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E. T. LARKIN

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PISTON FOR INTERNAL COMBUSTION ENGINES

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Fig. 1

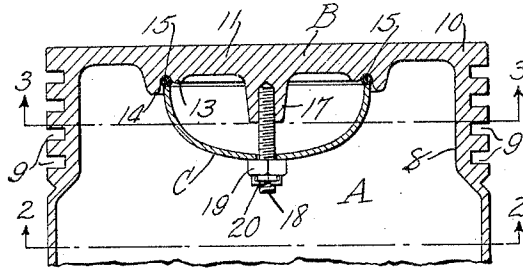


Fig. 2.

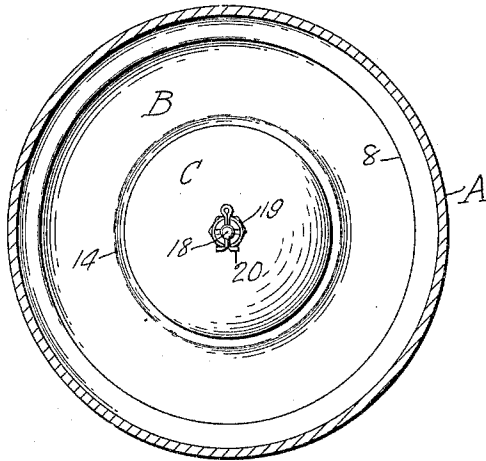
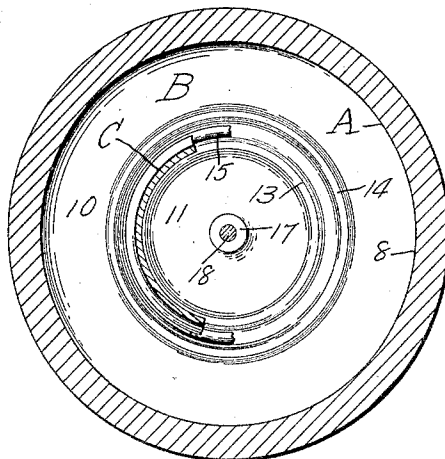


Fig. 3.



INVENTOR.

Elwood F. Larkin

by Larkin & Prochman
ATTORNEYS.

UNITED STATES PATENT OFFICE

ELWOOD T. LARKIN, OF BUFFALO, NEW YORK, ASSIGNOR TO CHARLES A. CRIQUI, OF
BUFFALO, NEW YORK

PISTON FOR INTERNAL-COMBUSTION ENGINES

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This invention relates to pistons for use in connection with internal combustion engines, and more particularly to the heads of pistons of this kind.

5 Trunk pistons as ordinarily used on internal combustion engines are subjected on the upper faces of their heads to heat resulting from the burning of the gases, which is substantially uniform at all portions of the
10 piston heads, but the edge portions of the piston heads, being closer to the cooled walls of the cylinder, can be readily maintained at a much lower temperature than the middle portions of the piston head, because the heat
15 is rapidly conducted from the edge portions to the cylinder walls. Where a trunk piston is used on a high speed internal combustion engine having pressure feed or splash lubrication, the oil or lubricant comes in contact
20 with the under side of the piston head, and the heat of the middle portion of the piston head usually causes some dissolution or cracking of the lubricant or of the fuel diluent contained in the lubricant. Carbon is thus
25 formed which may fall off in flakes or in small masses and get into the lubricating system and thus cause more or less injury to some of the bearings.

The objects of this invention are to provide
30 a piston which is so constructed that the combustion head thereof is provided in the middle portion with walls of greater thickness than at the sides, so that heat can more readily be conducted from the middle portion so
35 that the middle portion will not attain as high temperatures as in cases where the middle portion of the piston head is of lesser thickness; also to provide a guard or protector on the lower face of the piston head which is
40 arranged to prevent oil or other lubricating material or diluent contained therein from contacting with the middle portion of the lower face of the piston; also to improve the
45 construction of pistons in other respects hereinafter specified.

In the accompanying drawings,

50 Fig. 1 is a sectional elevation of the upper part of a piston having a combustion head embodying this invention.

Fig. 2 is a sectional, bottom plan view thereof on line 2—2, Fig. 1.

Fig. 3 is a sectional, bottom plan view thereof approximately on line 3—3, Fig. 1.

A represents the cylindrical wall of the
55 piston which is provided near the upper portion of the piston with the usual portion 8 of increased thickness, having a series of annular slots 9 in the outer surface thereof in which the piston rings (not shown) are arranged when the piston is assembled in a
60 cylinder. B represents the top wall or combustion head of the piston, which is usually formed integral with the cylindrical wall A. The combustion head or top wall B of the
65 piston is provided with an annular portion 10 adjoining the cylindrical wall A which is approximately of the thickness of which these combustion heads are usually made. However the intermediate or middle portion 11 of
70 the combustion head is of greater thickness than the peripheral portion 10. Consequently the portion 11 of greater thickness can more readily conduct heat radially toward
75 the cylindrical wall of the piston and also has a greater capacity for storing or absorbing heat so that this portion of the piston head will not attain as high a temperature as it would if it were made of less thickness.
80 Consequently the danger of cracking or dissolution of lubricant or of diluents contained therein, when coming in contact with the lower face of the combustion head, is greatly reduced.

