

[54] **SEALING BAR FOR A ROTARY PISTON INTERNAL COMBUSTION ENGINE**

[75] Inventor: **Heinz Lamm**, Esslingen-St. Bernhardt, Germany

[73] Assignee: **Daimler-Benz Aktiengesellschaft**, Stuttgart Unterturekheim, Germany

[22] Filed: **Jan. 25, 1971**

[21] Appl. No.: **109,474**

[30] **Foreign Application Priority Data**
Jan. 24, 1970 Germany..... P 20 03 203.5

[52] U.S. Cl..... **418/117, 418/113**
[51] Int. Cl.... **F01c 19/02, F04c 15/00, F04c 27/00**
[58] Field of Search..... 418/113, 117, 119-124, 418/145; 277/81 P

[56] **References Cited**
UNITED STATES PATENTS

3,194,489	7/1965	Frenzel	418/117
3,263,912	8/1966	Frenzel	418/121
3,286,912	11/1966	Tado.....	418/120
3,300,124	1/1967	Jones	418/121

3,180,564	4/1965	Fuhrmann et al.	418/122
3,120,815	2/1964	Froede.....	418/123
3,215,340	11/1965	Lamm.....	418/124
3,270,954	9/1966	Yamamoto	418/113

FOREIGN PATENTS OR APPLICATIONS

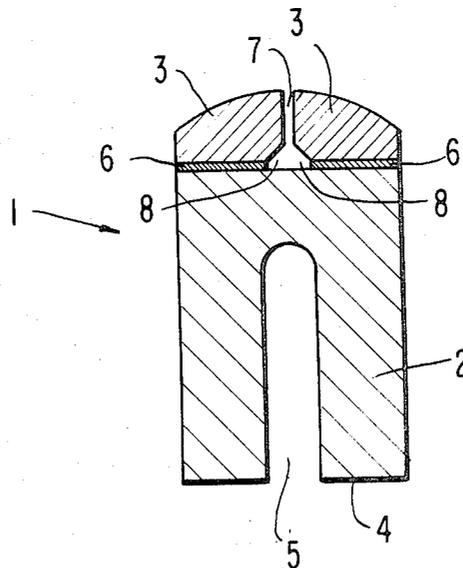
1,083,041	6/1954	France.....	418/113
-----------	--------	-------------	---------

Primary Examiner—Carlton R. Croyle
Assistant Examiner—John J. Vrablik
Attorney—Craig, Antonelli, Stewart & Hill

[57] **ABSTRACT**

A sealing bar for a rotary piston internal combustion engine, particularly of trochoidal construction, which is arranged within a piston groove so as to be movable in a radial direction, and which sealingly slides with its head portion along a contact surface in the housing case of the internal combustion engine; the sealing bar is provided with a multi-partite, preferably two-partite, wear head portion subdivided substantially parallel to the longitudinal axis and having small-connecting surfaces with respect to the support portion of the sealing bar.

