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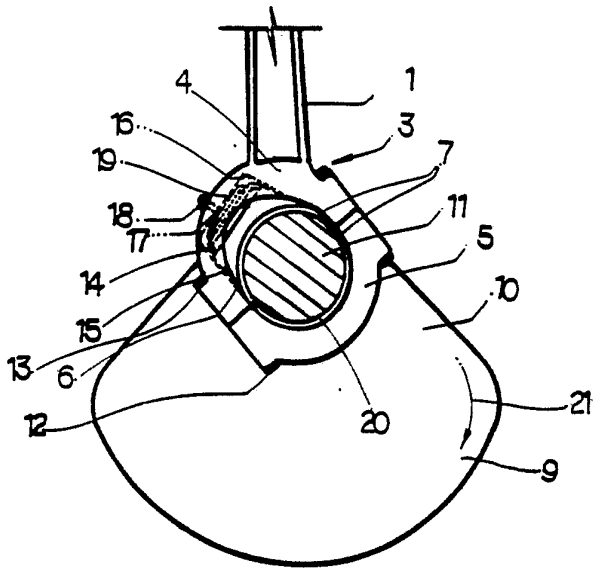

(57) Abstract

A connecting rod (1) for an automobile for performing an eccentric push toward a rimside (21) of a crankshaft (2) in a rotational direction in an expansion stroke at the top dead center comprises: a plain bearing housing (6) being formed in such an inclined, oval shape inside an annular big end (3) that the big end (3) may make a little inclined, reciprocating sliding on a round crankpin (11) in a forward, rotational direction and keep the crankpin (11) to the lower portion (20) normally; and a spring (14) and a spring block (15) being placed in the upper portion (19) of the inclined, oval plain bearing housing (6) for performing elastic operations to keep the crankpin (11) to the lower portion (20) normally and to be contracted to permit the big end (3) to make an inclined sliding and to push the crankpin (11) in a rotational direction in an expansion stroke.

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SPECIFICATION

CONNECTING ROD/CRANKSHAFT POWER TRANSMISSION MECHANISM

Technical Field

This invention relates to automobiles, specifically to improved connecting rod/crankshaft power transmission mechanism so as to secure the maximum of efficiency in rotating a crankshaft with the minimum of engine power.

Background Art

A conventional connecting rod/crankshaft power transmission mechanism consisted of several connecting rods and a crankshaft, the big ends of the connecting rods simply rotatably mounting on the crankpins of the crankshaft so that expansion strokes may cause the connecting rods to push the crankpins anyway to rotate the crankshaft. Each big end comprises a half-annular main body, another half-annular bearing cap being fixed to the main body by cap bolts and nuts with a crankpin in, a round plain bearing housing being formed inside for holding the crankpin, while the crankshaft comprises a crank journal, balance weights, crankarms, and round crankpins being just rotatably mounted on by the big ends.

This method of simply mounting the big end on the crankpin of the crankshaft is regarded as unsatisfactory for efficient rotation of the crankshaft, because an expansion stroke at the top dead center would force the connecting rod to push the crankpin straight toward the center of the crankshaft, not toward a rimside of the crankshaft for efficient rotation, unless the crankshaft

is already rotating at a reasonable speed. Even at the reasonable speed the connecting rod would dash a little eccentrically, as a resultant velocity of the expansion stroke and of a crankshaft revolution would indicate. Even in a high speed gear the connecting rod would push the crankpin eccentrically toward a spot less than half the radius of the crankshaft sidewise, as the expansion stroke is always speedier than the crankshaft revolution.

Thus, the revolution of a crankshaft by this method requires much stronger, more frequent expasnion strokes than that by pushing the crankpin toward a rismide (the open end of the radius sidewise) of the crankshaft and brings about successive impacts of the big ends upon the crankpins, crankarms, and the crank journal, resulting in bend, twists, vibrations, noises, quick wearing, energy waste, and increased gas emissions.

Disclosure of Invention

This invention, therefore, contemplates providing a means of causing the big end to dash eccentrically toward a rimside of the crankshaft in an expansion stroke at the top dead center so as to push in a forward, rotational direction the open end of the radius of the crankshaft to rotate the crankshaft most efficiently and freely in accordance with the principle of the wheel and the axle and a means of causing the big end to return to the original position for next expansion strokes.

To this end the improved connecting rod/crankshaft mechanism comprising:

connecting rods(1), big ends(3) at one end thereof each comprising a half-annular main body(4); another half-annular bearing cap(5) being fixed to the main body (4) by cap bolts(12) and nuts(13); a round plain bearing housing(6) being formed inside the big end(3);

split, round plain bearings(7) being fit into the plain bearing housing(6);

a crankshaft(2) comprising a crank journal(8), balance weights(9), crankarms(10), and round crankpins(11) being rotatably mounted in the plain bearings(7);

wherein the improvement comprises in Fig 1 through Fig 4:

the round plain bearing housing(6) being formed in an inclined, one-side expanded round shape (like oval herein after) inside the big end(3) to provide room for the big end(3) to keep the crankpin(11) to a lower portion(20) of the oval plain bearing housing(6) normally and to make a little inclined reciprocating slidings, to an upper portion(19), on the round crankpin(11) eccentrically in a forward, rotational direction in expansion strokes;

a multi-fold, flat spring(14) being formed in a ㄷ shape; multi-fold, flat spring block(15) in a ㅍ shape for securely supporting the plain bearings(7) and preventing the flat spring(14) from overheat due to frictions; a multi-fold, flat spring housing(16) being formed in the upper portion(19) with a bolt hole in the center;

