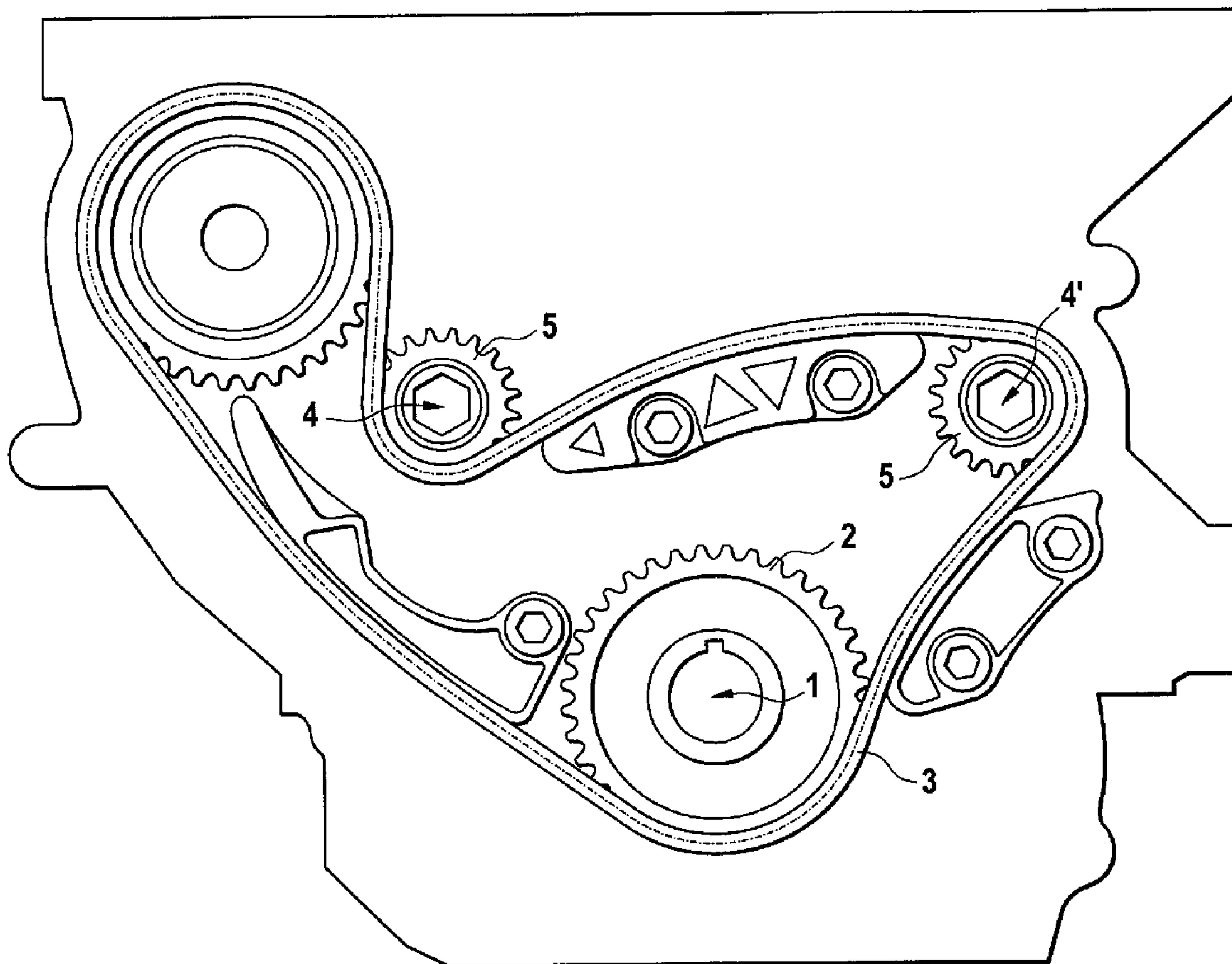




(86) Date de dépôt PCT/PCT Filing Date: 2005/06/25
 (87) Date publication PCT/PCT Publication Date: 2006/01/19
 (45) Date de délivrance/Issue Date: 2013/12/03
 (85) Entrée phase nationale/National Entry: 2006/12/28
 (86) N° demande PCT/PCT Application No.: EP 2005/006878
 (87) N° publication PCT/PCT Publication No.: 2006/005430
 (30) Priorité/Priority: 2004/07/14 (DE10 2004 033 927.9)

