

(12) UK Patent Application (19) GB (11) 2 296 902 (13) A

(43) Date of A Publication 17.07.1996

(21) Application No 9500781.1

(22) Date of Filing 16.01.1995

(71) Applicant(s)

Nigel John Hill
5 St Johns Road, LEATHERHEAD, Surrey,
United Kingdom

(72) Inventor(s)

Nigel John Hill

(74) Agent and/or Address for Service

Gallafent & Co
9 Staple Inn, LONDON, WC1V 7QH, United Kingdom

(51) INT CL⁶

B62K 25/08

(52) UK CL (Edition O)

B7E ECS

(56) Documents Cited

GB 2049579 A EP 0507088 A1 US 5209319 A

(58) Field of Search

UK CL (Edition N) **B7E ECS**

INT CL⁶ **B62K 25/00 25/04 25/06 25/08**

(54) Motor cycle front suspension arrangement

(57) The front suspension comprises a pair of telescopic struts each having a stanchion, 21, and a cylinder 22, 23. The upper parts of the cylinders, 22, 23, are linked together by a brace 25, which is in turn pivotally linked to the frame by a radius arm 15. The radius arm imposes a lateral load on the strut cylinders 22, 23, and thereby promotes wear. Lubrication of the strut is ensured by a lubricant chamber formed in the base of the cylinder, from which lubricant is transferred by the action of compressing the strut, to the wearing surfaces, 30, at the upper end of the cylinder.

