(12) UK Patent Application (19) GB (11) 2 064 387 A

(21) Application No **8037166**
(22) Date of filing **19 Nov 1980**
(30) Priority data
(31) **2947091**
(32) **22 Nov 1979**
(33) **Fed. Rep. of Germany (DE)**
(43) Application published
17 Jun 1981
(51) **INT CL³**
B21D 31/00
(52) Domestic classification
B3E 14F 2 AK
(56) Documents cited
GB 1564642
(58) Field of search
B3E
(71) Applicants
SKF Kugellagerfabriken GmbH, Postfach 1440, D—8720 Schweinfurt 2, German Federal Republic
(72) Inventors
Armin Olschewski, Manfred Brandenstein, Lothar Walter, Heinrich Kunkel
(74) Agents
Boult, Wade & Tennant, 27 Furnival Street, London EC4A 1PQ

(54) **A method of forming an axially directed split in a race ring for a rolling bearing and a race ring having such a split**

(57) A race ring (10) is formed with a radial bore (11) and an offset notch (14) in one end face (12). The ring (10) is supported at two spaced locations (15, 16) on the one end face (12) and an axial force (P) is applied until a break (17) is formed. A second notch (18) is formed in the other axial end face (13) and is similarly offset, and the ring is again supported and again an axial force (P) is applied until a second break (19) is formed. The ring (10) is thus formed with a V-shaped split extending from one axial end face to the other.

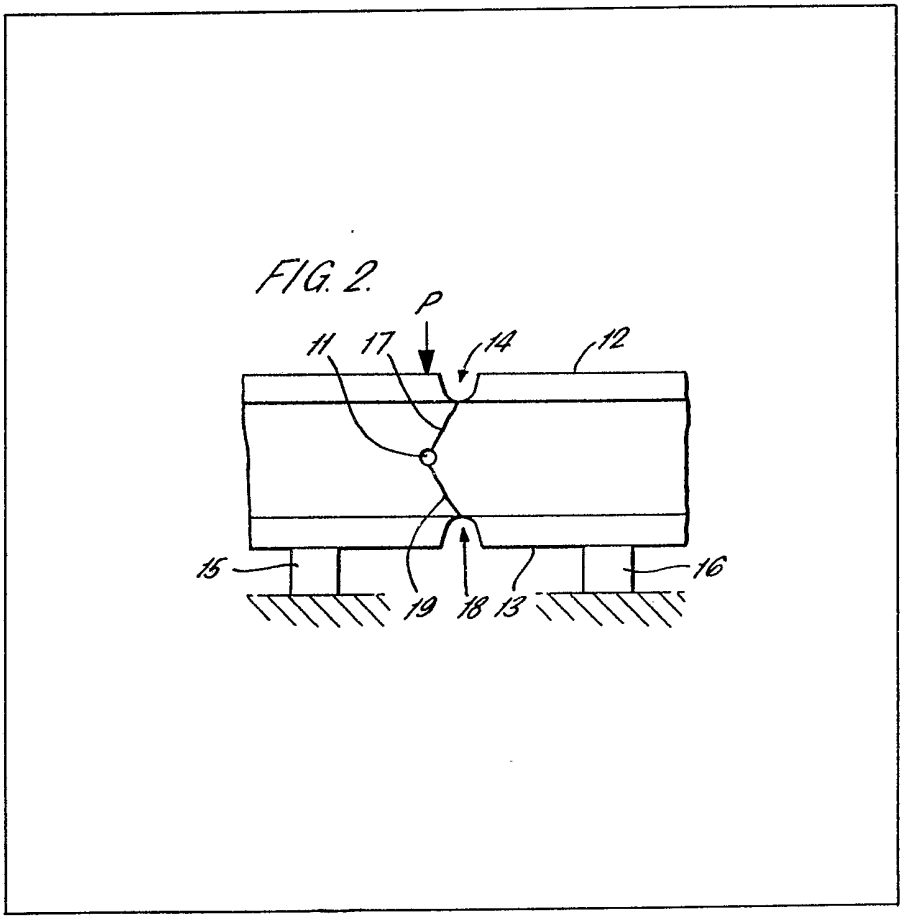

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FIG. 1.