(51) Cl.Int./Int.Cl. *F16F 15/26* (2006.01)
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(54) Titre : ENTRAINEMENT D'ARBRE DE COMPENSATION
 (54) Title: COMPENSATING SHAFT DRIVE



(57) Abrégé/Abstract:

The inventive compensating drive for driving a compensating shaft of an internal combustion engine comprises a toothed belt or a chain which connects the crankshaft driven wheel of an internal combustion engine to a drive wheel arranged on the shaft or on



(57) **Abrégé(suite)/Abstract(continued):**

the compensating shafts, wherein the crankshaft driven wheel (2, 2') and/ or the drive shaft(s) (5) of the compensating shafts (4) are shaped non-circular in such a way that they transmit to a drive a variability which compensates the vibrations produced during the crankshaft (1) rotation.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro(43) Internationales Veröffentlichungsdatum
19. Januar 2006 (19.01.2006)

PCT

(10) Internationale Veröffentlichungsnummer
WO 2006/005430 A1(51) Internationale Patentklassifikation⁷: **F16F 15/26**

(21) Internationales Aktenzeichen: PCT/EP2005/006878

(22) Internationales Anmeldedatum:
25. Juni 2005 (25.06.2005)

(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
10 2004 033 927.9 14. Juli 2004 (14.07.2004) DE(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): **INA-SCHAEFFLER KG** [DE/DE]; Industriestrasse 1-3, 91074 Herzogenaurach (DE).

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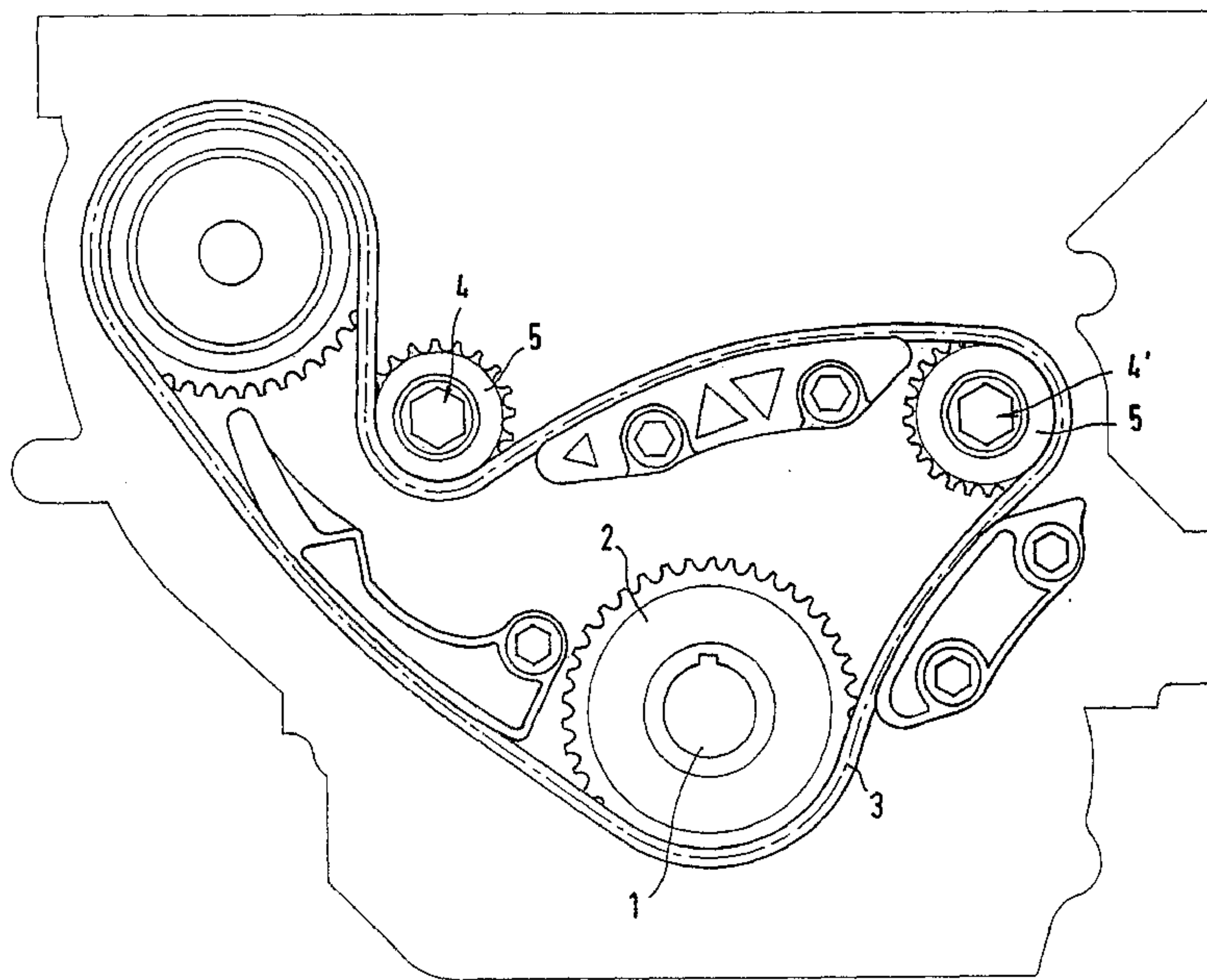
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(81) Bestimmungsstaaten (soweit nicht anders angegeben, für jede verfügbare nationale Schutzrechtsart): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL,