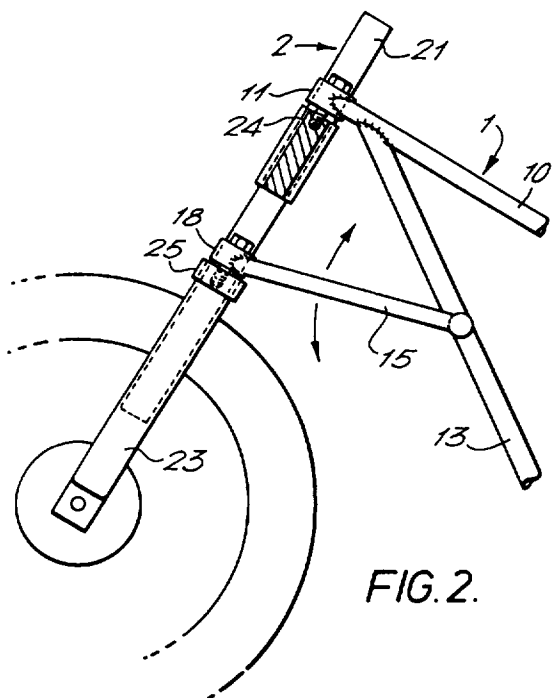
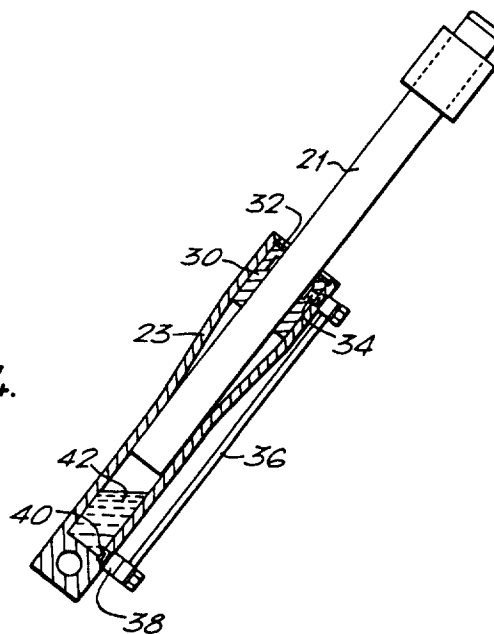
