

(21) Application No 9126614.8

(22) Date of filing 14.12.1991

(71) Applicant
Michael Victor Rodrigues
19/21/23 Fosse Way, Ealing, London, W13 0BZ,
United Kingdom

(72) Inventor
Michael Victor Rodrigues

(74) Agent and/or Address for Service
Michael Victor Rodrigues
19/21/23 Fosse Way, Ealing, London, W13 0BZ,
United Kingdom

(51) INT CL⁵
F16F 15/26, F16H 21/40

(52) UK CL (Edition L)
F2U U1
F2K K9
U1S S1835 S1992

(56) Documents cited
GB 2191822 A WO 91/15633 A US 3899933 A

(58) Field of search
UK CL (Edition K) F1M, F2T, F2U
INT CL⁵ F16F 15/26, F16H 21/40
On-line database: WPI

(54) A balanced oscillating mechanism

(57) A balanced oscillating mechanism comprising a crankshaft, 1, crank pin, 2, connecting rod, 3, gudgeon pin, 4 and oscillator, 5, wherein the connecting rod, 3, embodies at least one balance weight, 6, to counter balance the connecting rod, 3, about the axis, 2a, of the crank pin, 2, and wherein the crankshaft, 1, embodies at least one balance weight, 7, to counter balance the combined weight of the connecting rod, 2, the connecting rod balance weight, 6, and the crank pin, 2, about the axis, 1a, of the crankshaft, 1.

The counter balancing of the combined weight includes the mass of the gudgeon pin, 4, and additionally the mass of gudgeon pin bearing, 8.

The connecting rod, 3, and the gudgeon pin, 4, are integral and the gudgeon pin bearing, 8, is embodied within the oscillator, 5.

A plurality of balanced oscillating mechanisms is provided for multiple crank shaft operation as, for example, in a multi power unit ganged oscillating piston engine.

