O. S. PULLIAM.

CYLINDER AND PISTON CONSTRUCTION.

APPLICATION FILED FEB. 27, 1920.

**1,379,041.** **Patented May 24, 1921.**

Fig. 1.

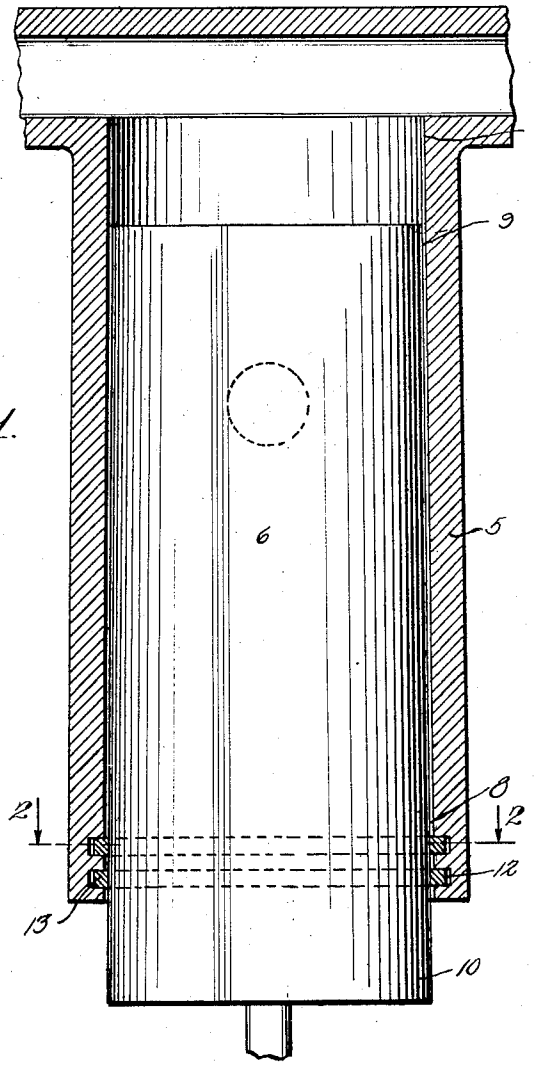
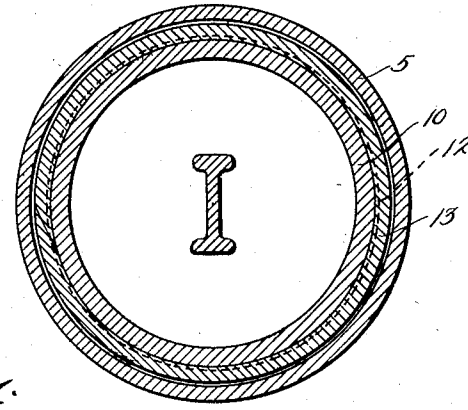



Fig. 2.




WITNESSES

Frank J. Paggioni

P. H. Pattison.

INVENTOR

O. S. PULLIAM.

BY Munn & Co.

ATTORNEYS

# UNITED STATES PATENT OFFICE.

OSWALD S. PULLIAM, OF NEW YORK, N. Y.

## CYLINDER AND PISTON CONSTRUCTION.

1,379,041. Specification of Letters Patent. Patented May 24, 1921.

Application filed February 27, 1920. Serial No. 361,738.

*To all whom it may concern:*

Be it known that I, OSWALD S. PULLIAM, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Cylinder and Piston Construction, of which the following is a full, clear, and exact description.

The present invention relates to new and useful improvements in piston construction, and it pertains more particularly to devices of this character commonly employed in internal combustion engines. So far as known by me, it has heretofore been the common practice to make the sides of cylinders and pistons of internal combustion engines straight, and to provide the piston with piston rings in order that a tight fit between the piston and the cylinder may be obtained. In constructions above described, the piston rings very often break and serve to score the interior surface of the cylinders. Inasmuch as these cylinders in ordinary forms are cast *en bloc*, the damage done to any one cylinder renders the entire set inoperative, thus necessitating the re-boring or replacing of the several cylinders.