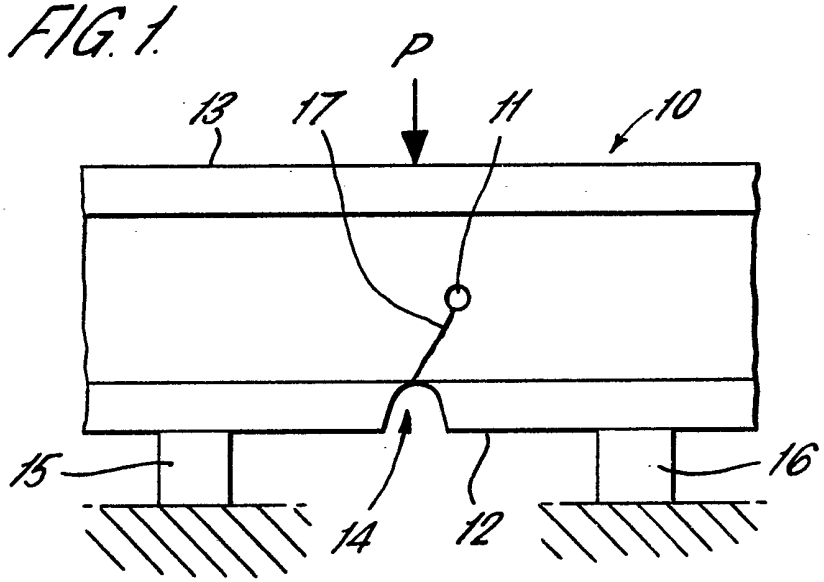
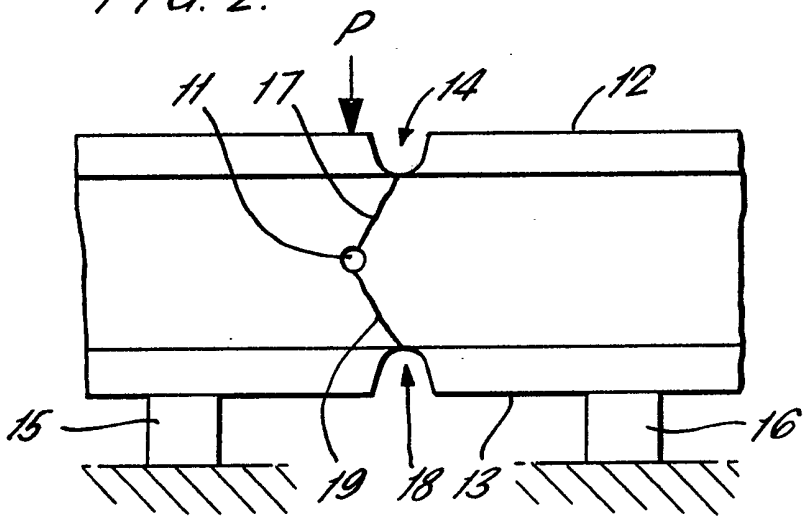


FIG. 2.



SPECIFICATION

A method of forming an axially directed split in a race ring for a rolling bearing, and a race ring having such a split

This invention concerns a method of forming an axially directed split in a race ring for a rolling bearing, and includes a race ring having such a split formed by the method.

Ordinarily rolling bearings, despite their advantages, cannot be used in some cases because the bearings are difficult to gain access to and the one piece closed race rings cannot be fitted on a shaft or inserted into a housing. In such cases rolling bearings having split or two piece race rings have been known to be used, the split extending axially and the two pieces each being part of a circle; either the rings are produced and treated as split or two piece rings from the start, or they are produced as one piece closed rings and are then split or broken into two.

In a known process for producing two piece race rings by first forming the closed one piece ring and then splitting or breaking the ring into two, each split or break usually extends parallel to the axis of the bearing, with the disadvantage that special means are required to prevent the two pieces of the ring, when assembled together, from shifting axially relative to one another.

The invention provides a method of forming an axially directed split in a race ring for a rolling bearing comprising

i) forming a radial bore through the ring,

ii) forming a first notch in one axial end face of the ring at a first position adjacent to and circumferentially spaced from the radial bore, the notch not extending axially to the radial bore but extending radially across the radial width of the ring at the first position,

iii) engaging the ring at first and second spaced locations on the said one axial end face of the ring with the radial bore and the first notch lying between the said two locations,

iv) engaging the ring at a third location on the other axial end face of the ring and axially in line with the first notch, and

v) compressing the ring axially between the said first and second locations and the said third location until a first break in the ring is formed from the first notch to the radial bore,

vi) then forming a second notch in the said other axial end face of the ring at a second position adjacent to and circumferentially spaced from the radial bore and on the same circumferential side of the radial bore as the first notch, the second notch not extending axially to the radial bore but extending radially across the radial width of the ring at the second position,

vii) engaging the ring at fourth and fifth spaced locations on the said other axial end face of the ring with the two notches and the radial bore lying between the said two locations,

viii) engaging the ring at a sixth location on the said one axial end face of the ring and axially in line with the radial bore, and

ix) compressing the ring axially between the said fourth and fifth locations and the said sixth location until a second break in the ring is formed from the second notch to the radial bore so that a V-shaped split is formed in the ring from one axial end face to the other axial end face of the ring.

To produce a two piece race ring by forming two axially directed splits in the ring, the method may include

i) forming two diametrically opposed radial bores through the ring,

ii) forming two diametrically opposed notches in the same axial end face of the ring,

iii) forming breaks in the ring from the notches to the radial bores,

iv) then forming two diametrically opposed notches in the other axial end face of the ring, and

v) forming breaks in the ring from the latter notches to the radial bores.

The invention also includes a race ring for a rolling bearing produced by a method according to the invention.

An embodiment of the invention will now be described by way of example, reference being made to the accompanying drawings, of which:

Figure 1 is a radial view of part of a race ring for a rolling bearing at one stage in the method according to the invention where the first break is formed; and

Figure 2 is a similar view of the same race ring at another stage in the method according to the invention where the second break is formed.