28 Claims, 4 Drawing Figures



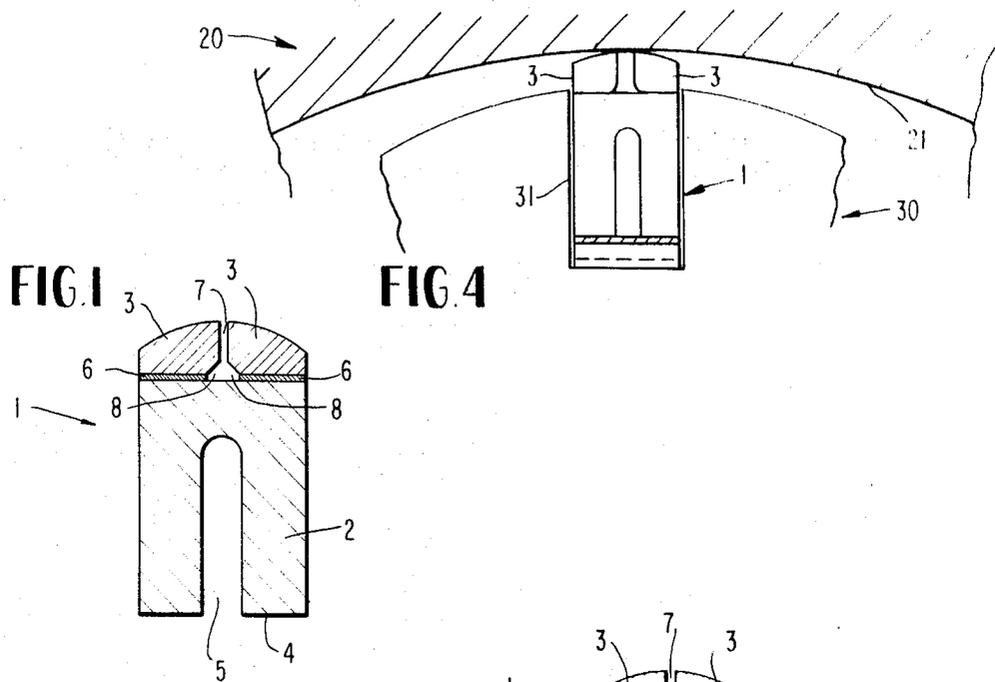


FIG. 1

FIG. 4

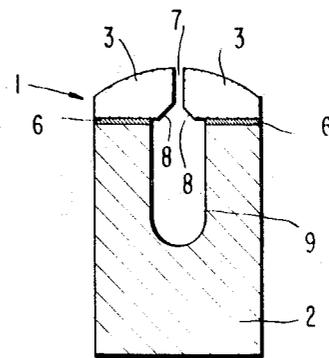


FIG. 2

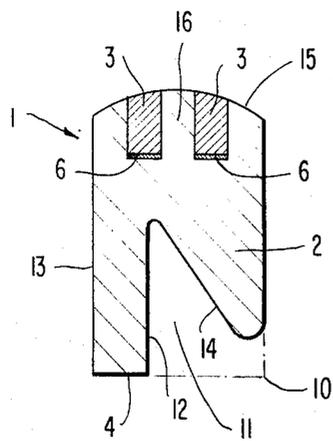


FIG. 3

INVENTOR
HEINZ LAMM

BY *Craig, Antonelli, Stewart & Hill*

ATTORNEYS

SEALING BAR FOR A ROTARY PISTON INTERNAL COMBUSTION ENGINE

The present invention relates to a sealing bar for a rotary piston internal combustion engine, particularly of trochoidal type of construction, which is arranged within a piston groove movable in a radial direction and which with its dome or head portion sealingly slides along an engaging or running surface in the housing case of the internal combustion engine.

With the known sealing bars, stresses occur on the inside during the manufacture as also during the operation as a result of the differing expansion conditions and moduli of elasticity. The present invention is concerned with the task to avoid these stresses to the greatest possible extent. The underlying problems are solved by the present invention in that the sealing bar is provided with a multi-partite, preferably two-partite, wear head portion subdivided parallel to its longitudinal axis and having small connecting surfaces with respect to the support portion. The stresses leading to disturbances during operation are reduced in this manner.

In an advantageous construction of the subject matter of the present invention, the connecting surfaces may be arranged preferably only horizontally. Furthermore, an elastic connecting layer of conventional material may be provided at the connecting surfaces. The elastic connection may be formed, for example, by an elastic soldering (brazing) or adhesive connection as used for the installation of gas turbine blades. The elastic connecting material may consist, for example, of an elastic alloy to be melted-in — customary in connections for metal to ceramic or glass — or of an elastic metal adhesive, as long as these materials can be used within a temperature range of about 400° centigrade to 1,000° centigrade. As a result of the small, horizontal elastic connecting layer, an occurrence of residual stresses is nearly completely avoided.

According to a further feature of the present invention, a very narrow gap may exist between the parts of the wear head portion made of customary wear material. This small gap assures freedom from stress of the parts with respect to one another.

Accordingly, it is an object of the present invention to provide a sealing bar for a rotary piston internal combustion engine which avoids by simple means the aforementioned shortcomings and drawbacks encountered heretofore.

Another object of the present invention resides in a sealing bar for a rotary piston internal combustion engine of trochoidal construction which at least greatly minimizes the stresses occurring on the inside thereof during manufacture and operation as a result of differences in the expansion conditions and moduli of elasticity.

A further object of the present invention resides in a sealing bar of the type described above which not only minimizes the operational stresses, but almost completely eliminates any residual stresses by extremely simple means.

These and further objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, several embodiments in accordance with the present invention, and wherein:

FIGS. 1 to 3 illustrate cross-sectional views through three embodiments of a sealing bar in accordance with the present invention; and

FIG. 4 illustrates a cross-sectional view of a portion of a rotary piston internal combustion engine of trochoidal construction.