the annular big end(3) being formed as inclined,

oval in shape as the inclined, oval plain bearing housing (6) and bigger for fully accommodating the strong multi-fold flat spring(14) and the flat spring block(15) in the upper portion(19); and the plain bearings(7) in the lower portion(20), of the bearing housing(6) so as to be rigid enough to meet the strong, successive pushings on the flat spring(14) and on the crankpin(11);

the flat spring(14) being put into the flat spring housing(16) and fixed to the upper portion(19) by a bolt (17) and a nut(18); the flat spring block(15) being tightly placed between the flat spring(14) and the plain bearings(7);

the multi-fold flat spring(14) comprising elastic means for performing elastic operation to keep the round crankpin(11) to the lower portion(20) of the inclined, oval plain bearing housing(6) until an expansion stroke and to be contracted to permit the big end(3) to make an inclined sliding on the crankpin(11) in a forward, rotational direction in the expansion stroke: and

additive means combined with the inclined, oval plain bearing housing(6) and the multi-fold flat spring (14) for permitting the big end(3) to perform, in expansion strokes, repeated, eccentric pushings on the crankpin(11) toward a rimside(21) of the crankshaft(2) to rotate the crankshaft(2) most efficiently.

The improvement may comprise, instead of the multi-fold flat spring(14), as shown in Fig 5 through Fig 7, another coil spring(22), a coil spring block(23) being formed in a ㄹ shape, a coil spring housing(24) being

formed in a sylindrical hole in the upper portion(19), the coil spring(22) being partly placed into the coil spring housing(24), the coil spring block(23) being tightly put into the outer end of the coil spring(22) through a sylindrical base(25) of the coil block(23) and coupled to the plain bearings(7) through the arc surface (26) thereof;

the coil spring(22) comprising elastic means for performing elastic operation to keep the round crankpin (11) to the lower portion(20) of the inclined, oval plain bearing housing(6) until an expansion stroke and to be contracted to permit the big end(3) to make an inclined sliding on the crankpin(11) in a forward, rotational direction in the expansion stroke; and

additive means combined with the inclined, oval plain bearing housing(6) and the coil spring(22) for permitting the big end(3) to perform, in expansion strokes, repeated, eccentric pushings on the crankpin(11) toward a rimside (21) of the crankshaft(2) to rotate the crankshaft(2) most efficiently.

The improvement, in place of spring means, may comprise in Fig 8 through Fig 13 the split, plain bearings (27) being formed as inclined, oval as the inclined, oval plain bearing housing(6) for being just fit into the oval plain bearing housing(6);

strong, thick bosses(28) being integrally or separately attached to either side of the bearing cap(5) for forming sidewise protrusion from the sides toward the crankarms(10);

inclined cam/curved driven members(31) with a shaped driven sections(33) and a half-moon like surfaces (34) facing the crankpin(11) each being protruded from either opposite crankarms(10), with open spaces(36) each being as wide as the bearing cap bosses(28) at the inclined cam sections(32) and at the upper ends(35) of the driven sections(33) but wider than the width of the bosses(28) at the center of the curved driven section (33) being provided between the crankpin(11) and the cam/driven members(31), so that the half-circlar bosses (28) may slide closely along the inclined cam section(32) toward the center of the driven section(33) and make pushing upon the curved driven section(33) without impacts, before the upper surface(19) of the plain bearing housing (6) would reach the crankpin(11), and slide back along the inclined cam section(32) through the open spaces(36) to the starting point; and

additive means combined together with the inclined, oval plain bearing housing(6), the bearing cap bosses(28), and the cam/driven members(31) for permitting the big end(3) to make inclined slidings toward a rimside(21) of the crankshaft(2) and to push the crankarms(10) through the bearing cap bosses(28) and to return to the starting point through the bearing cap bosses(28) sliding back along the inclined cam section(32) through the open spaces (36) for next expansion strokes.

The improvement, as shown in Fig 12 and Fig 13, further includes half-moon white metals(37) being attached to the half-moon surfaces(34) of the inclined cam/driven

members(31) by flat screws(39) through flat screw holes (38) for the efficient smooth slidings of the bearing cap bosses(28).

The operation of the invention will be carried out as follows:

Even if an expansion stroke forces the connecting rod straight toward the center of the crankshaft, the big end dashes eccentrically in a forward, rotational direction by making an inclined sliding on the round crankpin through the inclined, oval plain bearing housing, while pressing and pushing the spring and the crankpin in the rotational direction and then the spring is operated to keep the crankpin to the lower portion of the bearing housing until next expansion strokes.

In the case of the set-up of the bearing cap bosses and the cam/driven members, the big end dashes eccentricaly in a forward, rotational direction by making an inclined sliding on the round crankpin through the inclined, oval plain bearing housing, while the bearing cap bosses having a half-circular outer rims each slide along the inclined cam section and push directly the driven section of the cam/driven member, or the big end directly pushes the crankpin through the upper surface (19) of the inclined, oval plain bearing housing in a forward, rotational direction, if the driven sections would not work due to wear or other reasons, and then return to the starting points by sliding back along the inclined cam sections through the open spaces(28) for next expansion strokes.

The advantages of the invention will be explained after the description of the principle of the wheel and the axle in connection with this invention.

This invention developed in accordance with the principle of the wheel and the axle, which says that it is easier to turn an axle of two different sized pulleys fixed thereon by pushing a large pulley rim than by a small pulley rim, provides the crankshaft for performing the most efficient rotation with the minimum of efforts by causing the big end to dash toward a forward, rotational direction, that is, to push the open end of the full radius of the crankshaft to rotate.

As described in the background art above, the big end of the prior art dashes eccentrically toward a spot still less than one-half of the radius of the crankshaft sidewise at most, based on the resultant of the two different velocities of an expansion stroke and a crankshaft revolution; whereas that of this invention is operated to dash toward a rimside, the open end of the radius of the crankshaft, to rotate the crankshaft in a rotational direction.

