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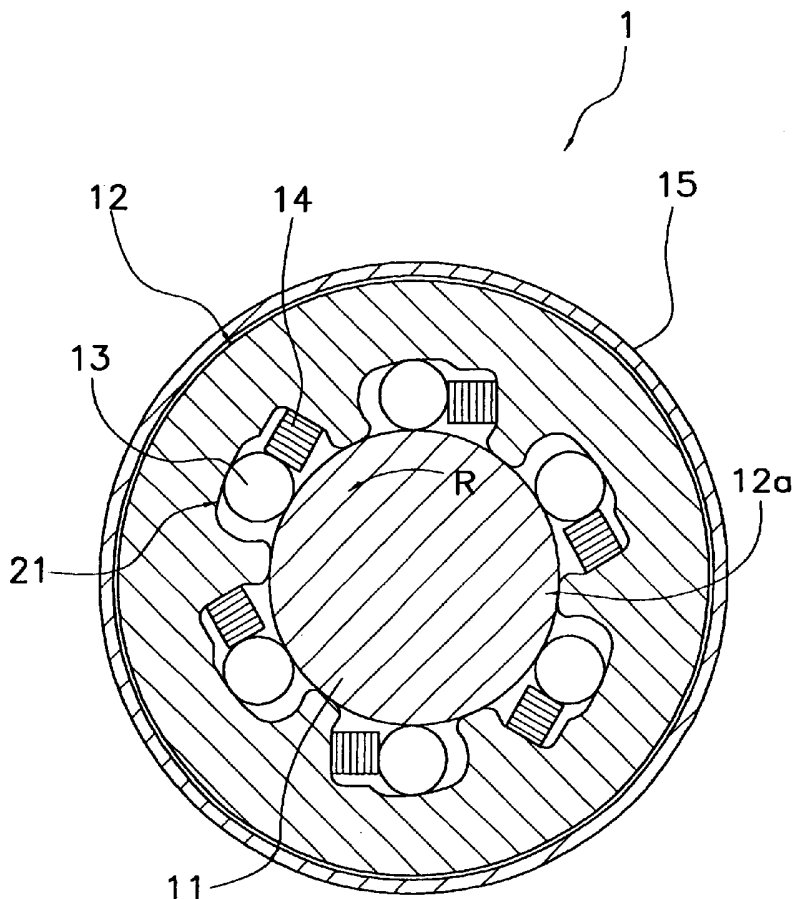
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[Continued on next page]

(54) Title: METHOD OF PRODUCING ONE-WAY CLUTCH



(57) Abstract: A method of producing a one way clutch (1) includes a preparation step of providing a disk-shaped blank (31) from which an outer race (12) is to be formed, a preforming step of performing cold presswork on the disk-shaped blank to reduce the thickness of the disk-shaped blank, a forming step of using a metal die having a shape with which a through-hole (12a) into which a shaft member (11) is to be fitted, a plurality of pocket portions (21) and retaining portions (22, 23) can be stamped at a time to perform cold stamping on the disk-shaped blank to complete the outer race, and an assembling step of assembling resilient members (14) and rollers (13) into the pocket portions of the outer race and fitting the outer race with the outer circumference of the shaft member, thereby completing the one-way clutch.



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DESCRIPTION

METHOD OF PRODUCING ONE-WAY CLUTCH

TECHNICAL FIELD

This invention relates generally to a method of producing
5 a one-way clutch. More particularly, it relates to a method of
producing a one-way clutch which includes a shaft member, an outer
race disposed on an outer circumference side of the shaft member
and having a plurality of pocket portions provided on an inner
circumferential face thereof in such a manner as to be concave
10 toward the outer circumference side, and a roller and a resilient
member accommodated in each of the pocket portions.