Referring now to the drawing wherein like reference numerals are used throughout the various views to designate like parts and, more particularly, to FIG. 1, a sealing bar generally designated by reference numeral 1 is illustrated in this figure which consists of a support portion 2 made of conventional support material and of a wear head portion 3 made of conventional wear material. The sealing bar 1 is provided at its bottom side 4 with a slot 5 whose width corresponds to approximately one-fourth of the width of the sealing and whose height corresponds to approximately three-fourths of the height of the sealing bar 1. The wear head portion 3 is subdivided along its longitudinal axis and is so secured on the support portion 2 by means of an elastic connecting layer 6 of any conventional material, known per se, that a narrow gap 7 remains between its two parts 3 which assures the freedom from stress of the two parts 3 with respect to one another. In order to counteract any residual stresses that may possibly still occur notwithstanding the elastic connecting layer 6 between the support portion 2 and the wear head portion 3, both mutually facing lower edges 8 of the two parts of the wear head portion 3 are beveled off whereby the connecting surfaces of the support portion 2 and of the wear portion 3 are reduced.

The sealing bar generally designated by reference numeral 1 and illustrated in FIG. 2 consists of a support portion 2 and of a subdivided wear head portion 3 which is constructed exactly as the wear head portion 3 illustrated in FIG. 1. In contradistinction to FIG. 1, in the support portion 2 of the embodiment of FIG. 2, a slot 9 is arranged facing the wear portion 3 whose width corresponds to approximately a third of the width of the sealing bar 1 and whose height corresponds to approximately half the height of the sealing bar 1.

A sealing bar generally designated by reference numeral 1 is illustrated in FIG. 3 in which an aperture 11 approximately V-shaped in cross-section is provided which starts from a lower edge 10 of the support portion 2; one side 12 of the V-shaped aperture 11 extends parallel to a flank 13 of the sealing bar 1 disposed opposite the edge 10 and the other side 14 of the V-shaped aperture 11 extends approximately in the diagonal direction of the cross-section of the sealing bar 1. The height of the aperture 11 corresponds to approximately three-fourths of the width of the sealing bar 1. Two parts of the wear head portion 3 with a thickness corresponding to about one-fifth of the width of the sealing bar 1 are arranged at the top side 15 of the support portion 2 with a web portion 16 of the support portion 2 having about the same thickness arranged therebetween. The two parts of the wear portion 3 are wear-determinative for the entire top side 15. They are connected at its bottom side thereof by the elastic connecting layer 6 with the support part 2.

As shown in FIG. 4 the sealing bar 1 is disposed in a slot 31 provided in a piston generally designated by the reference numeral 30 so as to enable the wear head portion 3 to engage the piston grooves 21 provided in the housing casing of the rotary piston internal combustion engine.

tion engine generally designated by the reference numeral 20.

While I have shown and described only three embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to those skilled in the art. For example, the features described in the foregoing specification and illustrated in the drawing, as well as defined by the claims, may be utilized individually with conventional sealing bars, or may be interchanged individually as well as in suitable combination with one another for the realization of the present invention in various types of construction. Consequently, I do not wish to be limited to the details shown and described herein, but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. A sealing bar for a rotary piston internal combustion engine which includes a housing casing and a piston provided with piston grooves, said sealing bar being movably arranged in a radial direction within a piston groove and sliding sealingly with a head portion thereof along engaging surface means provided in the housing case of the internal combustion engine, characterized in that the sealing bar is provided with a multi-partite wear head portion subdivided over its entire length in the longitudinal direction thereof, the wear head portion is supported on a support portion disposed therebelow by way of connecting surfaces of relatively small dimensions relative to the width of the sealing bar, and in that means are provided for avoiding stresses in the sealing bar which are caused by different thermal expansions of the utilized materials including an elastic layer means provided on the connecting surfaces for connecting the wear head portion to the support portion and a slot means provided in the support portion with at least a portion of the slot means extending substantially parallel to the longitudinal axis of the support portion.

2. A sealing bar according to claim 1, characterized in that all parts of the multi-partite wear portion are made of wear material.

3. A sealing bar according to claim 1, characterized in that said connecting surfaces extend at substantially right angle to the vertical longitudinal center plane of the sealing bar.

4. A sealing bar according to claim 1, characterized in that said connecting surfaces extend only in plane at least approximately at right angle to the outer longitudinal surfaces of the bar.