In order to prevent the lubricant or diluent
85 contained in the lubricant from splashing against or otherwise coming in contact with the under face of the combustion head of the piston, a protector or guard C is preferably arranged on the under side of the combustion
90 head. This guard may be of any suitable or desired construction, that shown being in the form of a metal stamping of concaved or inverted dome shape, which is preferably so
95 secured to the under side of the combustion head that the edge portions thereof form a substantially tight joint with the combustion head and which forms an enclosed air space between the under face of the middle portion of the combustion head and the guard.
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Since air is a poor conductor of heat, the guard remains cool enough so that any lubricant which contacts therewith will not be damaged. Any suitable means may be provided for holding this protector or guard in place on the under face of the combustion head of the piston. In the particular construction shown the under face of the combustion head of the piston is provided with a pair of annular projections or bosses 13 and 14, between which a groove or recess is formed in which an annular gasket or a packing ring 15 is arranged, against which the upper edges of the guard C may be pressed. The piston head may also be provided with a central lug 17 with which a screw or stud 18 has a threaded engagement. The protector or guard C is provided with a central aperture through which the stud 18 extends and a nut 19 and cotter pin 20 or other suitable device or devices for securing the guard in place may be used. By means of the construction described the stud and nut hold the guard securely in place and also press the edges thereof against the packing or gasket member 15 so that none of the lubricant may enter into the space between the guard C and the lower surface of the combustion head. The air contained within the guard C is a comparatively poor conductor of heat, and the gasket used may also, if desired, be made of material which is a poor conductor of heat so that the guard C will not attain anywhere nearly as high a temperature as the lower face of the combustion head of the piston, particularly in view of the fact that the portions of the combustion head against which the edges of the guard are pressed is removed from the central portion of the combustion head and are consequently not as hot as portions thereof arranged nearer the center of the combustion head. Consequently any lubricant splashing against the guard will not be in any way damaged, and no carbon will be formed on the lower face of the piston head, so that damage to any of the bearings of the engine from this source is avoided.

It will be obvious that by means of the construction described, the guard C can be maintained at a comparatively low temperature because of the thickness of the middle portion of the combustion head of the piston. It will be understood, however, that the guard described can be used with good results on pistons in which the middle portion of the combustion head is of the same or of less thickness than the portions thereof nearer the cylindrical wall of the piston. The guard can be made of very light material and adds practically nothing to the weight of the piston.

I claim as my invention:—

1. A piston for an internal combustion engine including a cylindrical wall and a head, said piston being provided below said head with a guard to prevent lubricating material

from splashing against the under side of said head, and a stud extending from the under side of said piston through said guard for securing said guard in operative position.

2. A piston for an internal combustion engine including a cylindrical wall and a head, and a guard of concave construction arranged substantially concentrically on the under face of said head and having its edge portions pressed toward said head at portions thereof remote from the middle portion of said head, whereby said edges are exposed to a lower temperature than the temperature of the middle portion of said head, said guard preventing lubricant from contacting with the middle portion of the under face of said head.

3. A piston for an internal combustion engine including a cylindrical wall and a head, a guard having its edges arranged to form a substantially tight joint with the under side of said combustion head and confining an air space between said combustion head and said guard and preventing the splashing of lubricant against the under side of said intermediate portion of said combustion head, and means for holding said guard in place.

4. A piston for an internal combustion engine including a cylindrical wall and a head, a guard having its edges arranged to form a substantially tight joint with the under side of said combustion head and confining an air space between said combustion head and said guard and preventing the splashing of lubricant against the under side of said intermediate portion of said combustion head, and a threaded member connecting said guard and said combustion head for holding said guard in its operative position on the under face of said combustion head.

5. A piston having a cylindrical wall and a head formed integral therewith, said head being provided with an annular groove on the under face thereof extending around the middle portion of said head, a guard of inverted dome shape secured to the lower side of said head and having its edge portions extending into said groove, a packing ring between said groove and said edges, and means for pressing said guard upwardly against the lower face of said head.

6. A cylinder including a cylindrical wall and a combustion head, said combustion head having an annular portion adjacent to said cylindrical wall and an intermediate portion of greater thickness than said annular portion, and a guard secured on the lower face of said combustion head and confining an air space between said intermediate portion and said guard and preventing the splashing of lubricant against said intermediate portion of said combustion head.

7. A cylinder including a cylindrical wall and a combustion head, said combustion head having an annular portion adjacent to said cylindrical wall and an intermediate portion

of greater thickness than said annular portion, an annular groove formed between said intermediate portion and said annular outer portion of said combustion head, a guard of
5 inverted dome shape having its edge portions arranged to extend into said groove, a gasket arranged in said groove and against which said edge portions are adapted to bear, a central stud secured to said combustion head and
10 extending through an aperture in said guard, and means on said stud for securing said guard in operative position on the lower face of said combustion head.

8. A piston for an internal combustion engine including a cylindrical wall and a head,
15 a guard arranged below the piston head and having its edge portions engaging the under side of said head, said head being shaped to form an air space between a portion of the
20 under side of said head and said guard to prevent splashing of lubricant against the portion of said head protected by said guard, and securing means directly connecting said head and said guard.

25 ELWOOD T. LARKIN.

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