BACKGROUND ART

A one-way clutch of the type described includes a shaft
15 member, an outer race disposed on an outer circumference side of
the shaft member and having a plurality of pocket portions
provided on an inner circumferential face thereof in such a manner
as to be concave toward the outer circumference side, and a roller
and a resilient member accommodated in each of the pocket portions.
20 A one-way clutch having such a configuration as just described
is produced by performing broaching for a disk-type blank to form
a plurality of pocket portions and a through-hole, into which a
shaft member is to be fitted, in the disk-type disk-shaped blank
to complete an outer race, assembling rollers and resilient
25 members into the pocket portions and then fitting the outer race
with the shaft member.

In the production of an outer race of a one-way clutch

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described above, a plurality of broaches is used to form the pocket portions, and therefore, the number of man-hours is great.

The subject of the present invention resides in provision of a method of producing a one-way clutch by which the number of
5 man-hours for working an outer race can be reduced.

DISCLOSURE OF THE INVENTION

According to an aspect of the present invention, there is provided a method of producing a one-way clutch which includes
10 a shaft member, an outer race disposed on an outer circumference side of the shaft member and having a plurality of pocket portions provided on an inner circumferential face thereof in such a manner as to be concave toward the outer circumference side, and a roller and a resilient member accommodated in each of the pocket portions,
15 the method comprising: a preparation step of providing a disk-shaped blank; a preforming step of performing cold presswork on the disk-shaped blank to reduce the thickness of the disk-shaped blank; a forming step of performing cold presswork on the disk-shaped blank subsequently to the preforming step to form a
20 through-hole into which the shaft member is to be fitted and the pocket portions in the disk-shaped member to complete the outer race; and an assembling step of assembling the rollers and the resilient members into the pocket portions and fitting the outer race with the shaft member.

25 The one-way clutch production method is characterized in that cold presswork (forming step) is performed on a disk-shaped blank to produce an outer race. By this, the number of man-hours

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can be reduced when compared with that of a conventional method wherein a plurality of broaches are used to form an outer race.

Desirably, the outer race has retaining portions formed thereon for retaining the rollers and the resilient members so
5 as not to come off from the pocket portions to the inner circumference side of the outer race.

With this arrangement, since the retaining portions can be formed together with the through-hole and the pocket portions at the forming step even where the outer race has a complicated shape,
10 the number of man-hours does not increase at all.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the present invention will be described in detail below, by way of example only, with reference
15 to the accompanying drawings, in which:

FIG. 1 is a schematic sectional view of a one-way clutch according to an embodiment of the present invention;

FIG. 2 is an enlarged view showing a portion around a pocket portion of FIG. 1;

20 FIG. 3 shows side face of a disk-shaped blank for illustrating a preparation step in the one-way clutch production;

FIG. 4 shows the side face of the disk-shaped blank for illustrating a pre-forming step in the one-way clutch production;

FIG. 5 shows an outer race for illustrating a forming step
25 in the one-way clutch production;

FIG. 6 shows rollers and resilient members assembled in the outer race for illustrating an assembling step in the one-way

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clutch production; and

FIG. 7 is an enlarged view showing a portion around a pocket portion of FIG. 6.

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BEST MODE FOR CARRYING OUT THE INVENTION

Reference is now made to FIG. 1 showing in section a one-way clutch 1 according to an embodiment of the present invention.

(1) Configuration

The one-way clutch 1 shown in FIG. 1 comprises a shaft member 10 11, an outer race 12, rollers 13, resilient members 14, and a lid member 15.

The shaft member 11 is a cylindrical member for transmitting a torque to the outer race 12.

The outer race 12 is an annular member metal and has a 15 through-hole 12a formed at a center thereof for engaging with the shaft member 11, a plurality of pocket portions 21 (six in the illustrated embodiment) provided in an equidistantly spaced relation from each other in a circumferential direction on an inner circumferential face thereof in such a manner as to be 20 concave toward the outer circumference side, and retaining portions 22, 23 (refer to FIG. 2) provided at edge portions of each of the pocket portions 21 in the circumferential direction in such a manner as to make the opening width of the pocket portion 21 smaller. Further, on the concave face of each of the pocket 25 portions 21, an inclined face 21a is formed such that the distance between the concave face of the pocket portion 21 and the outer circumferential face of the shaft member 11 decreases toward one

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side in the circumferential direction (left side on the plane in FIG. 2).