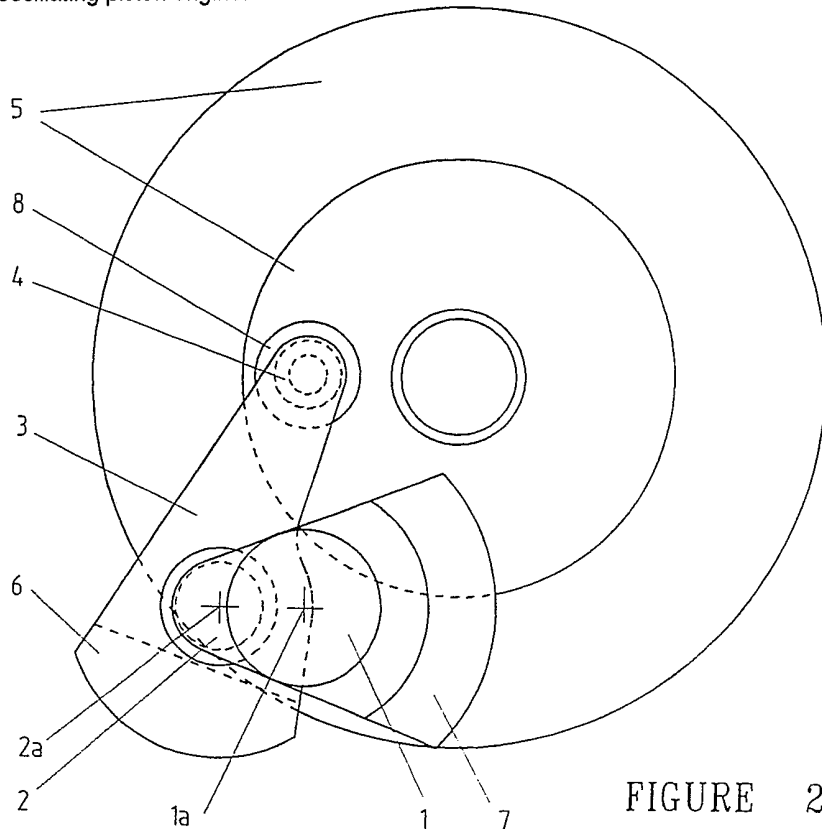


FIGURE 2

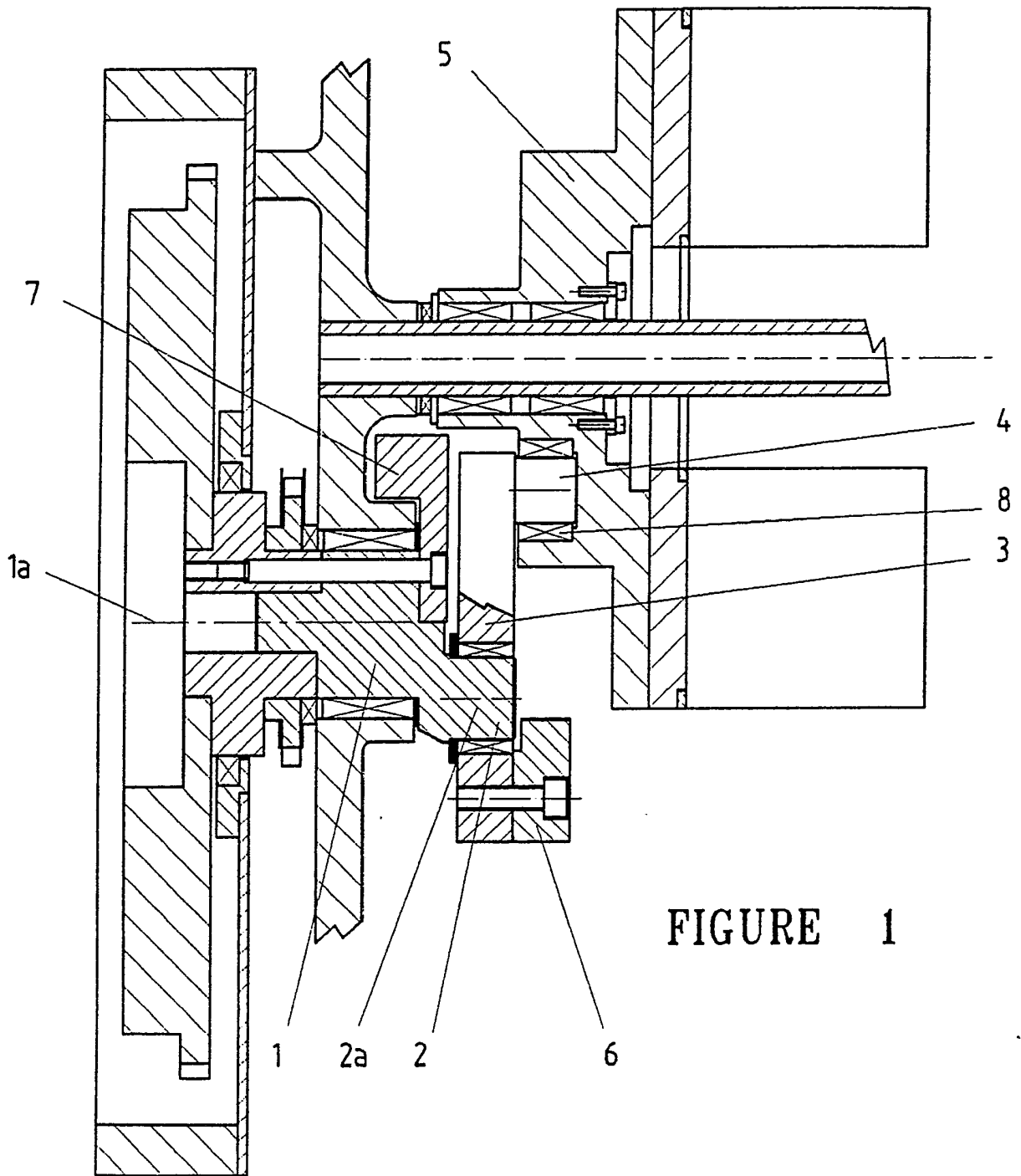


FIGURE 1

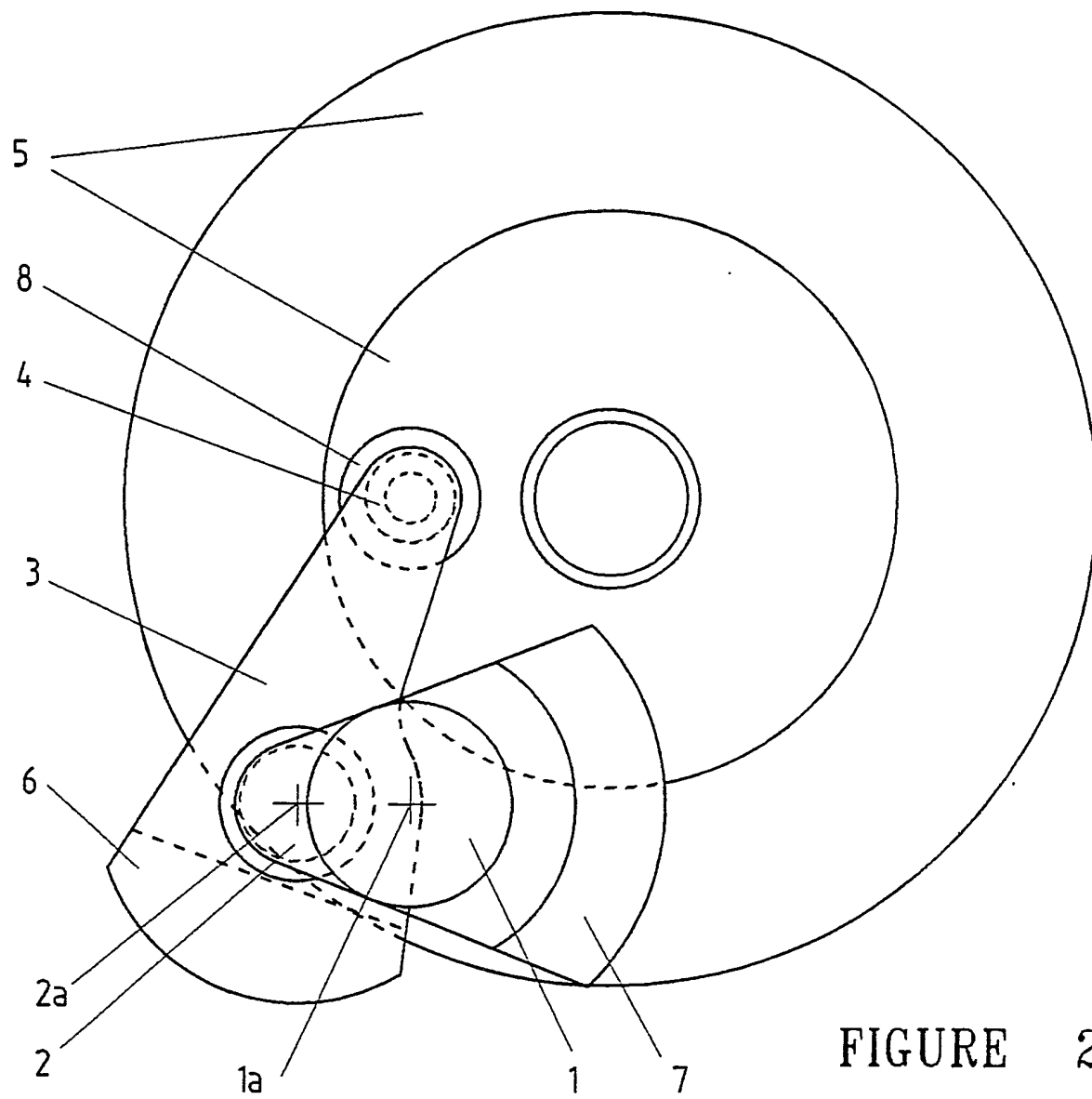


FIGURE 2

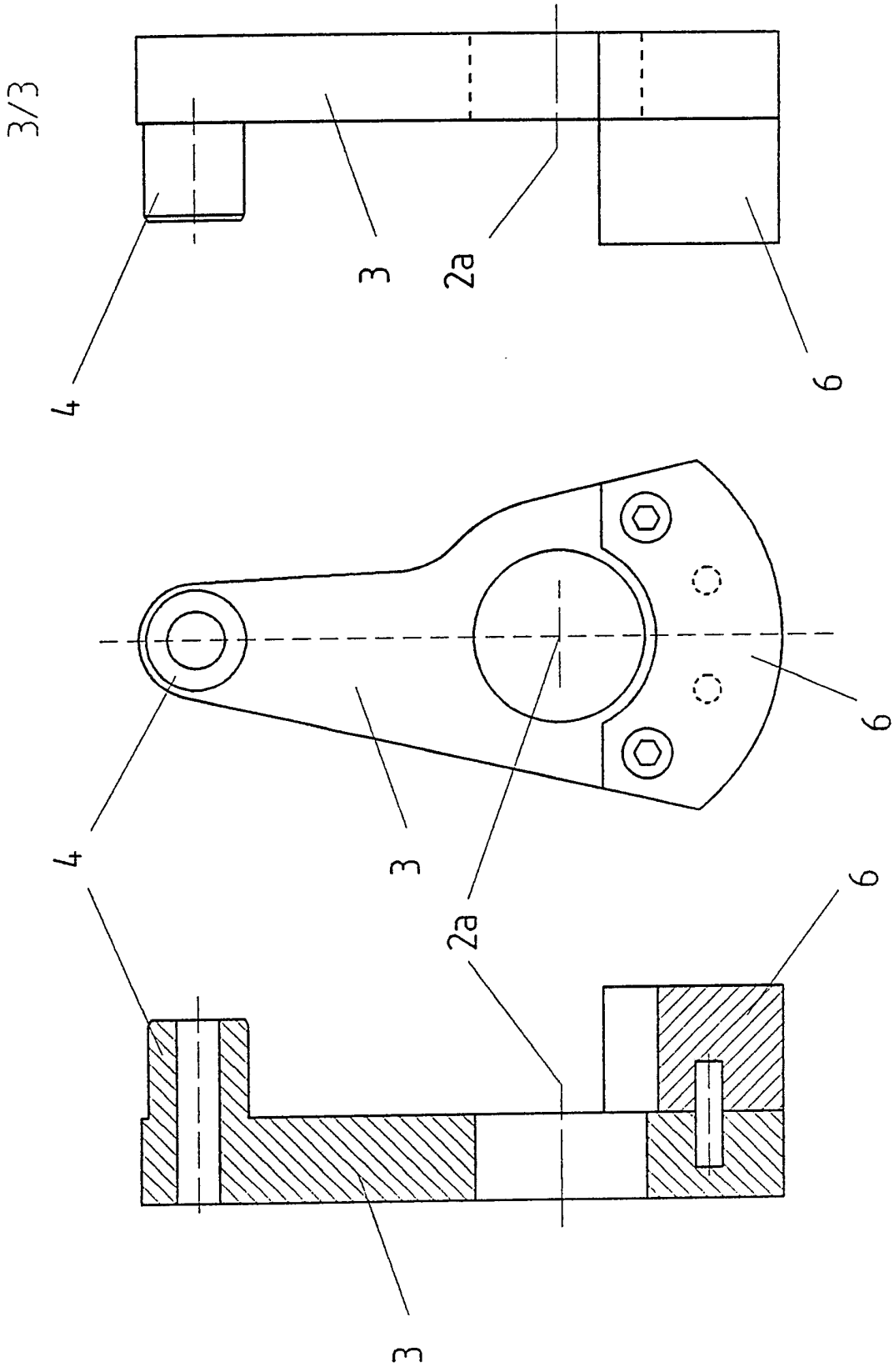


FIGURE 3

A BALANCED OSCILLATING MECHANISM

This invention relates to an improved balanced Oscillating mechanism (for use in engines, pumps, compressors, motors and other machines).

The importance of good balance in such machines cannot be over emphasized. Out of balance results in vibration being transmitted to the vehicle or installation and could lead to many problems such as premature break-down, due to nuts and bolts working themselves loose, fatigue failure of the machine components, as well as discomfort/injury to the user.

DISCOMFORT AT SEA