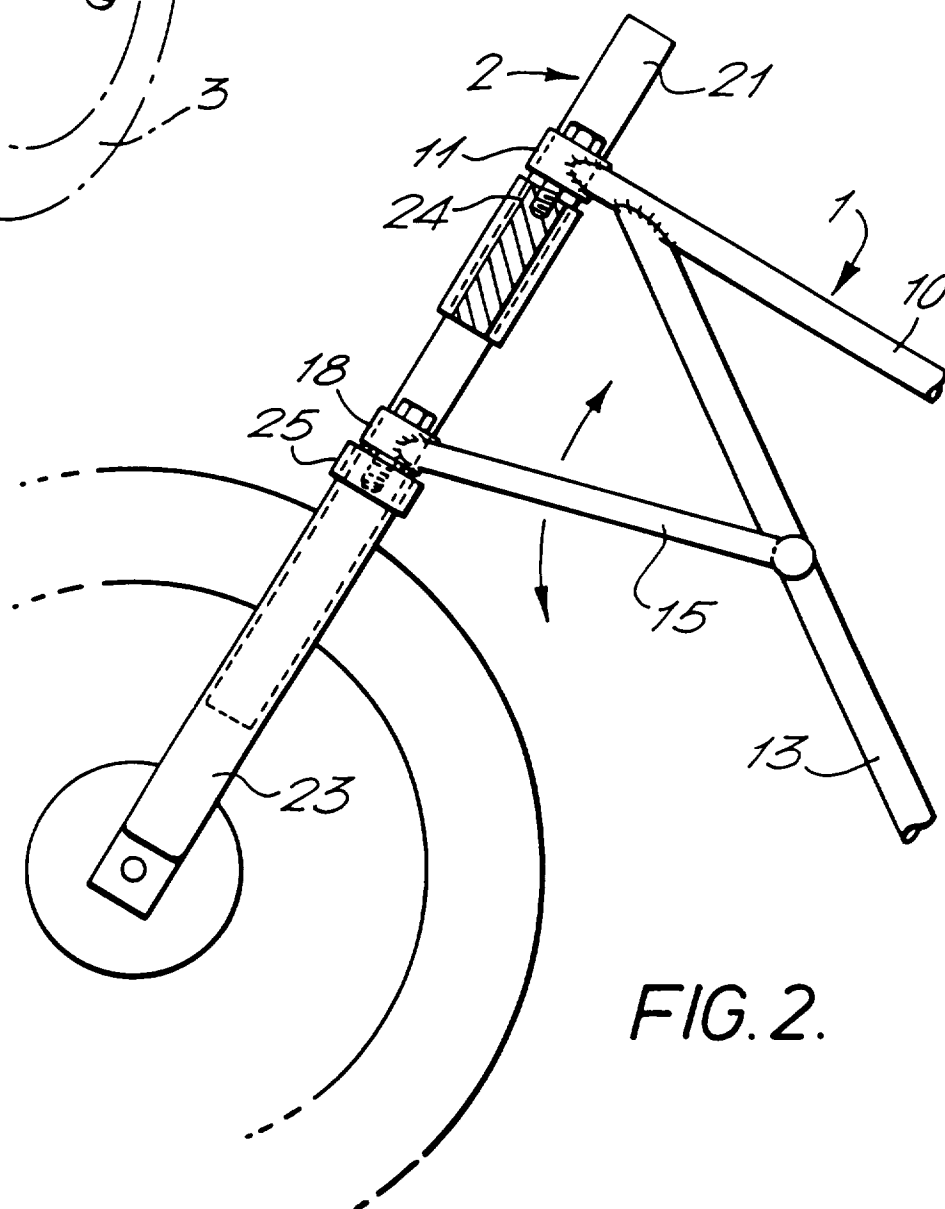
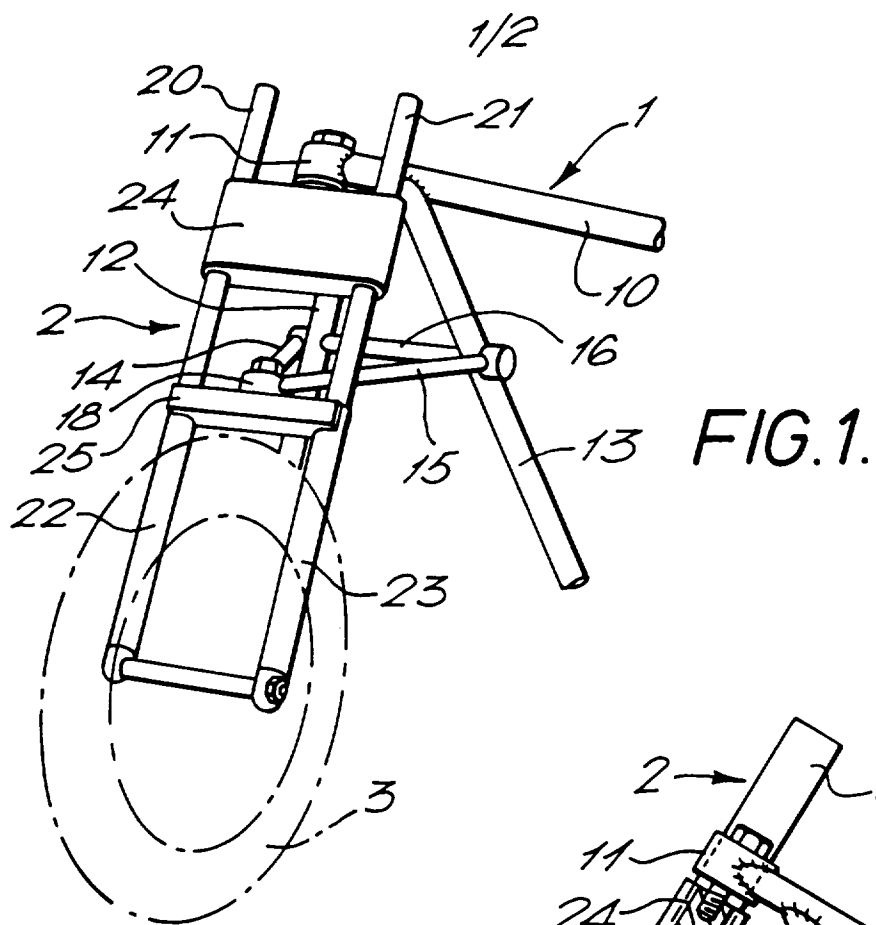
