is, of course, coaxial with the skirt 2 of the piston.

The lower end of the housing 6 is provided with an upwardly arched portion adapted to receive the thrust of the upper end of the connecting rod. In the preferred form of construction the housing 6 is provided with an integral lower end closure portion comprising a semi-spherical upwardly extending central portion 9 which is surrounded by annular flange 10. The semi-spherical portion 9 of the housing is adapted to receive a spherical ball 11 formed on the upper end of the connecting rod 12. The ball 11 of the connecting rod may be held in place by a separate sheet metal member pressed to shape to provide a downwardly extending central portion 13 of spherical curvature which is adapted to fit around a portion of ball 11 below the center thereof. An annular flange 14 surrounds the semi-spherical portion 13 of this member and is adapted to bear against the lower surface of the flange 10 of the housing, flange 14 preferably having a short upwardly extending cylindrical flange 15 adapted to fit closely around the lower edge of the downwardly extending cylindrical portion of housing 6.

In assembling the device, bolts 16 may be

dropped down through suitable openings in the flange 10 of the housing 6 before the flange 7 of the latter is secured to the head of the piston, these bolts being adapted to extend through aligned openings in the flange 14. The housing having been secured to the head of the piston and the ball 11 of the connecting rod being inserted within the semi-spherical portion 9 of the housing, the lower member comprising curved portion 13 and flange 14 may be positioned and nuts 17 tightened on bolts 16 to draw flanges 10 and 14 closely together, whereupon a ball and socket joint for the connecting rod will be established. With such a construction the thrust of the connecting rod will be transmitted directly through the cylindrical shell of housing 6 to the head of the piston, the skirt 2 of the piston not being called upon to transmit any stress. The provision of a ball and socket joint for the connecting rod permits the automatic alignment of the parts and enables the piston to run smoothly and truly in the cylinder at all times while the arched construction of the parts as described insures the transmission of force between the piston and connecting rod without buckling or deforming the parts. It will be observed that the thrust to be transmitted is directed axially of the cylindrical member 6 and that the flange 7 reinforces the piston head, and the flange 14 reinforces the lower end portion of housing 6, at the points through which the force is transmitted at the opposite ends of the cylindrical member 6 and also that the piston head is effectively stiffened by the upwardly arched portion 4 about which the housing is secured. An annular washer or reinforcing member may, of course, be inserted between the flange 10 and the heads of bolts 16, if desired.

It should be understood that the invention is not limited to the exact details of construction described but is as broad as is indicated by the accompanying claims.

What I claim is:—

1. A piston construction comprising a shell having a head and skirt, and a flanged housing secured to the under side of said head having an upwardly arched bottom portion to form a thrust bearing for the upper end of the connecting rod, said housing having a cylindrical portion and a flange

bearing against and secured to said head, to transmit the thrust.

2. A piston construction comprising a sheet metal shell having a head and skirt, a sheet metal housing within the skirt and secured to the head and extending downwardly therefrom, and having an upwardly arched lower end portion stamped up to form a thrust bearing for the upper end of the connecting rod, and a downwardly curved member adapted to complete the joint with the upper end of the connecting rod, and secured to the lower end of the housing.

3. A piston construction comprising a sheet metal shell having a head and skirt, and a separate sheet metal housing within the skirt and secured to the head, said housing having an integral lower end stamped up and upwardly arched to form a thrust ball socket bearing for the upper end of the connecting rod.

4. A piston construction comprising a sheet metal shell having a head with an upwardly arched portion and a skirt, and a cylindrical sheet metal housing having an upper flange secured to said head about said arched portion thereof, said housing having its lower end closed and upwardly arched to form a thrust bearing for the upper end of the connecting rod.

5. A piston construction comprising a sheet metal shell having a head and skirt, and a cylindrical sheet metal housing within the skirt and secured to the head, said housing having its lower end closed with an upwardly extending semi-spherical portion surrounded by an annular portion, and a sheet metal member having a downwardly extending portion of spherical curvature surrounded by an annular portion, said two spherically curved portions coacting to form a socket for a ball on the end of a connecting rod, the annular portion of said member being removably secured to said annular portion of said housing and having a cylindrical upwardly extending edge flange surrounding the lower edge of the cylindrical portion of said housing.

Signed at Newburgh, in the county of Orange and State of New York, this 14th day of December A. D. 1921.

FREDERICK R. SUNDERMAN.