[Fortsetzung auf der nächsten Seite]

(54) Title: COMPENSATING SHAFT DRIVE

(54) Bezeichnung: AUSGLEICHSWELLENANTRIEB



(57) Abstract: The inventive compensating drive for driving a compensating shaft of an internal combustion engine comprises a toothed belt or a chain which connects the crankshaft driven wheel of an internal combustion engine to a drive wheel arranged on the shaft or on the compensating shafts, wherein the crankshaft driven wheel (2, 2') and/ or the drive shaft(s) (5) of the compensating shafts (4) are shaped non-circular in such a way that they transmit to a drive a variability which compensates the vibrations produced during the crankshaft (1) rotation.

(57) Zusammenfassung: Ausgleichstrieb zum Antrieb einer Ausgleichswelle eines Verbrennungsmotors mit einem Zahnriemen oder einer Kette, die ein Abtriebsrad der Kurbelwelle des Verbrennungsmotors mit einem Antriebsrad auf der oder den Ausgleichswellen verbindet, wobei das

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SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC,
VN, YU, ZA, ZM, ZW.

PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI,
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(84) Bestimmungsstaaten (soweit nicht anders angegeben, für jede verfügbare regionale Schutzrechtsart): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasisches (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL,

Veröffentlicht:

— mit internationalem Recherchenbericht

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

Abtriebsrad (2, 2') der Kurbelwelle und/oder das oder die Antriebsräder (5) der Ausgleichswellen (4) derart unrund ausgebildet ist, dass sie dem Trieb eine Ungleichförmigkeit aufprägen, durch die Schwankungen in der Rotationsbewegung der Kurbelwelle (1) zumindest teilweise kompensiert werden.

Description of the Invention

Compensating Shaft Drive

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Field of the Invention

The invention pertains to compensating drives for driving one or more compensating shafts of an internal combustion engine, comprising a toothed belt or a chain, which connects a crankshaft driven wheel of the internal combustion engine to one or more drive wheels on the compensating shafts.