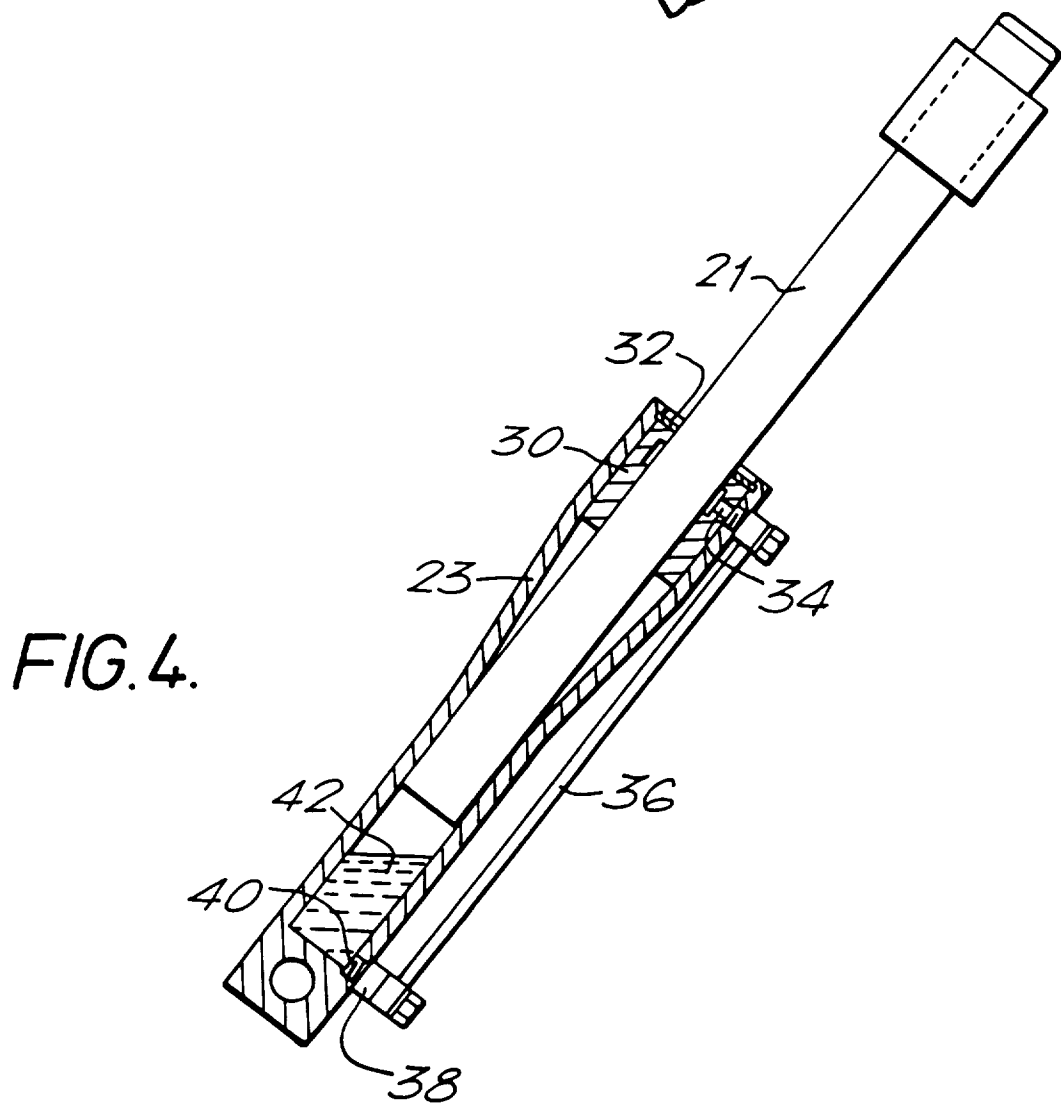
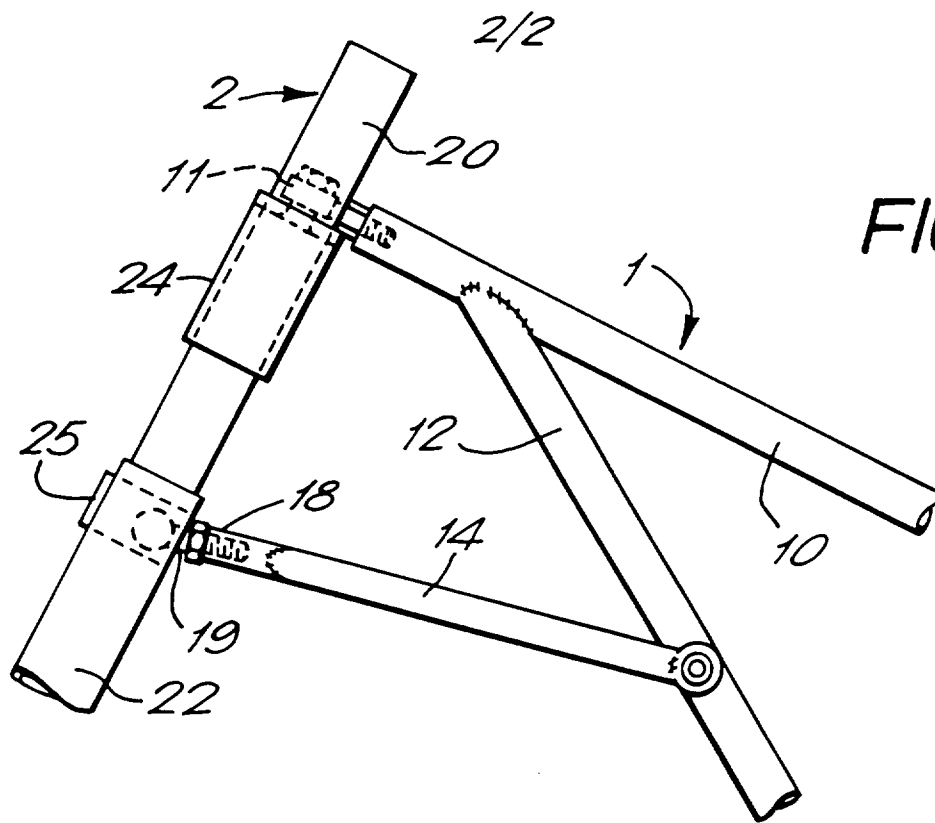