Besides, this invention may be better than a device which performs just straight pushing on a rim in a rotational direction, because the resultant length of the two different velocities, based on this invention, is longer than the length of the direct, straight pushing velocity of the device toward a rotational direction, since the big end first makes an inclined sliding impact on the revolving crankpin and then jumps further forward with the aid

of the rebounding of the spring provided.

Now you can get a rough percentage of efforts savings by applying the above two radii to the related formula for the principle of the wheel and the axle:

$W \times r = F \times R$, $F = W \times \frac{r}{R}$

W: Force to push a small wheel rim
r: Small wheel radius
F: Force to push a large wheel rim
R: Large wheel radius

W represents a weight on a string hung over a small pulley or a force to push a rim of a small wheel (one-half radius of a crankshaft); r, a radius of the small pulley (one-half radius of a crankshaft); F, a force to pull a string hung over a large pulley on an opposite side or a force to push a rim of a large wheel (the full radius of a crankshaft); and R represents a radius of a large pulley (a full radius of a crankshaft).

Suppose, for example, that the following radii of a crankshaft are applied to the formula:

	r	R
Crankshaft	5 cm(1/2)	10 cm(1)

Then, you wll get the following computation:

$F = W \times 5/10 = W \times 0.5$ or 50% of W

That is, only the 50 per cent (F) of the efforts(W) required to rotate a conventional crankshaft will be enough to rotate a crankshaft of this invention. Accordingly, this invention will bring about at least 30 per cent to more than 50 per cent savings of the engine output, depending on engine speeds.

This applicant, therefore, claims the following as

his advantages: to provide a crankshaft for performing the most efficient rotation with least engine power (over 50 per cent savings of energy over the prior art) by big end pushing a rim of the crankshaft in a forward, rotational direction, whereby a large quantity of fuel will be saved and that much of poluted gases will be prevented from emitting; to provide the connecting rod/crankshaft mechanism which enables a car to start running in a second or a third speed gear easily; to provide the mechanism which enables to keep the engine running even at a much slower engine speed while idling without load; to keep running over hilly roads without frequent shifts of change levers; to carry much more loads; to set up more change levers and transfer gears for speedier driving; to eliminate bend, twists, noises, vibrations, and impacts as much as possible; to replace a six-cylinder engine with a four-cylinder engine; to extend the life span of engine parts; and to provide the connecting rod which is simple in construction and replacement.

Readers will find further objects and advantages of the invention from a consideration of the ensuing description and the accompanying drawings.

Brief Description of Drawings

Fig 1 shows a side view of a connecting rod/crankshaft mechanism containing a multi-fold flat spring according to the invention.

Fig 2 shows a front view of such mechanism.

Fig 3 shows an exploded view of the big end.

Fig 4 shows side and front views of the multi-fold

flat spring.

Fig 5 shows a side view of a connecting rod/crankshaft mechanism containing a coil spring and a coil spring block.

Fig 6 shows an exploded view of the big end including the coil spring housing, the coil spring, and the coil spring block of Fig 5.

Fig 7 shows a perspective view of the coil spring, and the coil spring block of Fig 5.

Fig 8 shows a side view of a connecting rod/crankshaft mechanism including bearing cap bosses and cam/driven members according to another embodiment of the invention.

Fig 9 shows a front view of Fig 8 including cam/driven members on both crankarms.

Fig 10 shows an exploded view of the big end including inclined, oval plain bearing housing, split, inclined, oval plain bearing, and bearing cap bosses on either side.

Fig 11 shows a side view of the bearing cap with the bosses.

Fig 12 shows a perspective view of the crankarm with relation to the cam/driven member and the crankpin.

Fig 13 shows a perspective view of the cam/driven member and of white metal.

Drawing Reference Numerals

1 connecting rod

2 crankshaft

3 big end of 1

4 half-annular main body

5 another half-annular bearing cap

6 inclined, oval plain bearing housing

7 split, round plain bearings

8 crank journal

9 balance weights

10 crankarms

11 crankpin

12 cap bolts

13 nuts

14 multi-fold flat spring

15 multi-fold spring block

16 multi-fold spring housing

17 bolt for 14

18 nut for 17

19 upper portion (surface) of 6

20 lower portion of 6

21 rimside

22 coil spring

23 coil spring block

24 coil spring housing

25 sylindrical base of 23

26 arc surface of 23

27 split, inclined oval plain bearings

28 bearing cap bosses

31 inclined cam/driven member

32 inclined cam section

33 curved driven section

34 half-moon surface of 31

35 upper end of the driven section

36 open spaces

37 white metal

38 flat screw hole in 37

39 flat screw

Best Mode for Carrying Out the Invention

The best mode for carrying out the invention with reference to the accompanying drawings is described below:

Fig 1 and Fig 2 show side and front views of an improved connecting rod(1) and of a conventional crankshaft(2) assembled. The connecting rod(1) has at one end a big end(3), which comprises an inclined, half-oval main body(4); another half-round bearing cap(5) being fixed to the main body(4) by two cap bolts(12) and two nuts(13); an inclined, oval plain bearing housing(6) being formed inside the big end(3); a multi-fold flat spring(14), a multi-fold flat spring block(15), and split, round plain bearings(7) being placed in the upper portion(19) and in the lower portion(20) of the inclined, oval plain bearing housing(6) in order. The crankshaft(2), on the other hand, comprises a crank journal(8), balance weights(9), crankarms(10), and round crankpins(11), the crankpins(11) being rotatably mounted in the split, round plain bearings(7).

