W. H. SACKMAN.

PISTON.

APPLICATION FILED APR. 12, 1919.

1,426,913. Patented Aug. 22, 1922.

Fig. 1.

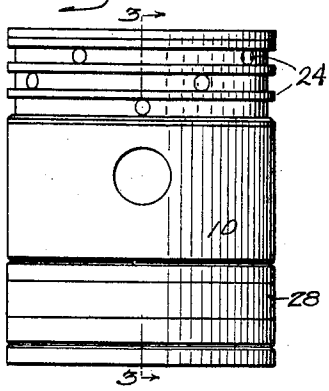


Fig. 3.

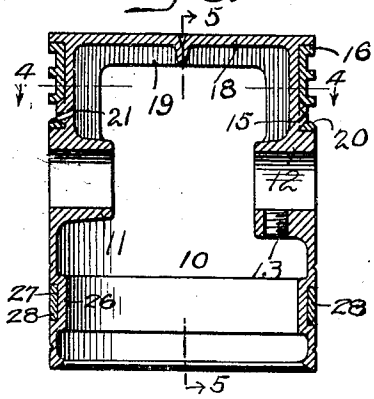


Fig. 2.

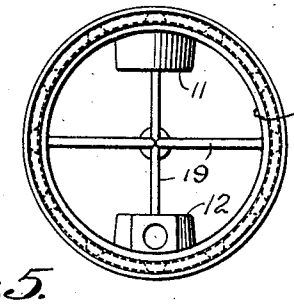


Fig. 4.

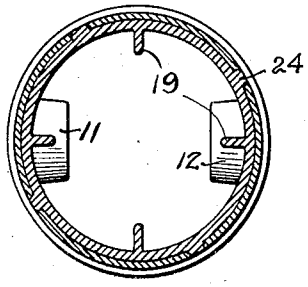


Fig. 5.

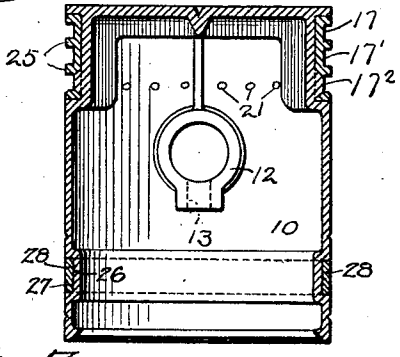


Fig. 6.

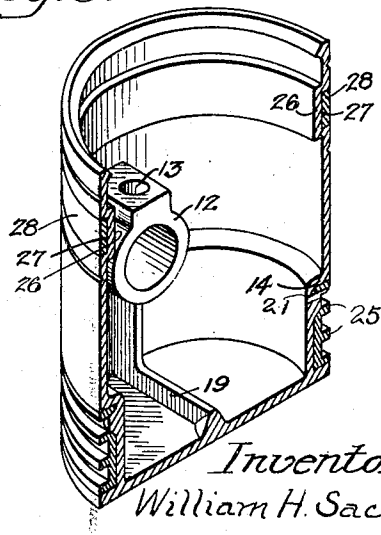
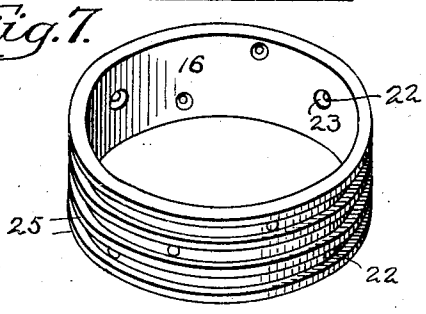


Fig. 7.



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UNITED STATES PATENT OFFICE.

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PISTON.

1,426,913. Specification of Letters Patent. Patented Aug. 22, 1922.

Application filed April 12, 1919. Serial No. 289,655.

To all whom it may concern:

Be it known that I, WILLIAM H. SACKMAN, a citizen of the United States, residing at Pottstown, in the county of Montgomery and State of Pennsylvania, have invented a certain new and useful Piston, of which the following is a specification.

My invention relates to pistons for use in the cylinders of engines driven by explosive charges, which pistons have bodies of lighter material than the piston rings to be used.

The purpose of my invention is to support the packing rings within a single shell or sleeve united with the piston body during the casting of the body and prevented from circumferential as well as radial movements with respect to the body.

A further purpose is to interfit the metal of the shell and piston by generally radial and preferably tapered projections from the one into the other.

A further purpose is to provide for oil collections and drainage through into the interior of the piston as part of or at the point of the support for the piston rings.

A further purpose is to form the projections upon the body of the piston and to so locate them that they project into the shell where the grooves are formed for the piston rings.

A further purpose is to stiffen the rear of the piston and support it against wear.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate my invention by but one form thereof, selecting a form which in use has proved to be practical, efficient, reliable and durable and which at the same time well illustrates the principles of my invention.

Figure 1 is a side elevation and Figure 2 is a top plan view of a piston body with the connected ring-supporting shell.

Figures 3 and 4 are sections of Figures 1 and 3, respectively, taken upon lines 3—3 and 4—4.

Figure 5 is a section of Figure 3, upon line 5—5.

Figure 6 is a sectioned perspective showing the same structure as is seen in the other figures.

Figure 7 is a perspective view of the ring-supporting shell.

In the drawings, similar numerals indicate corresponding parts.