FIG. 4.



GB 2 296 902 A





- 1 -

**FRONT SUSPENSION ARRANGEMENTS
FOR PERFORMANCE MOTOR CYCLES**

5 This invention relates to motor cycles and particularly
to front suspension arrangements for performance motor
cycles.

10 In a conventional two-wheel motor cycle construction,
drive is applied to the rear wheel and the front wheel is
used to steer the motor cycle. The front wheel is
mounted in a front fork which can be rotated about an
axis inclined towards the rear of the bicycle and in a
vertical plane in order to steer the bicycle. The
15 arrangement of handle bars, front fork and any
intermediate members is usually to mount them pivotally
relative to the front end of a main bicycle frame.

20 It is known to join the main frame to the arrangement of
the handlebars and front forks at two vertically spaced
apart positions. This materially decreases the amount of
flexure applied to the front fork and when the motor
cycle is braked, the tendency of the machine to "dive" is
reduced.

It is also well known to provide a resilient suspension between the lower ends of the front fork arrangement to which the hub of the front wheel are attached and the upper parts of the fork. Such resilient suspension may
5 be provided by making each part of the fork telescopic and by providing spring means, for example mechanical, hydraulic or pneumatic, urging the telescoping portions apart. When combined with the spaced mounting arrangements noted above, it is often convenient to mount
10 the handlebars and the upper portions of the forks pivotally on the upper part of the main frame and to connect a lower part of the main frame by means of one or more radius arms to the portions of the front forks attached to the wheel. Arrangements of this sort have
15 been manufactured and operated with some success, but there is a tendency to rapid wear on the telescoping portions of the front forks since the lower arm(s) connecting to the lower part of the main frame applies lateral forces to the telescoping fork members as the
20 motor cycle is driven over bumps, i.e. forces substantially at right angles to the axis along which the portions of the front forks telescope together and apart.

In accordance with the present invention, this problem is
25 solved and satisfactory systems which do not suffer from excess wear but which give the advantages of the previous systems are achieved by providing that the telescoping fork members define between them a chamber containing a quantity of lubricant, the relatively telescoping
30 portions being sealed to one another, and the bottom of the chamber having an outlet for lubricant connected to a lubricant feed to the region of the upper end of the lower of the two telescoping members.

In this way, when the two telescoping front fork members are telescoped together, e.g. by the front wheel being driven on to a bump or when the motor cycle is braked, lubricant at the bottom of the chamber is compressed and
5 the pressure urges the lubricant through a suitable lead, preferably one with a one-way check valve in it, to the upper end of telescoping sealed connection where it both maintains sealing (and accordingly enhances the lubricant circulation action) and additionally facilitates the
10 telescoping of the two members of the fork even against the application of lateral forces by the lower radius arm(s). The injection of the oil creates pressure at the upper bearing which ensures adequate lubrication, and does so precisely when that lubrication is needed, i.e.
15 when the suspension is compressed.

The invention is illustrated by way of example with reference to the accompanying drawings in which:

20 Figure 1 is a simplified diagrammatic perspective front view of the front suspension of a motor cycle in accordance with the invention,

25 Figure 2 is a side view, likewise diagrammatic, of the suspension shown in Figure 1,

Figure 3 is an enlarged scale view of certain parts of the suspension shown in Figure 2 and

30 Figure 4 is a diagrammatic mechanical drawing of the telescoping strut forming part of the suspension of the motor cycle.

Referring first to Figure 1, this shows part of the front

end of a performance motor cycle diagrammatically. The main frame of the motor cycle 1 carries at its front end a socket 11 in which is pivotally mounted a front fork arrangement 2 carrying a road wheel 3. The front fork arrangement consists of a pair of telescopic struts
5 formed by upper stanchions 20, 21 which are a sliding fit in lower sleeves 22 and 23. At their lower ends, sleeves 22 and 23 terminate in a suitable mounting lug for the ends of the axle of the front wheel 3. At their upper
10 ends, sleeves 22 and 23 are fixedly connected together via a cross-member 25.

Stanchions 20 and 21 are connected together via a brace 24 which, at its centre, has a mounting which is fitted
15 into socket 11 on frame 1.