In the above construction, the improvement is described in detail as follows:

The inclined, oval plain bearing housing(6), as best shown in Fig 1, is in such a one-side expanded round shape toward the upper portion(19) that provides a room for the round plain bearings(7) and the round crankpin(11)

therein to make a little inclined slidings back and forth and to be disposed normally in the lower portion(20) of, and another room for the multi-fold flat spring(14) in a ㄷ shape and the multi-fold flat spring block(15) in a ㅍ shape to be disposed in the upper portion(19) of, the inclined, oval plain bearing housing(6) and to perform elastic operation to facilitate sliding of the big end(3) on the crankpin(11) and keeping the crankpin(11) to the lower portion(20). A multi-fold flat spring housing(16) will be formed in the upper portion(19) with a bolt hole in the center. The multi-fold flat spring(14) in Fig 1 and Fig 3 will be put partly into the flat spring housing (16) and fixed to the upper portion(19) by a bolt(17) and a nut(18), and the flat spring block(15) will be tightly placed between the flat spring(14) and the plain bearings(7).

Thus, the reader will see that this improved connecting rod/crankshaft mechanism provides a highly reliable, simple, economical connecting rod for performing an eccentric push toward a rimside of a crankshaft in a forward, rotational direction so as to rotate the crankshaft as efficiently as expected from the principle of the wheel and the axle.

Though this applicant's above description contains only three specifications, it should not be construed as limitations in the scope of the invention, but rather as exemplifications of preferred embodiments thereof. Those skilled in the art will envision other possible variations within its scope. For example skilled artisans

will be able to use other stronger, bigger elastic elements for the guide purposes, or have a driven member projecting from the balance weight for possibly more efficiency in receiving boss pushing. They can also make only a plain bearing housing inclined, oval in shape for inclined sliding and an inclined cam projecting from a crankarm, without a driven member, for only guiding the bearing cap bosses in a controlled course and for permitting the upper surface of the plain bearing housing to push a crankpin in a rotational direction in an expansion stroke.

Accordingly the reader is requested to determine the scope of the invention by the appended claims and their legal equivalents, and not by the examples, which have been given.

Claims:

1. An improved connecting rod/crankshaft power transmission mechanism for an automobile for securing the maximum of efficiency in rotating a crankshaft with the minimum of engine power comprising:

connecting rods(1), big ends(3) at one end thereof each comprising a half-annular main body(4); another half-annular bearing cap(5) being fixed to said main body(4) by cap bolts(12) and nuts(13); a round plain bearing housing(6) being formed inside said big end(3);

split, round plain bearings(7) being fit into said plain bearing housing(6);

a crankshaft(2) comprising a crank journal(8), balance weights(9), crankarms(10), and round crankpins (11) being rotatably mounted in said plain bearings(7);

wherein the improvement comprises:

said round plain bearing housing(6) being formed in an inclined, one-side expanded round shape (like oval) so as to provide room for said big end(3) to keep said crankpin(11) to a lower portion(20) of said oval plain bearing housing(6) normally and to make a little inclined reciprocating slidings on said round crankpin(11) eccentrically in a forward, rotational direction in expansion strokes;

guide means for performing guidance to direct said big end(3) to slide a little on said crankpin(11) in a forward, rotational direction in an expansion stroke and to slide back on said crankpin(11) to the starting point when said big end(3) returns to the top dead center; and

additive means combined with said inclined, oval plain bearing housing(6) and said guide means for permitting said big end(3) to perform, in expansion strokes, repeated, eccentric pushings on said crankpin(11) toward a rimside(21) of said crankshaft(2) to rotate said crankshaft(2) most efficiently.

2. The mechanism of claim 1 wherein said guide means comprises:

a multi-fold flat spring(14) being formed in ㄷ shape;

a multi-fold flat spring block(15) being formed in a ㄷ shape for securely supporting said plain bearings (7) and preventing said flat spring(14) from overheat;

a multi-fold flat spring housing(16) being formed in said upper portion(19);

said annular big end(3) being formed as inclined, oval in shape as said inclined oval plain bearing housing (6) and bigger for fully accommodating said flat spring (14) and said flat spring block(15) in said upper portion (19) so as to be rigid enough to meet the strong, successive pushings on said flat spring(14) and on said crankpin(11);

said flat spring(14) being put into said flat spring housing(16) and fixed to said upper portion(19) by a bolt (17) and a nut(18), and said flat spring block(15) being tightly placed between said flat spring(14) and said plain bearings(7); and

said flat spring(14) comprising elastic means for performing elastic operation to keep said round crankpin(11) to said lower portion(20) of said inclined, oval

plain bearing housing(6) until an expansion stroke and to be contracted to permit said big end(3) to make a little inclined sliding on said round crankpin(11) in a forward, rotational direction in said expansion stroke.

3. The mechanism of claim 1 wherein said guide means comprises a coil spring(22), a coil spring block(23) being formed in a ㄷ shape, a coil spring housing(24) being formed in a sylindrical hole in said upper portion (19);

said coil spring(22) being partly placed into said coil spring housing(24), said coil spring block(23) being tightly put into the outer end of said coil spring(22) through a sylindrical base(25) of said coil spring block (23) and being coupled to said plain bearings(7) through an arc surface(26) thereof; and

said coil spring(22) comprising means for performing elastic operation to keep said round crankpin(11) to said lower portion(20) of said inclined oval plain bearing housing(6) until an expansion stroke and to be contracted to permit said big end(3) to make an inclined sliding on said crankpin(11) in a forward, rotational direction in said expansion stroke.