15

Background of the Invention

The compensating drives start, in principle, at the crankshaft of the internal combustion engine and drive mass-loaded shafts (compensating shafts), which give rise to a piston mass balance, for example. Generally, such drives are distinguished in that the strain on the traction means is very high. First and foremost, this is caused in that, due to their high inertia, the compensation shafts tend to rotate with uniform rotary motion. Due to the variability during the rotation of the crankshaft, this variability is transferred to the compensation shaft via the traction means, i.e. via the toothed belt or the chain, which leads to extreme strains on the traction means. The situation is yet aggravated in that the compensation shafts often rotate at twice the engine speed, which causes an additional strain (centrifugal force + abrasion-induced strain) on the traction means. This is why these drives are often not fatigue endurable and in many cases need to be repaired.

35

Summary of the Invention

The invention is thus based on the object of embodying

- 2 -

a compensating drive of the above-mentioned type in such a way that a reduction in the strain on the traction means and thus an extension of the service life of such drive is achieved.

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To solve this object, provision is made according to the invention that the crankshaft driven wheel and/or the drive wheel or wheels of the compensating shafts are shaped to be non-circular in such a way that they
10 transmit to the drive a variability, which at least partially compensates the vibrations produced during the rotation of the crankshaft.

The invention thus also makes use of drive damping by
15 means of the non-circular shape of a toothed drive wheel, which is already in use and has already proven itself for operational controls, for the case of a compensating shaft drive, where, until now, such drive damping was not provided.

20

In one embodiment of the invention, provision can be made for the drive wheel and/or the driven wheel to be embodied so as to be oval or polygonal, the shape being essentially only a function of the number of the
25 cylinders of the internal combustion engine, because the shape first and foremost causes the variability produced during the crankshaft rotation and thus also predefines the frequency at which the specific introduction of a counter-variability must occur. For
30 four-cylinder engines, it is recommended to embody the driven wheel or the drive wheel so as to be oval.

The non-circular shape according to the invention achieves the situation where, in phases of accelerated
35 motion, that is to say when the ignition stroke occurs in the piston of the internal combustion engine, the traction means is at a smaller diameter, so as to reduce the acceleration in the traction means and thus to reduce the strain.

Brief Description of the Drawings

Further advantages, features and details of the invention can be gathered from the following description of an exemplary embodiment. In the drawings:

Fig. 1 shows a partial view of an engine compartment with the crankshaft and two compensating shafts with a chain drive,

Fig. 2 shows a view of a toothed wheel which can be used as a driven wheel or as a drive wheel for a compensating drive according to the invention and is intended for a belt drive, and

Fig. 3 shows a view of a toothed wheel which can be used as a driven wheel or as a drive wheel for a compensating drive according to the invention and is intended for a chain drive.

Detailed Description of the Drawings

In the engine section according to Fig. 1, reference numeral 1 refers to the crankshaft, on which, according to the invention, in addition to the other common toothed driven wheels, a toothed driven wheel 2 from Fig. 2 embodied according to the invention is fitted in a rotationally fixed manner so as to drive the compensating shafts 4 and 4' via a chain or toothed belt 3. A toothed drive wheel 5 is located on both, and this toothed drive wheel 5 can be embodied as a compensating toothed wheel with oval or polygonal shape either instead of the toothed driven wheel 2 or in addition thereto. If the toothed driven wheel 2 and/or the toothed drive wheels 5 according to Fig. 2 are

- 4 -

embodied so as to be oval, the result is optimal compensation for a four-cylinder engine. The same also holds true for the toothed wheel 2 in Fig. 2, which is suitable for use as a toothed driven wheel or as a
5 toothed drive wheel and is shaped specifically as a belt wheel for a belt drive.

Reference Numerals

1	crankshaft
2, 2'	toothed driven wheel
5 3	toothed belt/chain
4, 4'	compensating shafts
5	toothed drive wheel

What is claimed is:

1. A compensating shaft drive of an internal combustion engine, comprising a toothed belt or a chain, which connects a crankshaft driven wheel of the internal combustion engine to a drive wheel on the compensating shaft or shafts, in which case the crankshaft driven wheel and the drive wheel or wheels of the compensating shafts are shaped to be non-circular in such a way that they transmit to the drive a variability, which at least partially compensates the vibrations produced during the rotation of the crankshaft.