Each of the rollers 13 is a cylindrical member provided corresponding to the inclined face 21a in the corresponding pocket portion 21 and is interposed between the shaft member 11 and the
5 outer race 12 to transmit torque between them.

Each of the resilient members 14 is formed from, for example, an accordion spring formed by bending a plate-like member made of a metal and is provided so as to bias the corresponding roller
10 13 in the direction in which the distance between the corresponding inclined face 21a and the outer circumferential face of the shaft member 11 decreases.

The lid member 15 is a member for covering the outer circumferential face of the outer race 12 and the pocket portion
15 21.

(2) Operation

Operation of the one-way clutch 1 is now described with reference to FIG. 1.

First, when the shaft member 11 rotates in a direction
20 indicated by an arrow mark R relative to the outer race 12, then each of the rollers 13 moves toward the R side of the corresponding pocket portion 21. Consequently, the roller 13 is bitten between the inclined face 21a of the pocket portion 21 and the outer circumferential face of the shaft member 11 to place the shaft
25 member 11 and the outer race 12 into a mutually locked state. Consequently, the torque of the shaft member 11 is transmitted to the outer race 12 through the rollers 13.

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On the contrary, when the shaft member 11 rotates in the direction opposite to the R direction relative to the outer race 12, each of the rollers 13 moves to the side opposite to the R side of the corresponding pocket portion 21 against the biasing force of the corresponding resilient member 14. Consequently, a gap is formed between the inclined face 21a of the pocket portion 21 and the outer circumferential face of the shaft member 11 thereby to place the shaft member 11 and the outer race 12 into a mutually free state. Consequently, the shaft member 11 rotates but idly and the torque transmission is interrupted.

(3) Production Method

A method of producing the one-way clutch 1 is described.

The method of producing the one-way clutch 1 comprises the following steps:

1. Preparation Step

In this step, a metal blank such as a round bar is cut to provide a disk-shaped blank 31 from which the outer race 12 is to be formed (see FIG. 3).

2. Preforming Step

At this step, cold presswork is performed on the disk-shaped blank 31 to reduce the thickness of the disk-shaped blank 31 approximately to the thickness of the outer race 12 after it is formed. By the cold presswork, lines or swells on the surface of the skin of the disk face of the disk-shaped blank 31 can be reduced (refer to FIG. 4).

3. Forming Step

A metal die having a shape with which the through-hole 12a

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into which the shaft member 11 is to be fitted, the pocket portions 21 and the retaining portions 22, 23 can be blanked at a time is used to perform cold stamping for the disk-shaped blank 31 to complete the outer race 12 (see FIG. 5).

5 4. Assembling Step

The resilient members 14 are assembled into positions of the pocket portions 21 of the outer race 12 at which the inclined faces 21a are not formed, and then the rollers 13 are pushed into the resilient members 14 at positions corresponding to the inclined faces 21a (refer to FIG. 6). Consequently, as shown in 10 FIG. 7, the rollers 13 and the resilient members 14 are retained by the retaining portions 22, 23 so that they do not come off to the inner circumference side of the outer race 12. Then, the outer race 12 is finally fitted with the outer circumference of the shaft 15 member 11, thereby completing the one-way clutch 1 (see FIG. 1).

(4) Characteristics

Characteristics of the one-way clutch of the present embodiment are now described.

1. Reduction of the number of man-hours by the presswork of a disk-shaped blank
- 20

In the method of producing the one-way clutch 1 in the present embodiment, the outer race 12 is produced by stamping (cold presswork) with a metal mold. Therefore, the number of man-hours can be reduced when compared with that of a conventional production method wherein a plurality of broaches are used. 25 Further, since also the retaining portions 22, 23 can be formed simultaneously, the number of man-hours for working the outer race

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12 does not increase at all.