4. The mechanism of claim 1 wherein said guide means comprises said split plain bearings(27) being formed as inclined, oval as said inclined, oval plain bearing housing(6) for being just fit into said oval plain bearing housing(6);

strong, thick bosses being integrally or separately attached to either side of said bearing cap(5) for

forming sidewise protrusion from said sides toward said crankarms(10) each;

inclined cam/curved driven members(31), with a ∇ shaped driven sections(33) and a half-moon like surfaces (34) facing said crankpins(11) each, being protruded from either said opposite crankarms(10), with open spaces(36) each being as wide as said bearing cap bosses (28) at said inclined cam section(32) and at an upper end (35) of said driven section(33) but wider than the width of said bosses(28) at the center of said curved driven section(33) being provided between said crankpin(11) and said cam/driven members(31), so that said bearing cap bosses(28) may slide closely along said inclined cam section(32) and make pushings upon said curved driven sections(33) without impacts, before said upper portion (surface)(19) of said plain bearing housing(6) would reach said crankpins(11), and slide back along said inclined cam section(32) to the starting point; and

additive means combined together with said inclined, oval plain bearing housing(6), said bearing cap bosses (28), and said cam/driven members(31) for permitting said big end(3) to make a little inclined slidings toward said rimside(21) of said crankshaft(2) and to push said crankarms(10) through said bearing cap bosses(28) and to return to the starting point through said bearing cap bosses(28) sliding back along said inclined cam sections (32) through said open spaces(36) for next expansion strokes.

5. The mechanism of claim 4 further including a

half-moon shaped white metals(37) being attached to said half-moon surface(34) of said inclined cam/driven members(31) by flat screws(39) through flat screw holes (38) for the efficient, smooth slidings of said bearing cap bosses(28).