Discomfort due to unbalanced engine vibration is particularly noticeable on large ocean going Motor Vessels using reciprocating diesel engines. The vibratory throb produced by the unbalanced reciprocating components is often a greater discomfort than the pitching and rolling of the ship at sea.

DISCOMFORT WITH HAND HELD TOOLS

In engine driven hand held power tools, such as chain saws and strimmers, this discomfort is not only noticeable but serious: it can leave the user with jangled nerves in the hands, wrists and arms, and in extreme cases, have been known to cause permanent damage to long-term users of such equipment.

PRIOR ART

Oscillating mechanisms have existed for years and in one case (PCT WO91/15663, claims 27 to 29) full balance achieved at all speeds. However, the embodiments (in claim 28) is for "a balance weight to counter balance the connecting rod about the axis of the gudgeon pin" and also (in claim 29) "a balance weight to counter balance the combined masses of the said gudgeon pin, said connecting rod, said connecting rod bearings and said connecting rod balance weight about the axis of oscillation of the said oscillator flange". The disadvantages of these embodiments is an increase in the weight (and Mass Moment of Inertia) of the oscillator, resulting in increased loads and stresses on the connecting rod, the bearings, gudgeon pin, crank pin and attendant parts, which limits the maximum speed and increases oscillatory motion transmitted to the stator.

