Nov. 18, 1924. **1,516,327**

J. E. BROWNFIELD

PISTON RING

Filed April 5, 1924

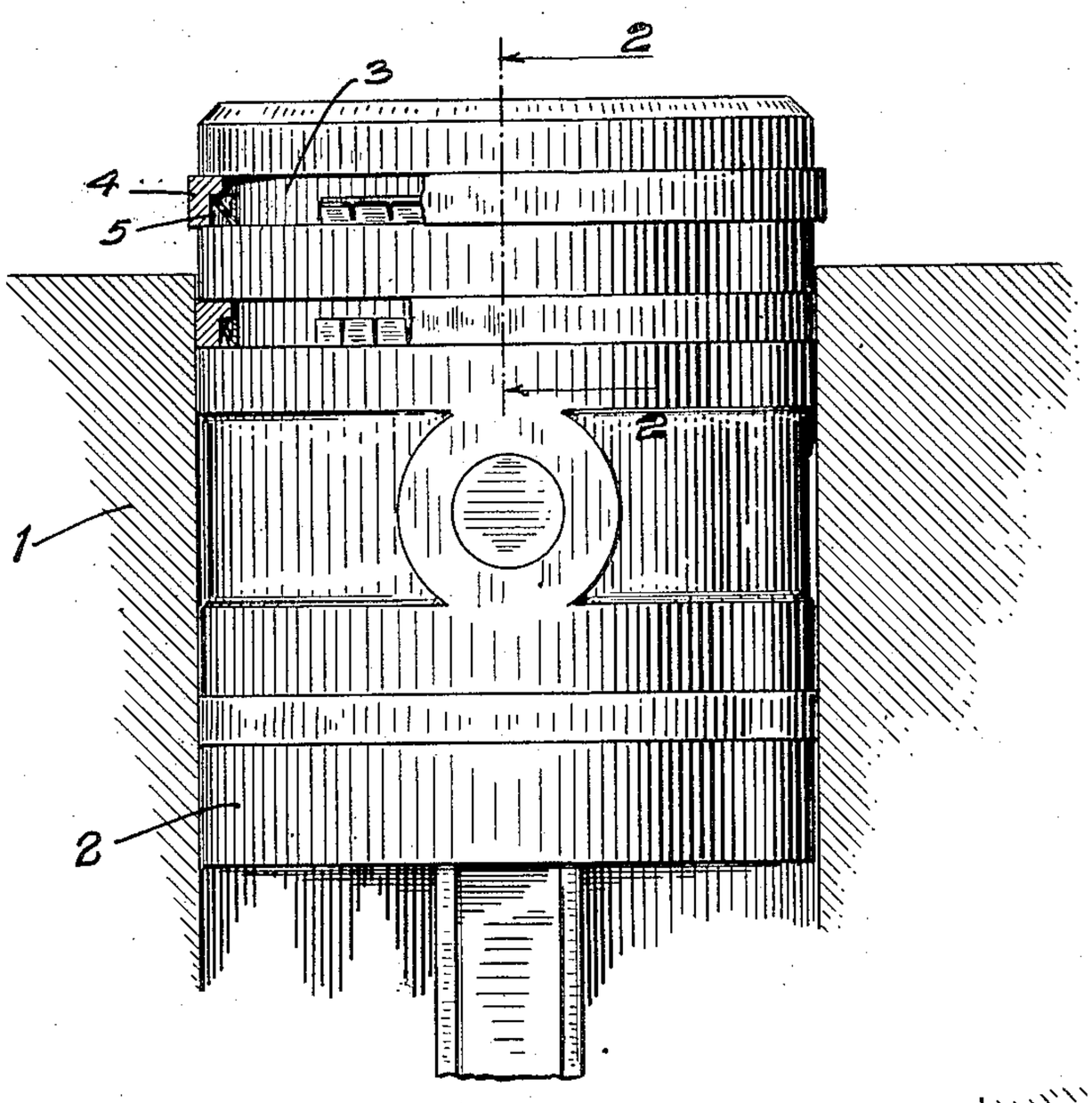

Fig. 1.