In the present invention, the cylinders are constructed in such a manner that they carry the rings instead of the pistons. By this construction should the rings break, the greatest damage which could be done would be a scoring of the piston. Since the pistons are separately carried by the crank shaft, a single piston when it becomes damaged may be replaced by a good one without the necessity of replacing the remainder of the pistons which go to make up the engine.

In the present invention the walls of the cylinder and the walls of the piston are slightly tapered in such a manner as to provide for a relatively snug fit between the piston and the cylinder when the piston is at the extent of its upward stroke, at which time it is desirable to obtain this relatively snug fit.

Referring to the drawings—

Figure 1 is a longitudinal sectional view of the cylinder, the piston thereof being shown in elevation;

Fig. 2 is a transverse sectional view on the line 2—2 of Fig. 1.

Referring to the drawings by reference character, 5 designates the cylinder, and 6 the piston. In the present instance but a single piston and cylinder have been shown since this is deemed adequate to properly set forth the principles of the invention. The inner diameter of the cylinder 5 at the point designated by the reference character 7 is slightly reduced as compared to the diameter of the cylinder 5 at that point indicated by the reference character 8 or the lower portion of the cylinder, and the upper end of the piston 6 as designated by the reference character 9 is of a slightly smaller diameter than its lower portion designated by the reference character 10.

Adjacent its lower open end the cylinder 5 is provided with two or more concentric channels 12, and mounted in each of these channels 12 is a ring 13. These rings 13 are of the common resilient type, and are adapted to surround the piston 6 in sliding contact therewith in such a manner as to provide a gas-tight joint between the piston and the cylinder.

The operation of the device is as follows: Upon the down stroke of the piston 6, the reduced diameter thereof will move to a point where it will be engaged by the rings 13. Upon the up stroke thereof, when the piston has reached the limit of said up stroke, the upper end 9 thereof will be of an exterior diameter substantially equal to the interior diameter of the portion 7 of the cylinder 5 and will form a snug joint therewith. At this point, the enlarged diameter of the piston engages the rings 13 and inasmuch as said rings are of an internal diameter equal or substantially equal to the reduced diameter 9 of the piston 6, the enlarged diameter of the piston will tend to expand said rings, thereby causing a tight joint between said rings and piston.

From the foregoing it will be seen that the present invention provides a cylinder and piston construction more particularly adapted for internal combustion motors in which it is practically impossible to subject the inner surface of the cylinder to destructive or mutilating scores which commonly exist in the form of broken piston rings.

Having thus described the invention, what is claimed as new is:

1. A cylinder and piston construction comprising a cylinder having a longitudinal taper, a piston having a corresponding lon-

gitudinal taper, and means for forming a tight joint between said piston and the walls of said cylinder.

2. In a cylinder and piston construction, a cylinder having a tapered bore, a piston having a correspondingly tapered exterior diameter, and means carried by the cylinder and adapted for interengagement with the piston to form a gas-tight joint therebetween.

3. In a cylinder and piston construction, a cylinder having a tapered bore, a piston having a correspondingly tapered diameter, and means carried by the cylinder and adapted to be operated by the increased diameter of the piston to render a tight joint between said piston and cylinder.

4. A cylinder and piston construction comprising a cylinder having a working space, one end of which is reduced with respect to the opposite end, and a piston shaped correspondingly to the shape of the working space of said cylinder, whereby said piston forms a gas-tight joint with the walls of the working space of said cylinder in one position therein.

5. A cylinder and piston construction comprising a cylinder having a working space, one end of which is reduced in diameter, a piston having a corresponding taper whereby a gas-tight joint is formed between the walls of the piston and the walls of the cylinder when the piston is in one position therein, and separate means for forming a gas-tight joint between the piston and cylinder when the walls of said piston are out of contact with the walls of the cylinder.

OSWALD S. PULLIAM.