Figure 1 shows a finished edged race ring 10, such as a race ring for a deep groove ball bearing, which has been formed with a radial bore 11 extending through the race ring. The bore 11 is positioned axially mid-way between the lower axial end face 12 and the upper axial end face 13 of the ring 10.

A first notch 14 is formed in the lower face 12 of the ring 10 and is positioned adjacent to and circumferentially spaced from the radial bore 11. The notch 14 extends axially as deep as the edge at that end face 12 but does not extend axially as far as the radial bore 11. The notch 14 does extend radially across the radial width of the ring 10.

The ring 10 is supported by two spaced apart supports 15 and 16 which engage the lower end face 12 at first and second locations with the radial bore 11 and the notch 14 lying between them.

An axial force P is then applied to the upper end face 13 of the ring 10 at a third location axially in line with the first notch 14 and the ring is compressed axially between the first and second locations and the third location until a first break 17 in the ring is formed from the notch 14 to the radial bore 11.

Referring now to Figure 2, in which the ring 10 has been turned over, a second notch 18 is subsequently formed in the other axial end face 13 of the ring 10 at a second position adjacent to and circumferentially spaced from the radial bore 11, and on the same circumferential side of the radial

bore as the first notch 14. The second notch 18 extends axially as deep as the edge at that end face 13 but does not extend axially as far as the radial bore 11. The notch 18 does extend radially across the radial width of the ring 10.

The ring 10 is again supported by two spaced apart supports 15 and 16 which engage the other axial end face 13 at fourth and fifth locations with the two notches 14 and 18 and the radial bore 11 lying between them.

Again an axial force P is then applied to the end face 12 of the ring 10, at a sixth location axially in line with the radial bore 11, and the ring is compressed axially between the fourth and fifth locations and the sixth location until a second break 19 in the ring is formed from the notch 18 to the radial bore 11.

The ring 10 is thus formed with a V-shaped split extending from one axial end face 12 to the other axial end face 13.

To produce a two piece race ring, two diametrically opposite radial bores extending through the ring are formed. Two diametrically opposite notches are formed in the same axial end face of the ring and the ring is supported and an axial force is applied until breaks are formed in the ring from the notches to the radial bores. Then two further diametrically opposite notches are formed in the other axial end face of the ring and the ring is supported and an axial force is applied until breaks are formed in the ring from these further notches to the radial bores.

The method can vary. For instance, the race ring can be split either before or after it has been hardened. Also the radial bore or bores need not be positioned axially mid-way between the axial end faces of the ring. The radial bore or bores and the notch or notches in the one axial end face of the ring can be formed during the machining of the ring, for example, before hardening. The second notch or notches must however be formed only after the first break or breaks have been formed.

The notches can be formed in various ways, such as by grinding. Also the axial depth of the notch or notches can vary; for instance, in contrast to what has been described in the embodiment, the notch or notches in an edgeless race ring can be much shallower than shown to ensure the breaking of the ring along the required line.

CLAIMS

1. A method of forming an axially directed split in a race ring for a rolling bearing comprising

i) forming a radial bore through the ring,

ii) forming a first notch in one axial end face of the ring at a first position adjacent to and circumferentially spaced from the radial bore, the notch not extending axially to the radial bore but extending radially across the radial width of the ring at the first position,

iii) engaging the ring at first and second spaced locations on the said one axial end face of the ring with the radial bore and the first notch lying between the said two locations,

iv) engaging the ring at a third location on the other axial end face of the ring and axially in line with the first notch, and

v) compressing the ring axially between the said first and second locations and the said third location until a first break in the ring is formed from the first notch to the radial bore,

vi) then forming a second notch in the said other axial end face of the ring at a second position adjacent to and circumferentially spaced from the radial bore and on the same circumferential side of the radial bore as the first notch, the second notch not extending axially to the radial bore but extending radially across the radial width of the ring at the second position,

vii) engaging the ring at fourth and fifth spaced locations on the said other axial end face of the ring with the two notches and the radial bore lying between the said two locations,

viii) engaging the ring at a sixth location on the said one axial end face of the ring and axially in line with the radial bore, and

ix) compressing the ring axially between the said fourth and fifth locations and the said sixth location until a second break in the ring is formed from the second notch to the radial bore so that a V-shaped split is formed in the ring from one axial end face to the other axial end face of the ring.

2. A method as claimed in claim 1, wherein, to produce a two piece race ring by forming two axially directed splits in the ring, the method includes

i) forming two diametrically opposed radial bores through the ring,

ii) forming two diametrically opposed notches in the same axial end face of the ring,

iii) forming breaks in the ring from the notches to the radial bores,

iv) then forming two diametrically opposed notches in the other axial end face of the ring, and

v) forming breaks in the ring from the latter notches to the radial bores.

3. A method of forming an axially directed split in a race ring for a rolling bearing substantially as herein described with reference to and as shown in the accompanying drawings.

4. A race ring for a rolling bearing having one or more splits produced by a method as claimed in any preceding claim.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1981. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.