2. The compensating shaft drive as claimed in claim 1, wherein the driven wheel and the drive wheel or wheels are embodied so as to be oval.

3. The compensating drive as claimed in claim 1, wherein the driven wheel and the drive wheel or wheels are embodied so as to be polygonal.

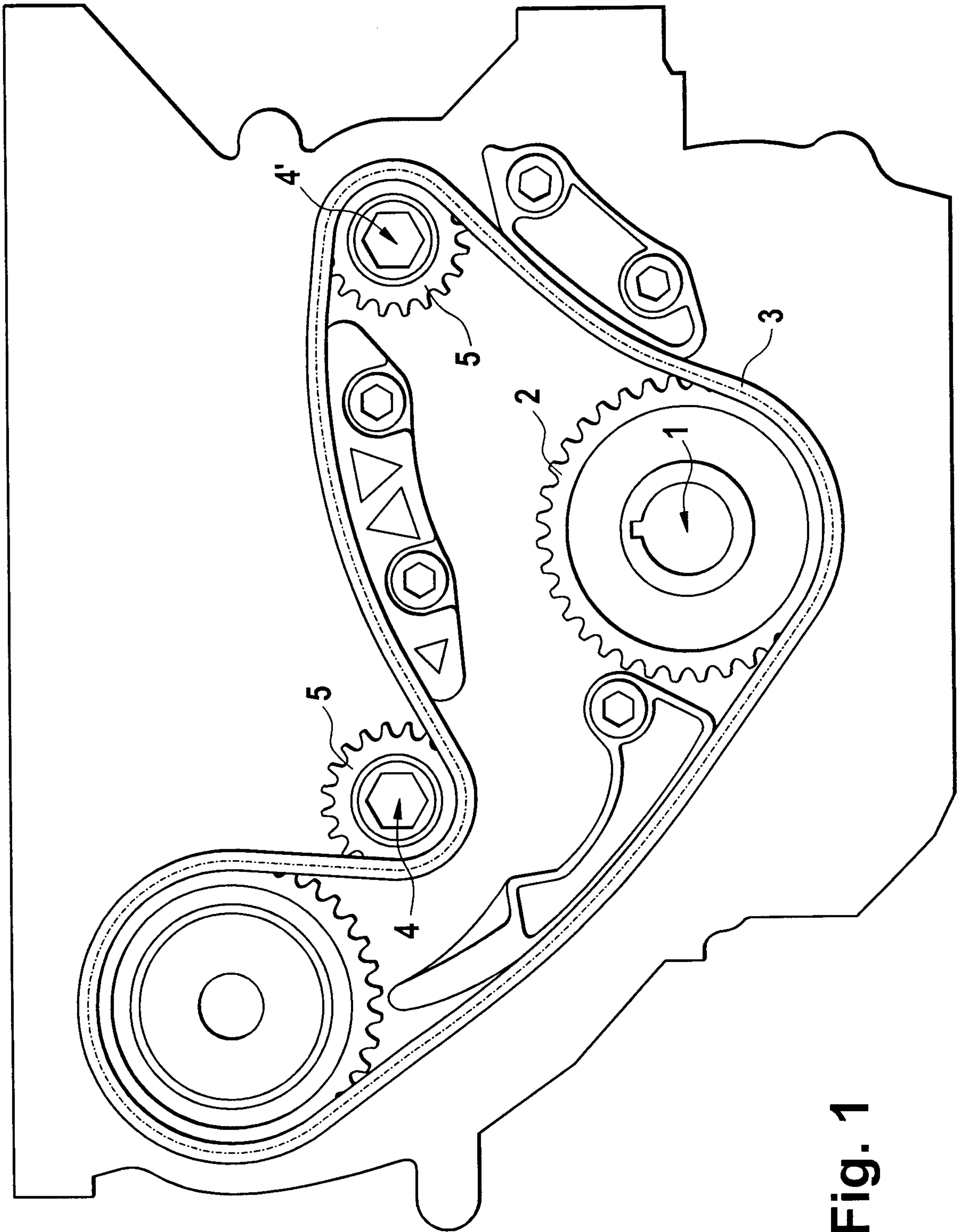


Fig. 1

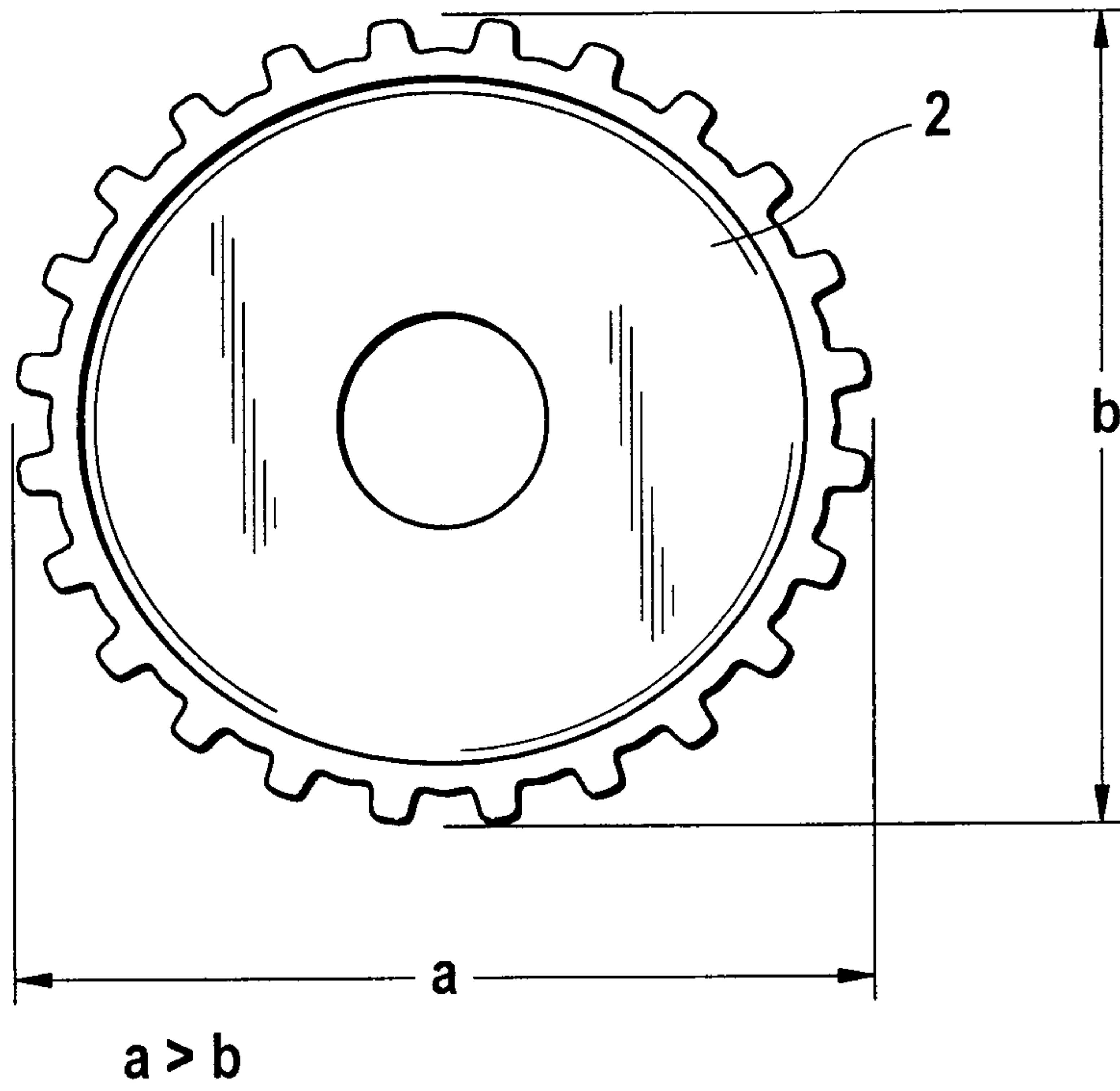


Fig. 2

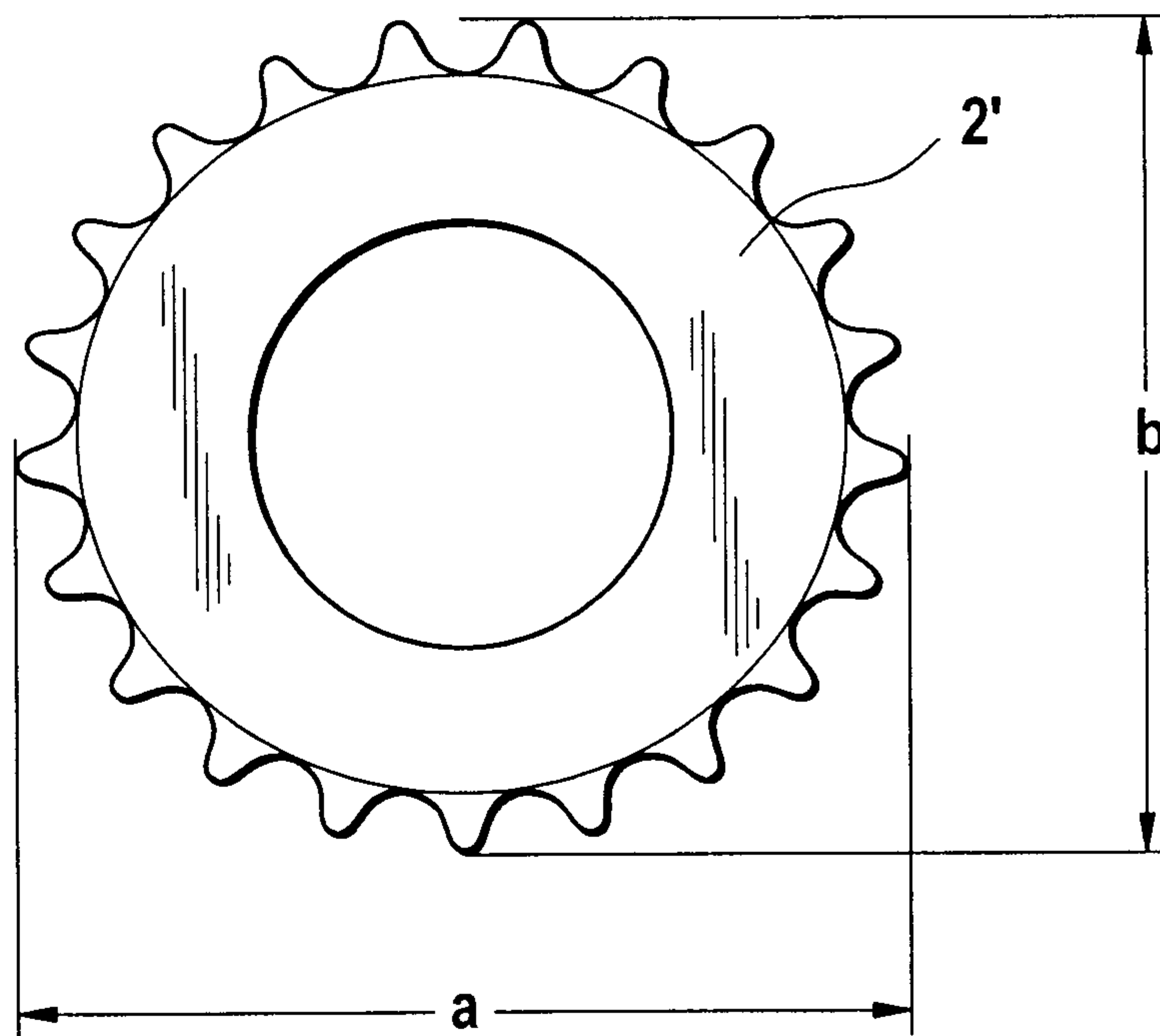


Fig. 3