5. A sealing bar according to claim 1, characterized in that the connecting surfaces are provided only substantially horizontally relative to the longitudinal direction.

6. A sealing bar according to claim 1, characterized in that the connecting surfaces extend over a distance smaller than the width of a sealing bar.

7. A sealing bar according to claim 6, characterized in that said connecting surfaces are spaced from one another by a gap in the direction of the width of the sealing bar.

8. A sealing bar according to claim 1, characterized in that the individual parts of the multi-partite wear head portion are separate from one another by a small gap extending in said longitudinal direction over the entire length of the sealing bar.

9. A sealing bar according to claim 8, characterized in that said connecting surfaces are angularly disposed to the plane of separation of the individual parts of the multi-partite wear head portion, said plane of separation also containing said gap.

10. A sealing bar according to claim 9, characterized in that all parts of the multi-partite wear portion are made of wear material.

11. A sealing bar according to claim 10, characterized in that the connecting surfaces extend over a distance smaller than the width of a sealing bar.

12. A sealing bar according to claim 11, characterized in that said connecting surfaces are spaced from one another by a gap in the direction of the width of the sealing bar.

13. A sealing bar according to claim 1, characterized in that the slot means extends from the bottom side of the sealing bar substantially in the center of the sealing bar cross section, the width of said slot corresponding to about one-fourth to one-third of the width of the sealing bar and the height thereof corresponding to about one-half to three-quarters of the height of the sealing bar.

14. A sealing bar according to claim 13, characterized in that a narrow gap exists between the parts of the wear portion.

15. A sealing bar according to claim 1, characterized in that the slot means is arranged in the part of the support portion facing the wear portion, the width of said slot corresponding to about one-third of the width of the sealing bar and the height thereof corresponding to about one-half of the height of the sealing bar.

16. A sealing bar according to claim 13, characterized in that a narrow gap exists between the parts of the wear portion.

17. A sealing bar according to claim 1, characterized in that the slot aperture means includes an approximately V-shaped in cross section starting from a lower edge of the sealing bar, one side of said aperture being substantially parallel to a flank disposed opposite to one of the edges of the sealing bar and the other side extending approximately in the diagonal direction of the cross section of the sealing bar, the height of said aperture corresponding approximately to half the height of the sealing bar and the width thereof at the bottom side corresponding to about three-fourths of the width of the sealing bar.

18. A sealing bar according to claim 17, characterized in that two sections of the wear portion with a thickness each of about one-fifth of the width of the sealing bar are arranged in the support portion with a web of the support portion disposed therebetween which has about the same thickness.

19. A sealing bar according to claim 1, characterized in that the wear portion is subdivided substantially parallel to its longitudinal axis.

20. A sealing bar according to claim 19, characterized in that the connecting surfaces are provided only substantially horizontally relative to the longitudinal direction.

21. A sealing bar according to claim 20, characterized in that said head portion is of two-partite construction.

22. A sealing bar according to claim 20, characterized in that the slot means extends in the longitudinal direction of the sealing bar.

23. A sealing bar according to claim 20, characterized in that the slot means extends from the bottom side of the sealing bar substantially in the center of the sealing bar cross section, the width of said slot corresponding to about one-fourth to one-third of the width of the sealing bar and the height thereof corresponding to about one-half to three-quarters of the height of the sealing bar.

24. A sealing bar according to claim 23, characterized in that a narrow gap exists between the parts of the wear portion.

25. A sealing bar according to claim 20, characterized in that the slot is arranged in the part of the support portion facing the wear portion, the width of said slot means corresponding to about one-third of the width of the sealing bar and the height thereof corresponding to about one-half of the height of the sealing bar.

26. A sealing bar according to claim 25, characterized in that a narrow gap exists between the parts of the

wear portion.

27. A sealing bar according to claim 20, characterized in that the slot means includes an aperture approximately V-shaped in cross section starting from a lower edge of the sealing bar one side of said aperture being substantially parallel to a flank disposed opposite to one of the edges of the sealing bar and the other side extending approximately in the diagonal direction of the cross section of the sealing bar, the height of said aperture corresponding approximately to half the height of the sealing bar and the width thereof at the bottom side corresponding to about three-fourths of the width of the sealing bar.

28. A sealing bar according to claim 27, characterized in that two sections of the wear portion with a thickness each of about one-fifth of the width of the sealing bar are arranged in the support portion with a web of the support portion disposed therebetween which has about the same thickness.

* * * * *

25

30

35

40

45

50

55

60

65