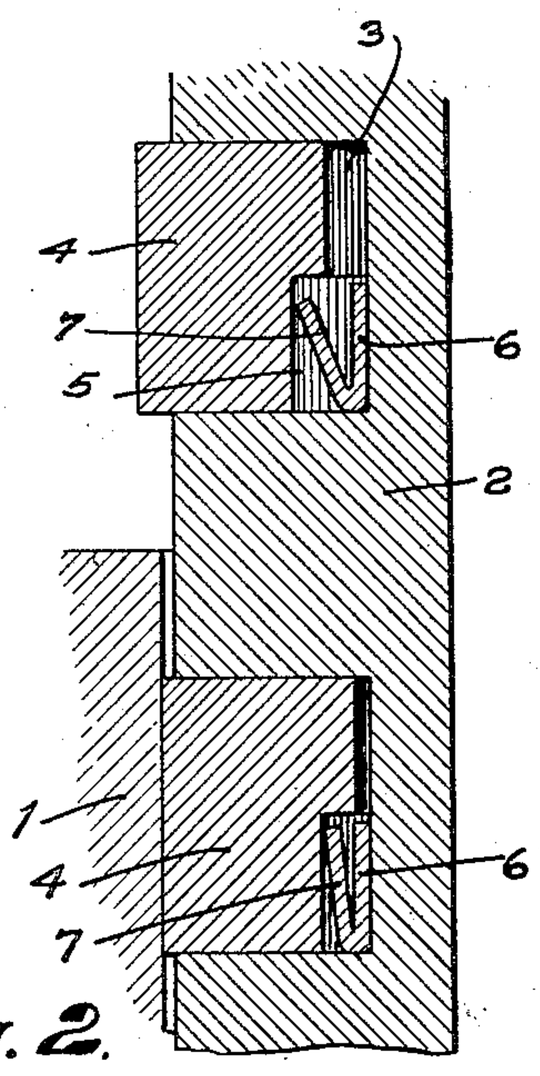

Fig. 2.

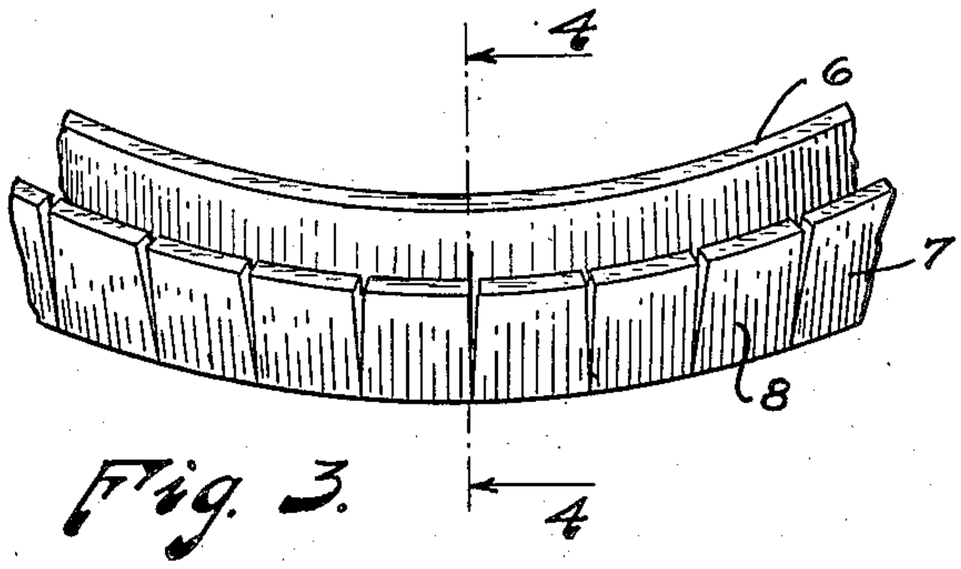

Fig. 3.

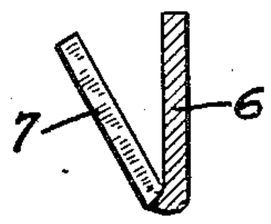

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN E. BROWNFIELD, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO JOHN C. JONES, OF DENVER, COLORADO.

PISTON RING.

Application filed April 5, 1924. Serial No. 704,413.

To all whom it may concern:

Be it known that I, JOHN E. BROWNFIELD, a citizen of the United States, residing at Denver, in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Piston Rings; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in piston rings.