2. Prevention of coming off of the rollers and the resilient members from the pocket portions

In the one-way clutch 1 in the present embodiment, since
5 the retaining portions 22, 23 are formed on the inner circumferential portions of the outer race 12, the rollers 13 and the resilient members 14 are retained so that they may not come off from the pocket portions 21 to the inner circumference side of the outer race 12. Therefore, even when the outer race 12 is
10 fitted with the outer circumference of the shaft member 11 which is disposed in a horizontal direction at the assembling step, the rollers 13 and the resilient members 14 do not come off from the pocket portions 21 at all.

(5) Other Embodiments

15 While an embodiment of the present invention has been described above, the particular configuration or arrangement is not limited to that of the embodiment. The arrangement can be modified without departing from the spirit of the present invention. For example, the shape of the retaining portions is
20 not limited to that of the present embodiment.

INDUSTRIAL APPLICABILITY

The one-way clutch production method according to the present invention can reduce the number of man-hours because an outer race is produced by cold presswork of a disk-shaped blank.
25 Thus, the present invention is useful in the power machine industry.

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CLAIMS

1. A method of producing a one-way clutch which includes a shaft member, an outer race disposed on an outer circumference side of said shaft member and having a plurality of pocket portions provided on an inner circumferential face thereof in such a manner as to be concave toward the outer circumference side, and a roller and a resilient member accommodated in each of said pocket portions, the method comprising:

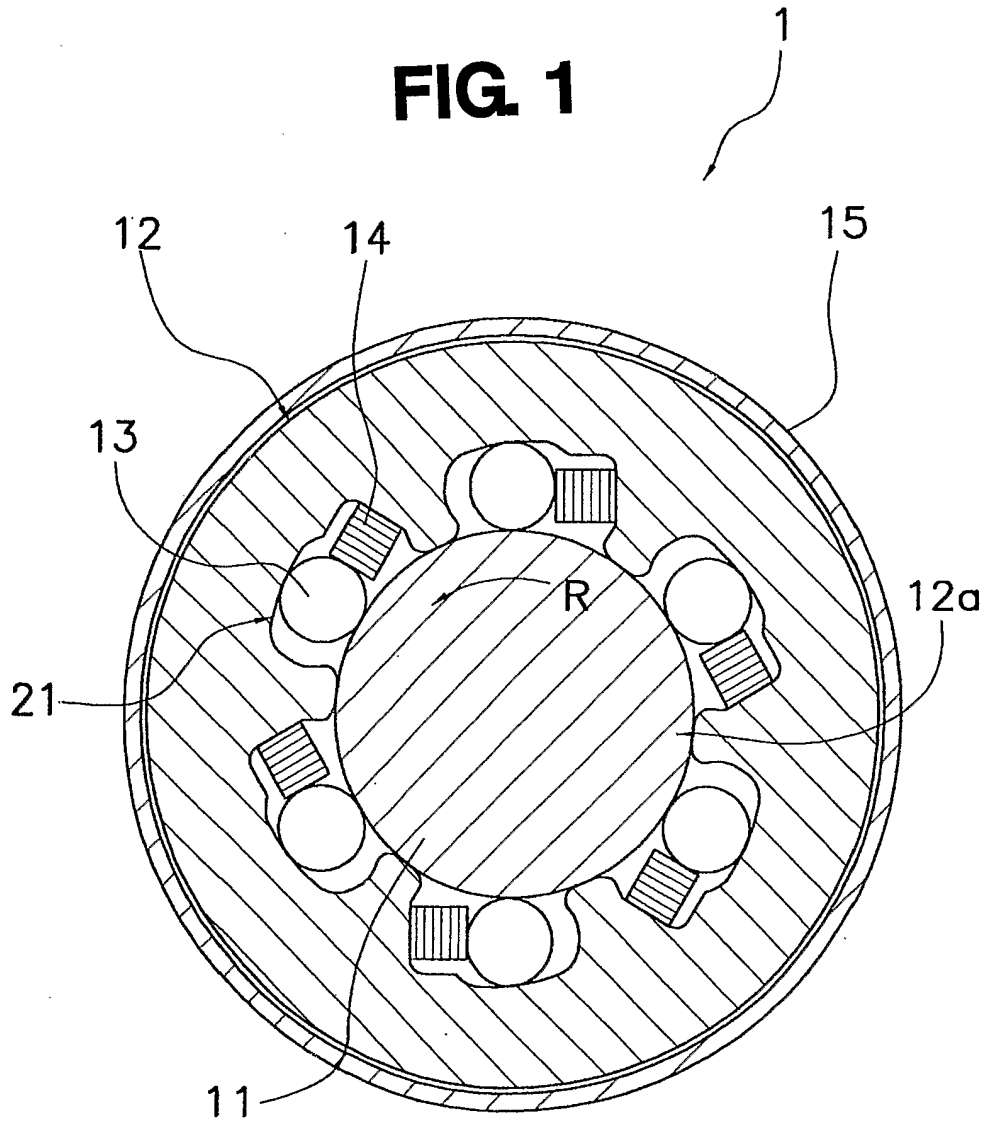
10 a preparation step of providing a disk-shaped blank;
a preforming step of performing cold presswork on the disk-shaped blank to reduce the thickness of the disk-shaped blank;