FIG.1

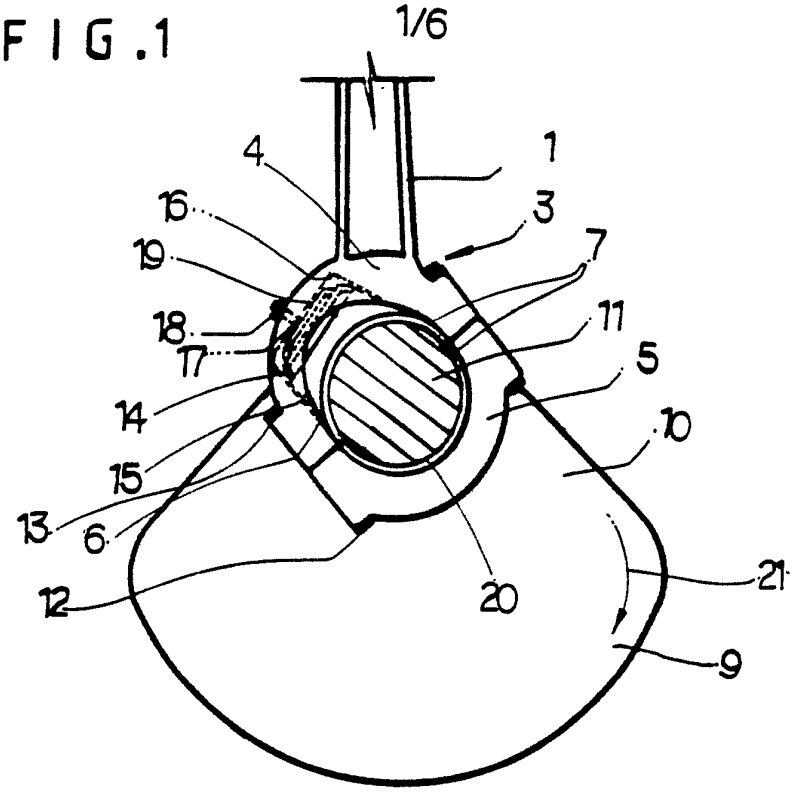


FIG.2

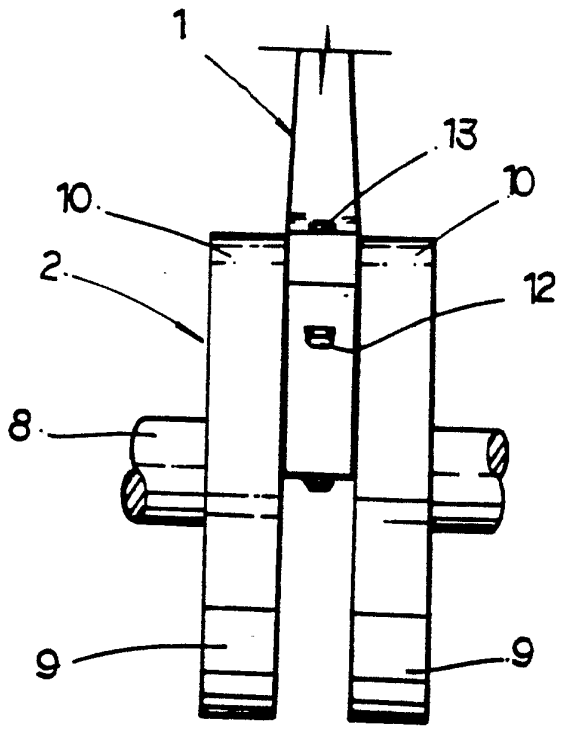


FIG. 3

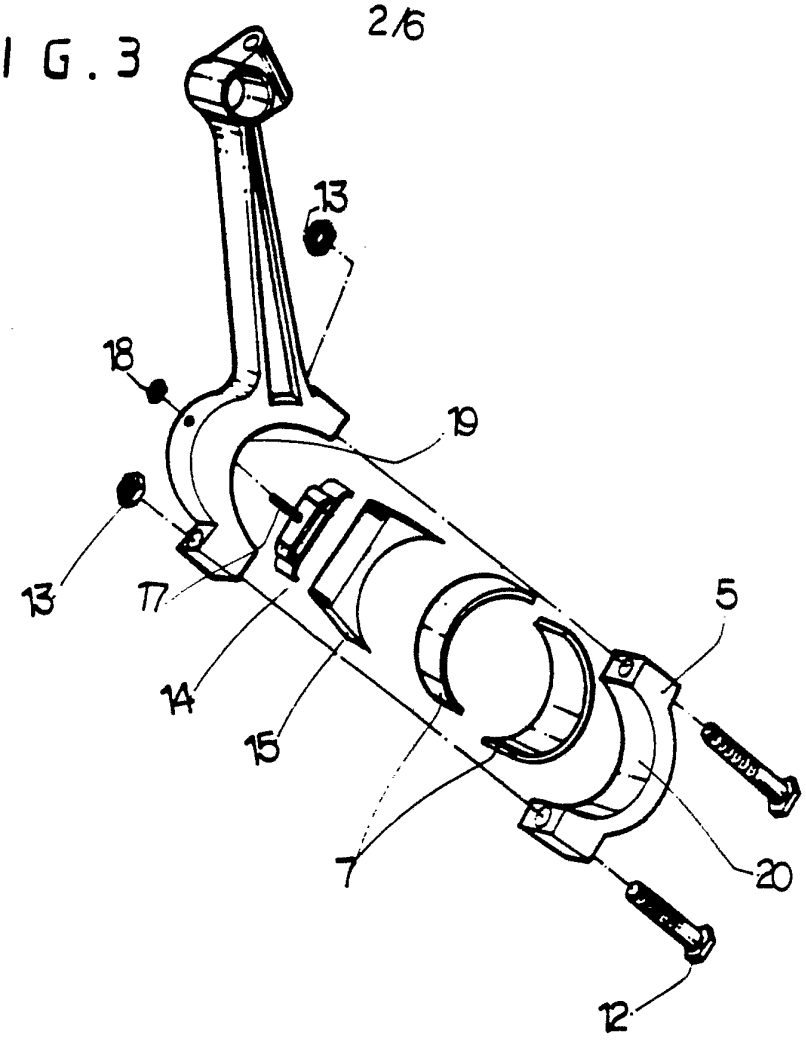


FIG. 4

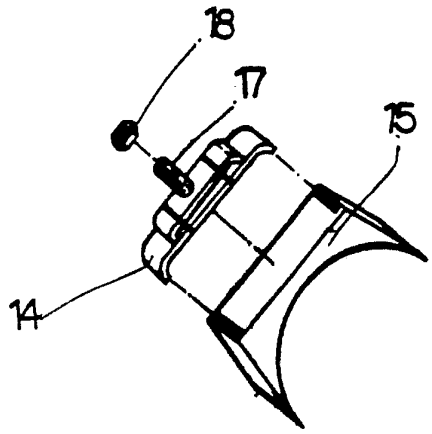


FIG. 5 3/6

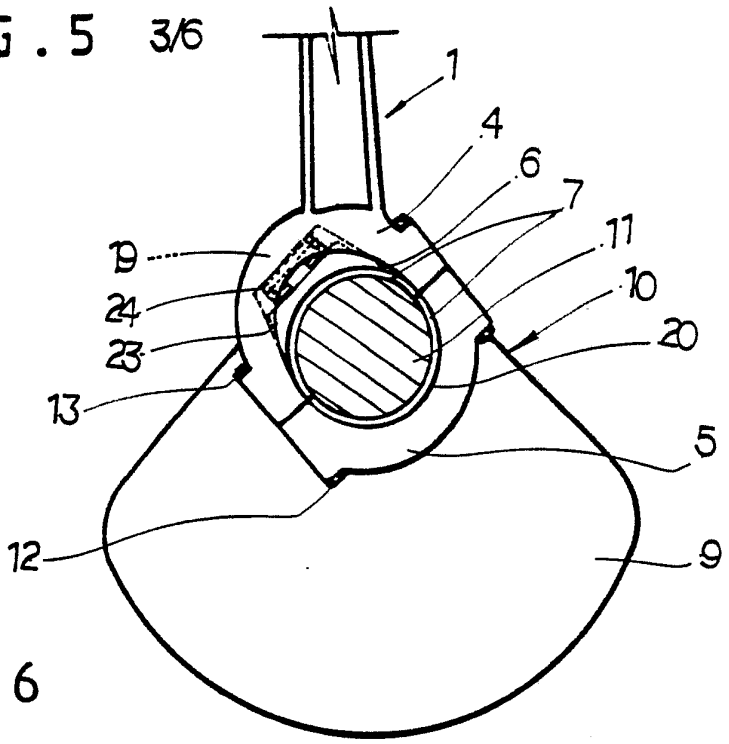


FIG. 6

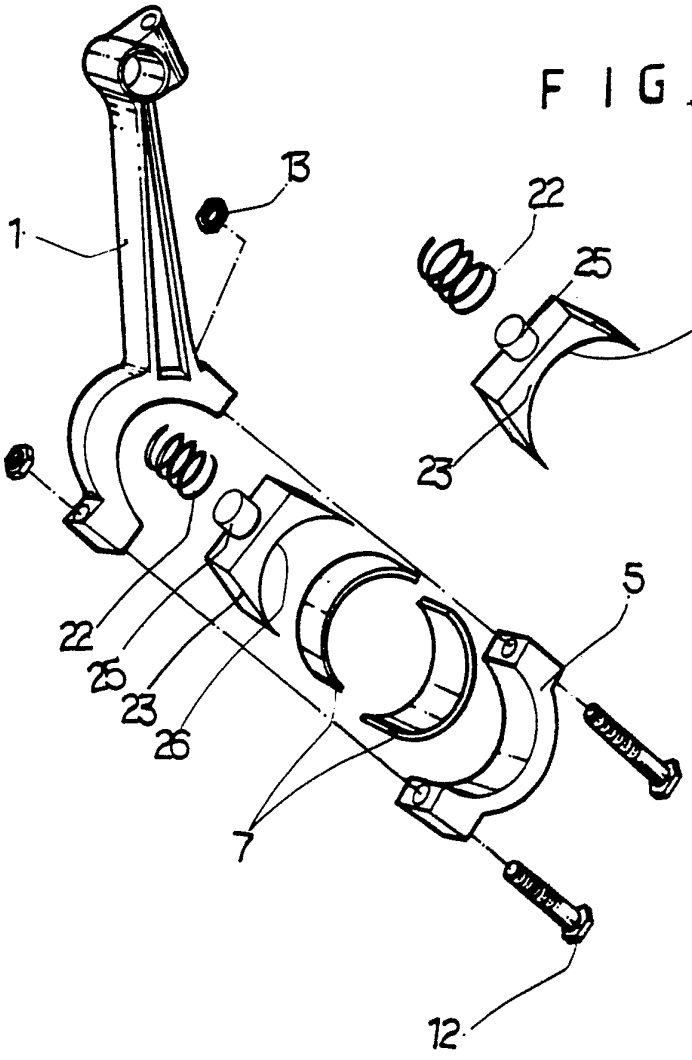


FIG. 7

FIG. 8

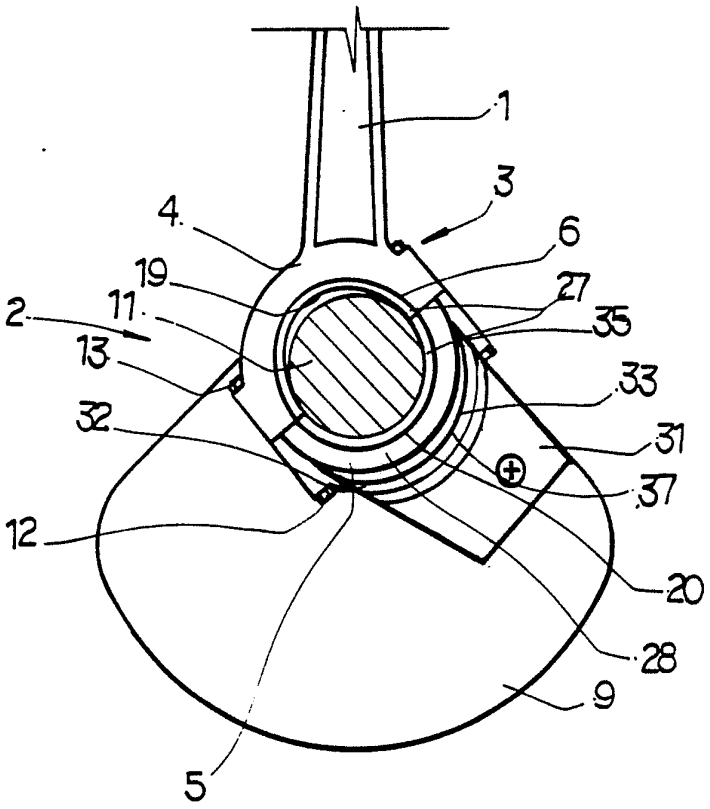


FIG. 9

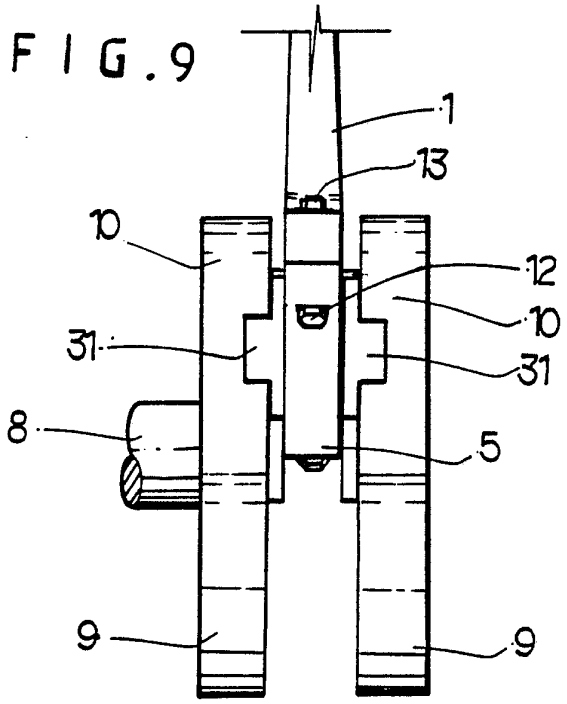


FIG. 10

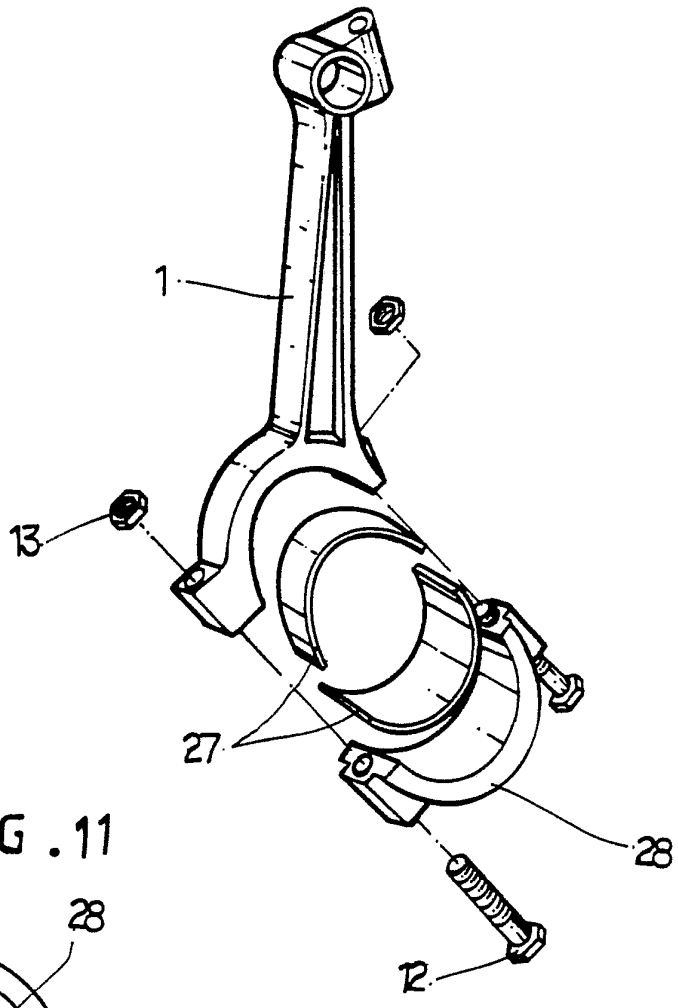


FIG. 11

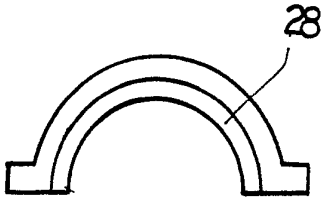


FIG.12

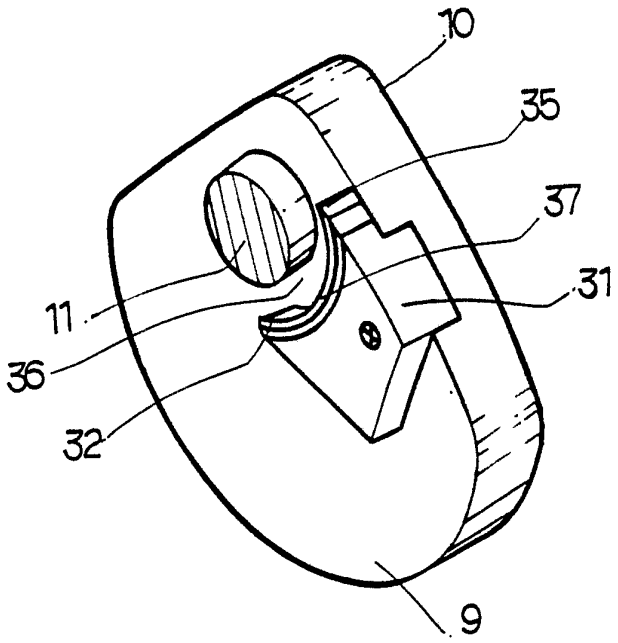
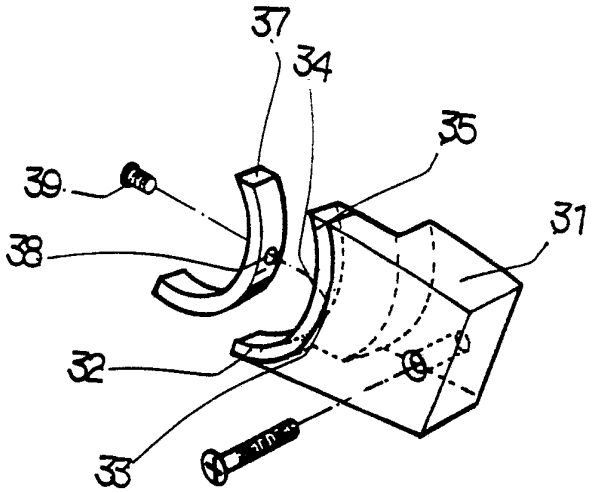


FIG.13



INTERNATIONAL SEARCH REPORT

International Application No PCT/KR 91/00024

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl.[5]: F 16 C 3/20; F 16 C 9/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl.[5]	F 16 C 3/20, 9/02, 9/03, 9/04; F 02 F 7/00 // F 02 B 75/04, 75/06, 75/32