The great desirability of light weight metal parts, particularly in the reciprocating mechanism of automobile engines led to considerable use of aluminum and light alloys for automobile pistons. It was at once recognized that the piston must have packing rings of a different material from the aluminum and the usual iron packing rings were applied to aluminum piston bodies. However, these harder (iron) rings very quickly wore the walls of the grooves in the aluminum pistons until the rings become "noisy." With cars of the type to which these pistons are applied this is so objectionable as to require correction at once. Even if it could be permitted to continue, leakage would soon take place which would be further objectionable. In either event recutting of the grooves and larger rings or other correction are required.

Where effort was made to insert harder metal to take the wear of the rings there was difficulty in maintaining the proper spacing and alignment of the supports and intimate attachment of these supports to the body of the piston; and where the supports were made loose in the piston body, the supports themselves rattled in the piston, creating the objection which they were intended to relieve. In those constructions most nearly approaching my invention in other features one of the most serious disadvantages lay in the turning of the insert about the body so that any eccentricity in the initial placing of the insert resulted in the projection of the "heavier" part of the insert as a "lobe," disturbing the balance of the piston as a unit and causing excessive cylinder wear opposite the lobe.

With these objections in mind, I have attempted to overcome all of the objections by uniting the supports for the individual packing rings into a common shell or band of sufficient axial length to be accurately aligned. I secure it rigidly to the piston body by radially-projecting pins cast on one part so as to extend into the other, much as spokes, and filleted or tapered, so that their bases are strengthened to maintain a maximum rigidity notwithstanding the differing coefficients of expansion of the two metals.

The body 10 of the piston is formed of light metal, such as aluminum and carries the usual apertured inwardly directed pin-

supporting bosses 11, 12 and set screw opening 13 for retention.

The piston beyond the bosses is contracted at 14 to provide for a circumferential seat 15 occupied by a preferably cast iron insert 16 in the form of a ring-supporting shell or band grooved at 17, 17′, 17^2 for packing rings, not shown. The closed end 18 and the contracted end portion are reinforced by ribs 19.

The edge 20 of the groove 17^2 is chamfered for the purpose of providing a circumferentially-extending oil groove adjoining the rear edge of the ring fitting within this groove, and the groove is connected with the interior of the cylinder by means of openings 21, so that the oil scoured from the interior of the cylinder on the back stroke of the piston is fed into the interior of the piston through these openings. These openings may extend at any convenient angle, shown as variant in Figures 3 and 6.

I have found that the shell or band insert 16 is best retained in rigid position within the piston by preliminarily forming the shell or band, centering it within the mold for the piston as well as possible and casting the body of the piston about it. The cast body material and the shell or band are interfitted by providing holes 22 in the ring shell or band, counter-sunk at 23, within which the molten body metal flows. These holes are preferably radial, like spokes 24, and are shown as terminating in the grooves 17, 17′ 17^2, as distinguished from terminating within the intermediate ribs 25. These ribs thus retain their full strength, both for stiffness and for wear.

The insert 16 is heated before being placed in the mold but is given at least a finish cut after the casting to ensure alinement.

Though the metal of the body of the piston has a higher coefficient of expansion than the cast iron and, being hotter when it is poured than the heated ring-carring shell or band, shrinks slightly away from it, it will be obvious that the diameters of the pins are so small that the difference in shrinkage between the pins and the surrounding metal of the holes in the shell or band will be slight and an effective tight engagement between the pins and the adjoining side walls will be maintained such as could not be obtained between the insert and the end walls of the groove within which they lie. In practice the pin engagement satisfactorily prevents rattling even when cold and is much more effective for this purpose at the temperature at which the piston is normally used.

It will be evident that the pin form of inter-connection between the interior material of the piston and the surrounding ring-carrying shell or band gives strong spoke-like contact and that the tapering of the pins adds to the strength of the pins against bending strain as well as greatly increasing their resistance against shearing.

In order to stiffen the piston and to reinforce it at its rear end against wear, I have restricted the piston body at 26, to form a seat 27 within which a cast iron or steel collar 28 as inserted.

The collar may be placed in position in the same manner as the shell 16, preferably with interfitting spoke-like connections between it and the body of the cylinder, and with at least a finish cut after it is cast in place.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a piston for engines operated by explosive charges, a body portion of light material having an annular seat therein, in combination with an annular ring-carrying shell within the seat and interlocking spoke-like projections from a cylindrical surface of one of the parts entering the other at intervals about the circumference.

2. In a piston for engines operated by explosive charges, a body portion of light metal having a relatively high coefficient of expansion, interlocking spoke-like pins projecting from its cylindrical surface, at intervals about the circumference, and an annular ring-carrying shell of relatively lower coefficient of expansion engaged by said projections.

3. In a piston for engines operated by explosive charges, a ring-carrying shell of generally cylindrical form having grooves for a plurality of rings and apertures extending inwardly from the grooves and a piston body located partly within the shell and extending into the apertures.

4. In a piston for engines operated by explosive charges, a ring support of generally cylindrical form having a plurality of grooves for rings and apertures extending inwardly from the grooves, enlarging inwardly and a piston body located in part within the support and having projections fitting into the apertures.

5. In a piston for engines operated by explosive charges, a ring support having radially-extending apertures growing larger in diameter as they extend inwardly, in combination with a piston body having projections fitting the apertures.

WILLIAM H. SACKMAN.