In all types of engines employing reciprocating pistons, it is essential that there shall be a gas- and oil-tight fit between the pistons and the cylinder walls. This tight fit must be obtained without the production of an undue amount of friction. In the ordinary internal combustion engine, such as is extensively employed on automobiles, the pistons are formed with grooves for the reception of piston rings, which are resilient and engage the inner surface of the cylinder. As these rings fit rather loosely in the grooves on the piston, they do not form a gas-tight and oil-tight seal, but permit considerable leakage to take place. I am aware that many different expedients have been resorted to for the purpose of making a tight seal between the cylinder walls and the piston, some of which have been employed with some degree of success.

It is the object of this invention to produce a piston ring that can be employed with any standard piston and which shall be so constructed that it will permit a peculiarly shaped spring member to be inserted between the bottom of the groove in the piston and the inner surface of the ring, for the purpose of producing a uniformly distributed force tending to move the ring outwardly against the inner surface of the cylinder and, at the same time, form a seal between the ring and the piston.

My invention can be most clearly explained and will be most readily understood when reference is had to the accompanying drawing in which my improved construction is illustrated, and in which:

Fig. 1 is a view partly in section and partly in elevation of a piston and a cylinder, parts being broken away to better show the construction of the piston ring;

Fig. 2 is a section taken on line 2—2, Fig. 1, the parts being shown to an enlarged scale;

Fig. 3 is a perspective view of a portion of the spring ring; and

Fig. 4 is a section taken on line 4—4, Fig. 3.

Numeral 1 indicates the cylinder and 2 the piston, which is provided with a plurality of grooves 3 for the reception of the piston rings 4. The rings differ from the ordinary piston ring only in one particular, namely, in that a portion of the inner surface has been cut away to form an offset 5. This offset extends substantially one-half of the width of the ring, in the manner shown in the drawings. For the purpose of producing a force that tends to expand the piston ring, I have provided a spring having a portion 6 bent into circular form and adapted to lie snugly against the bottom of the groove 3. The spring has a V-shaped cross-section and the side 7 is provided with a plurality of cuts 8, which divides it into a plurality of separate fingers. The spring ring extends substantially one-half the width of the groove 3. The sides 6 and 7 are normally inclined to each other at an angle substantially like that shown in Fig. 4, but when the spring ring is in the piston ring groove and the ring is within the cylinder, the sides 6 and 7 are forced into a more nearly parallel position, such as shown in Fig. 2. When the sides 6 and 7 are moved to the position shown in connection with the lower ring in Fig. 2, the cuts 8 are almost, if not entirely closed. The side 6 fits snugly against the bottom of the piston ring groove and the side 7 fits against the inside of the piston ring. It is now apparent that the spring ring forms a seal between the piston and the ring. Since the cuts 8 are substantially closed, any oil that enters the groove and comes between sides 6 and 7 will help to make the seal perfectly tight. The spring fingers 7 act uniformly on the ring to spread the same apart and therefore produces a uniform force tending to force the piston ring against the side of the cylinder. This force is sufficient to cause the ring to fit the cylinder, even when the latter has been worn so that it is no longer exactly circular. The spring ring, in addition to forming a

seal, also prevents side slap of the piston and permits the ring to be worn to a far greater extent than would otherwise be practical. The material of which the spring ring is made is preferably spring steel, although other resilient material may be employed. I contemplate using material about one one-hundredth of an inch in thickness, in which case the material should be cut away from the inside of the ring to a depth of about three one-hundredths of an inch.

Having now described my invention, what I claim as new is:

1. In combination, a cylinder having a piston ring groove of substantially rectangular cross-section, a ring-shaped spring member in said groove, said member having a substantially V-shaped cross-section, and a ring in said groove, said ring having one-half of its inner surface offset from the other half thereof, whereby space is provided for the spring member.

2. In combination, a cylinder having a piston ring groove of substantially rectangular cross-section, a ring-shaped spring member in said groove, said member having a substantially V-shaped cross-section, the outer portion of said ring being cut so as to provide a plurality of adjacent fingers, and a piston ring in said groove, the inner surface of said ring having a portion thereof offset so as to provide space for the spring ring member.

3. In combination, a cylinder having a piston ring groove of substantially rectangular cross-section, a ring-shaped spring member in said groove, said member having a substantially V-shaped cross-section, the outer portion of said ring being cut so as to provide a plurality of adjacent fingers, and a piston ring in said groove, said ring having a portion of its inner surface cut away so as to form a space for the reception of the spring ring.

In testimony whereof I affix my signature.

JOHN E. BROWNFIELD.