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	WO, A1, 90/ 12 202 (ADYAMA, MITSUGU) 18 October 1990 (18.10.90), see detailed description of the invention; fig. 1-7.	1,4
A	US, A, 2 287 472 (EBY) 22 March 1941 (22.03.41), see fig. 1,2.	1,4
A	EP, A1, 0 074 676 (K. SCHMIDT GMBH) 23 March 1983 (23.03.83), see abstract.	1,4
A	US, A, 4 467 756 (MC WHORTER) 28 August 1984 (28.08.84), see fig. 2-5.	1,4
A	GB, A, 797 080 (B.W. CROSSLEY) 25 June 1958 (25.06.58), see fig.	2,3
A	GB, A, 799 141 (FERLAY) 06 June 1936 (06.06.36), see fig. 7,8.	3
A	US, A, 2 625 048 (VISSAT) 09 September 1950 (09.09.50), see fig. 2-4.	1,4

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* Special categories of cited documents: [10]

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28 January 1992 (28.01.92)	03 February 1992 (03.02.92)
International Searching Authority	**Signature of Authorized Officer**
AUSTRIAN PATENT OFFICE	

Anhang zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

Annex to the International Search Report on International Patent Application No. PCT/KR 91/00024

Annexe au rapport de recherche internationale relatif à la demande de brevet international n°.

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned International search report. The Austrian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche internationale visé ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office autrichien des brevets.

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
WO-A1- 9012202	18-10-90	AU-A1-33573/89	05-11-90
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GB-A - 797080		Keine - None - Rien	
GB-A - 799141		Keine - None - Rien	
US-A - 2625048		Keine - None - Rien	