15 a forming step of performing cold presswork on the disk-shaped blank subsequently to the preforming step to form a through-hole into which said shaft member is to be fitted and the pocket portions in said disk-shaped member to complete said outer race; and

20 an assembling step of assembling the rollers and the resilient members into the pocket portions and fitting the outer race with the shaft member.

2. A method of producing a one-way clutch according to claim 1, wherein said outer race has retaining portions formed thereon for retaining said rollers and said resilient members so as not to come off from said pocket portions to the inner circumference side of the outer race.

FIG. 1



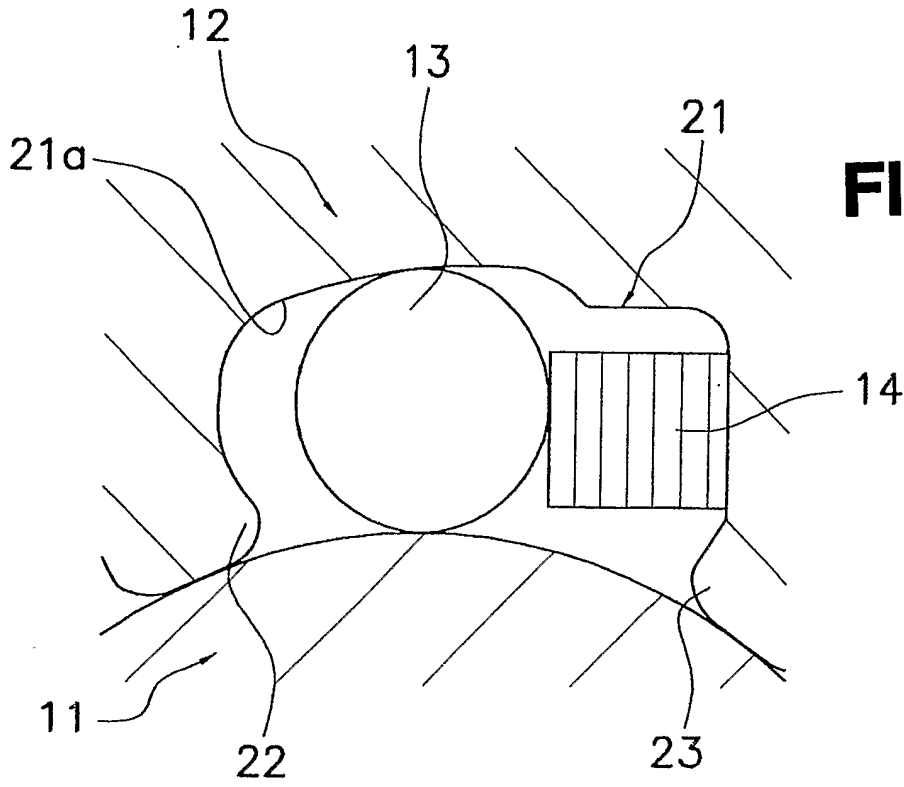


FIG. 3

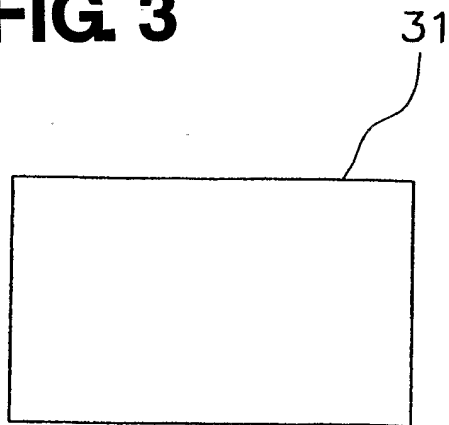


FIG. 4

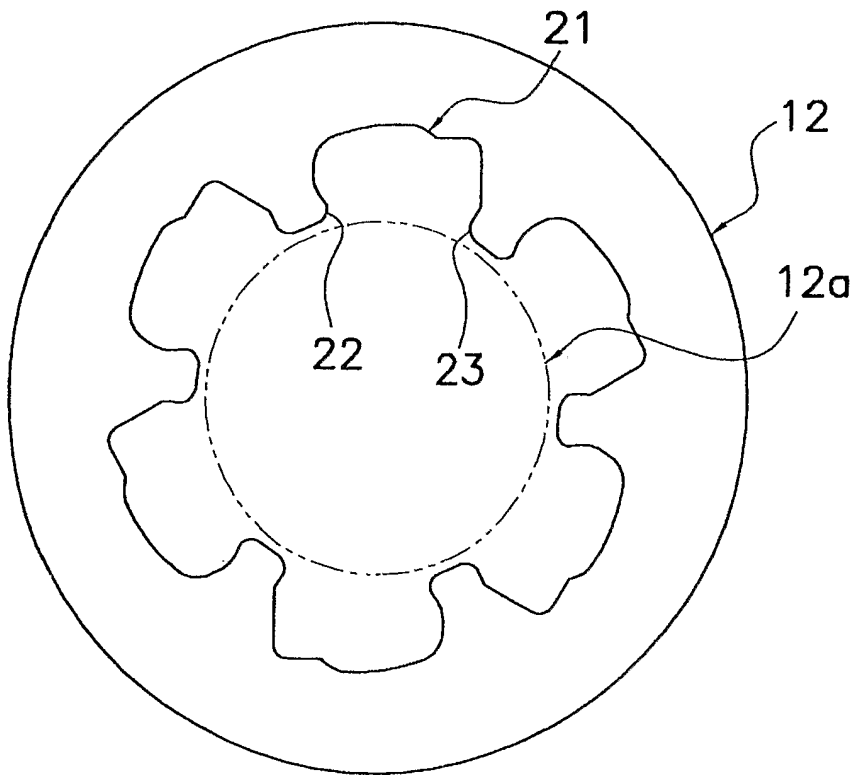
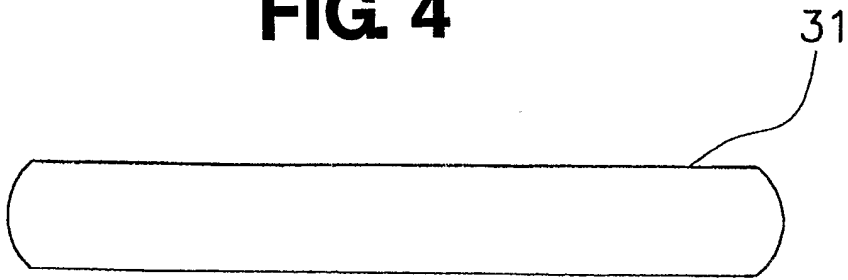