As shown, the frame 1 has an upper member 10 and, connected to it by welding near its forward end, a pair of downwardly and outwardly splayed struts 12 and 13.
20 Pivoted on to strut 12 is a radius arm 14 and on strut 13 a radius arm 15, both of which meet in a sleeve 18 which is pivotally fixed to the top of cross-member 25 via a suitable mounting 19 allowing a certain degree of play. Struts 12 and 13 are braced relative to one another by a
25 cross tie 16 shown in Figure 1.

Not shown for the sake of simplicity are spring and shock absorbing arrangements arranged to damp the ease with which stanchions 20 and 21 may be moved in and out of
30 sleeves 22 and 23 respectively. Hydraulic or pneumatic shock absorbers and springs may be built in between the two telescoping portions in any convenient fashion consistent with the application of the lubrication method of the invention. This lubrication method is shown

diagrammatically in considerably more detail in Figure 4. This shows stanchion 21 and sleeve 23; the arrangements for stanchion 20 and sleeve 22 are analogous.

5 As can be seen in Figure 4, sleeve 23 takes the form of a cylinder in which stanchion 21 fits like a piston. Towards its upper end, the cylinder broadens out and at the top of the cylinder there is a generally cylindrical bush 30 constituting an upper bearing bush having at its
10 outside a sealing ring 32 which seals round the stanchion 21. The stanchion 21 is a sliding fit in the bush 30, but the inner cylindrical surface of the upper bearing bush is provided with a relieved surface by the provision of one or more annular grooves therein. These annular
15 grooves communicate with one or more passages 34 leading to an inlet port to which is attached an oil feed pipe 36.

The lower end of the oil feed pipe is attached via a one-
20 way valve 38 to an oil outlet port 40 located at the bottom of sleeve 23. Prior to assembly, a quantity of oil 42 is introduced into the sleeve 23. Thus, each time stanchion 21 is pushed into sleeve 23, the pressure in the sleeve rises and oil is passed through the one-way
25 valve 38, up the oil pipe 36 and into the upper bearing bush 30 where it lubricates the stanchion 21 as it slides through the bush. This lubrication is sufficient to enable the stanchion 21 to slide satisfactorily both when originally assembled and a considerable while later
30 despite the fact that the upper bearing bush 30 is subject to lateral forces. As indicated diagrammatically in Figure 1, the upper bearing bushes are at the level of cross-member 25 and accordingly subjected to lateral forces transverse to the axis of stanchion 21 as well as

longitudinal forces as the stanchion 21 and sleeve 23 telescope together and apart from one another.

5 It is found that by providing this self-lubricating automatic pumping feed of lubricant to the upper bearing bush 30, very smooth operation is ensured and there is no tendency of the telescoping sliding movement to stick which would make for more difficult control of the performance motor cycle.

CLAIMS

1. A motor cycle front suspension arrangement wherein the front wheel is mounted in a telescoping front fork
5 which can be rotated by means of handlebars about an axis inclined towards the rear of the bicycle and in a vertical plane, the handlebars and front fork being mounted pivotally relative to the front end of a main bicycle frame joined to the arrangement of the handlebars
10 and front forks at two vertically spaced apart positions, wherein each telescoping front fork member has associated with it means urging the telescoping portions apart, and wherein the handlebars and the upper portions of the telescoping forks are mounted pivotally on the upper part
15 of the main frame and a lower part of the main frame is connected by means of one or more radius arms to the portions of the front forks attached to the wheel, and wherein the telescoping fork members define between them a chamber containing a quantity of lubricant, the
20 relatively telescoping portions being sealed to one another, and the bottom of the chamber having an outlet for lubricant connected to a lubricant feed to the region of the upper end of the lower of the two telescoping members.

2. An arrangement according to Claim 1 and including an oil lead from the lower portion of the chamber to an upper bush on the lower of the two telescoping front fork members.

3. An arrangement according to Claim 2 wherein the oil lead has a one-way check valve in it.

4. A motor cycle front suspension arrangement

substantially as hereinbefore described with reference to the accompanying drawings.



Application No: GB 9500781.1
Claims searched: 1 to 3

Examiner: Richard Brown
Date of search: 23 March 1995

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.N): B7E ECS

Int Cl (Ed.6): B62K 25/00,04,06,08

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB2049579A (PENNELL) Whole document.	
A	EP0507088A1 (B.M.W.) Whole document.	
A	US5209319 (BUELL) Whole document.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.