The object of the present invention is to minimise the weight (and Mass Moment of Inertia) of the Oscillator by embodying the counter balance weight of the connecting rod about the axis of the crankpin (instead of the axis of the gudgeon pin) and by embodying the counter balance weight (of the connecting rod, gudgeon pin and connecting rod balance weight) about the axis of the crankshaft (instead of the axis of the Oscillator).

The advantages of the present invention are:

1. Reduced weight (and Mass Moment of Inertia) of Oscillator.
2. Lower stresses in gudgeon pin, connecting rod, bearings and attendant parts.
3. Higher engine speed limits with reduced failure rate.
4. Reduced Oscillating Motion transmitted to Stator.
5. Reduced Flywheel weight and Mass Moment of Inertia.
6. Simpler, Cheaper and more Robust Design.

DESCRIPTION

A specific embodiment of the Invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a sectional view of a general arrangement showing the main embodiments of the oscillating mechanism, with the flywheel and flywheel housing on the left hand side.

Figure 2 is an end view of an oscillating mechanism viewed from the flywheel side.

Figure 3 shows three views of the crank pin balanced connecting rod with integral gudgeon pin.

Referring to the drawings, there is provided a balanced Oscillating mechanism comprising a crankshaft, 1, crank pin, 2, connecting rod, 3, gudgeon pin, 4, and oscillator, 5, wherein the connecting rod, 3, embodies at least one balance weight, 6, to counter balance the connecting rod, 3, about the axis, 2a, of the crank pin, 2, and wherein the crankshaft, 1, embodies at least one balance weight, 7, to counter balance the combined weight of the connecting rod, 2, the connecting rod balance weight, 6, and the crank pin, 2, about the axis, 1a, of the crankshaft, 1.

Preferably the said counter balancing of the connecting rod, 3, and the counter balancing of the said combined weight also includes the mass of the gudgeon pin, 4, and additionally the mass of gudgeon pin bearing, 8.

Preferably the said connecting rod, 3, and said gudgeon pin, 4, are integral and preferably the said gudgeon pin bearing, 8, is embodied within the said oscillator, 5.

A plurality of said balanced mechanisms is provided for multiple crankshaft operation as for example in a multi-power unit ganged oscillating piston engine.

CLAIMS:-

1. **A Balanced Oscillating Mechanism for use in engines, pumps, compressors, motors and other machines, comprising a crankshaft, connecting rod, gudgeon pin and oscillator, wherein said connecting rod embodies at least one balance weight to counter balance the connecting rod about the axis of crank pin, and wherein the crank shaft embodies at least one balance weight to counter balance the combined weight of the said connecting rod, said connecting rod balance weight and the said crank pin about the axis of the said crankshaft.**
2. **A Balanced Oscillating Mechanism as in claim 1, wherein said counter balancing of said connecting rod and said counter balancing of said combined weight also includes the mass of the said gudgeon pin.**
3. **A Balanced Oscillating Mechanism as in claim 2, wherein the said connecting rod and said gudgeon pin are integral and wherein the said gudgeon pin bearing is embodied within the said oscillator.**
4. **A Balanced Oscillating Mechanism as in claims 1, 2, or 3 provided for multiple crank shaft operation.**
5. **A Balanced Oscillating Mechanism as in claim 4, comprising a plurality of balanced oscillating mechanisms as in a multi-power unit ganged oscillating piston engine.**
6. **A Balanced Oscillating Mechanism substantially as described herein with reference to and as illustrated in the accompanying drawings.**

**Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)**

Application number
9126614.8

Relevant Technical fields

- (i) UK CI (Edition K) F2U F1M F2T
- (ii) Int CI (Edition 5) F16F 15/26 F16H 21/40

Search Examiner

T S SUTHERLAND

Databases (see over)

- (i) UK Patent Office
- (ii) ONLINE DATABASE: WPI

Date of Search

10 APRIL 1992

Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2191822 A (FORD) Note page 1 lines 74 to 78	
X	WO 91/15663 A (RODRIGUES) See Figure 8 and page 8, paragraphs 6 and 7	1-5
A	US 3899933 (WRIGHT) See Figures 1 and 2	



Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).