FIG. 5

FIG. 6

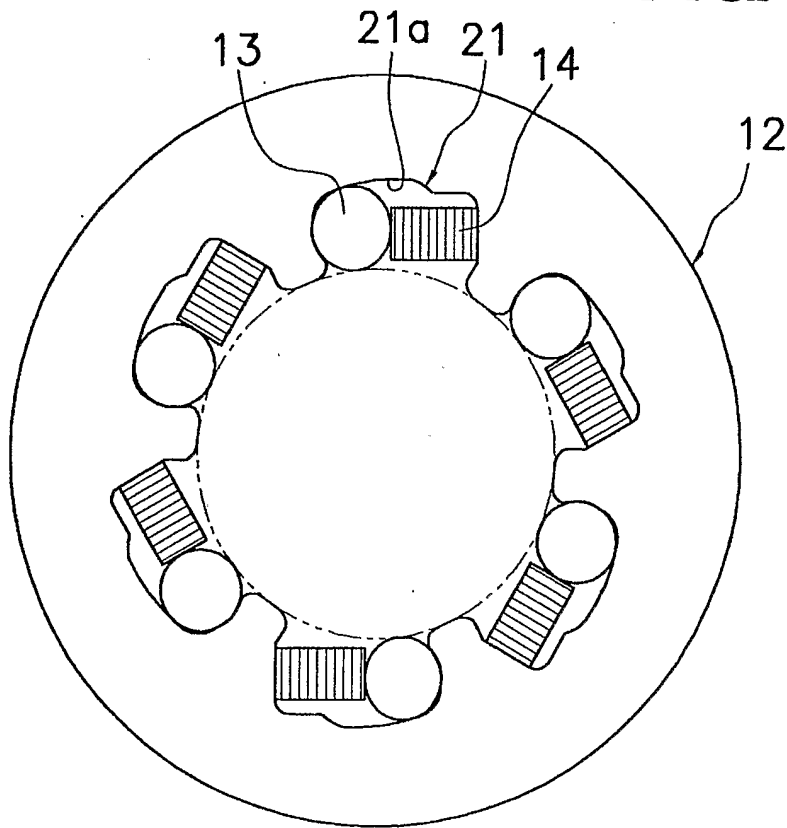
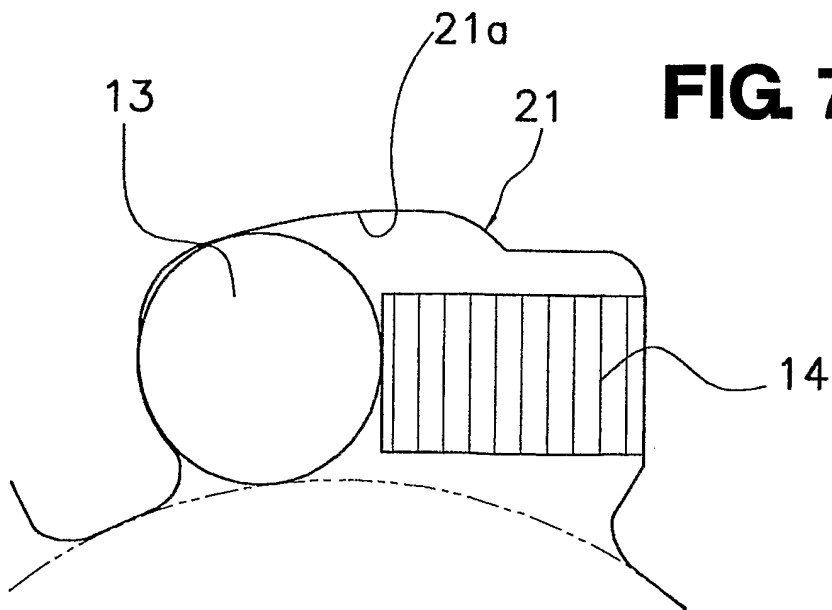


FIG. 7



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B23P15/00 F16D41/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B23P F16D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

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