

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 September 2007 (20.09.2007)

PCT

(10) International Publication Number
WO 2007/104938 A1

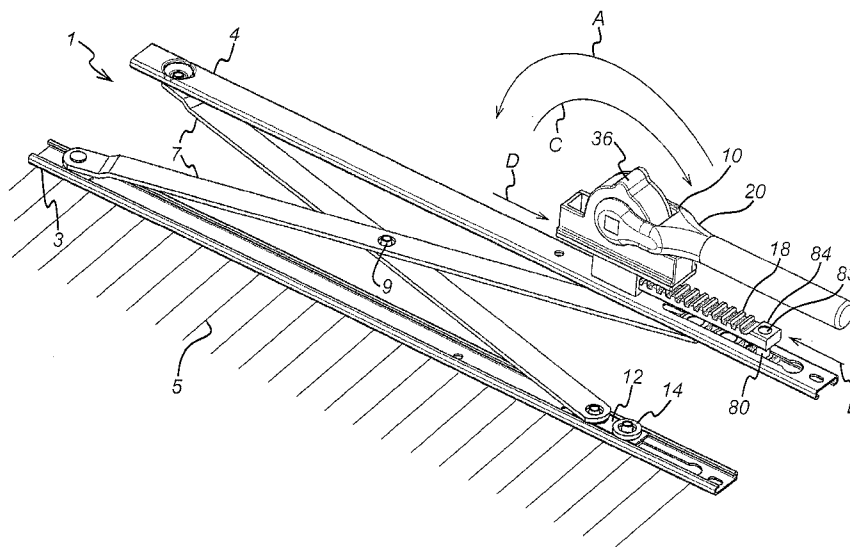
- (51) **International Patent Classification:**
E05F 11/24 (2006.01) E05D 15/30 (2006.01)
E05F 11/34 (2006.01)
- (21) **International Application Number:**
PCT/GB2007/000823
- (22) **International Filing Date:** 12 March 2007 (12.03.2007)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
0605364.9 16 March 2006 (16.03.2006) GB
- (71) **Applicant (for all designated States except US):** SECURISTYLE LIMITED [GB/GB]; Kingsmead Industrial Estate, Princess Elizabeth Way, Cheltenham, Gloucestershire GL51 7RE (GB).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** LAMBERT, John, F. [GB/GB]; 5 Hobby Close, Leckhampton, Cheltenham, Gloucestershire GL53 0LP (GB).
- (74) **Agents:** JACKSON, Richard, Eric et al.; Carpmaels & Ransford, 43-45 Bloomsbury Square, London WC1A 2RA (GB).

- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** 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, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
 — with international search report
 — before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** A PARALLEL HINGE



(57) **Abstract:** A parallel hinge (1) comprising a first and second parallel tracks (3, 4) for mounting the hinge (1) to a vent. The first track (3) is for attaching to a fixed frame 5 of the vent and the second track (4) is for attaching to an opening member of the vent. A cross member comprising a pair of diagonally crossing links (7) pivotally connected to each track (3, 4) and to each other at a central pivot (9). A drive mechanism (10) is mounted to the track (4) attached to the opening member for moving the vent between open and closed positions. The drive mechanism (10) comprises a gear assembly (16) operably coupled between a longitudinally extending drive rack (18) which engages the shoe (12) of the track (4) mounted to the opening member, and an actuating member (20). The actuating member drives the gear assembly (16), which drives the drive rack (18) and in turn the shoe (12) for opening or closing the hinge/window.

WO 2007/104938 A1

A PARALLEL HINGE

The present invention relates to parallel hinges.

5 Parallel hinges are well known in the art. One such parallel hinge is disclosed in EP0968349, which is also assigned to the present Applicant. EP0968349 discloses a parallel hinge, which comprises a pair of mounting tracks for mounting the hinge to a vent. One of the tracks is for attaching to the fixed frame of the vent and the other one of the tracks is for attaching to the opening member of the vent. A pair of diagonally
10 crossing links are pivotally connected to each track and to each other. Each track accommodates a shoe, which carries an end of one of the links. One end of each link is pivotally mounted to a respective shoe, thereby allowing the end of the link to move back and forth along the track during use of the hinge when moving the vent between open and closed positions. It is known that vents comprising parallel hinges enable the
15 opening member to move away from the fixed frame whilst remaining substantially parallel at all times to the fixed frame. In such a vent, the opening member is supported by three hinges on three sides and a fourth side is driven by a drive means. Motor drive means are expensive. The motors require maintenance and are made up of complex parts that are difficult to assemble correctly and are costly to replace if they fail. Further,
20 it is critical for a correctly fitted and fully functional vent to avoid misalignments between the hinges and the drive means. The need for providing such a driving means makes installation of such hinges more difficult, often requiring an expert fitter to install the hinges and the driving means making the installation expensive.

25 There is therefore a need for a parallel hinge which does not suffer from at least some of the drawbacks of the prior art. The present invention is directed to such a parallel hinge. The invention also relates to a vent comprising a fixed frame and an opening member attached to the fixed frame by parallel hinges. The invention further relates to an indexing drive device for driving a shoe along a track of a parallel hinge.

30

According to the present invention there is provided, in a first aspect, a parallel hinge comprising: first and second parallel mounts, a cross member coupled between the first

and second mounts; and a drive mechanism engaging the cross member to drive the first and second mounts apart; wherein the drive mechanism is mounted to the first mount.

One advantage of the present invention is that it provides a drive mechanism integrally
5 formed with a hinge. Another advantage is that an opening member may have the same number of driving mechanisms as hinges. For example, an opening member comprising two hinges may also have two driving mechanisms. Alternatively, one or more hinges may be coupled together by means of drive bars and corner drives such that the one or more hinges may be driven by one drive mechanism. This will facilitate opening of the
10 vent. Advantageously, the drive mechanism may be used to assist weather sealing of the vent. A further advantage is that having a driving mechanism integrally formed with a hinge reduces the cost, the number of components and the complexity involved in assembling the vent.

15 In one embodiment of the invention the first mount is fixed in use and the second mount is movable.

Preferably, the cross member is a pair of diagonally crossing links which are pivotally connected to each mount and to each other.

20

Preferably, the mounts are tracks which each accommodates a shoe which carries a pivot connected to a respective link.

In one embodiment of the invention the drive mechanism engages one of the shoes for
25 moving the respective shoe along the respective track. The drive mechanism may comprise a drive rack for engaging the respective shoe.

Preferably, the drive mechanism comprises a coupling means for coupling the drive rack to the respective shoe.

30

In one embodiment of the invention the drive mechanism comprises an actuating member for applying a driving force to drive the drive rack. Preferably, the actuating member is operable to move in an arcuate manner.

In another embodiment of the invention the drive mechanism comprises a gear assembly operably coupled to the drive rack and to the actuating member such that, in use, rotational force applied to the actuating member is translated into a linear driving force
5 for driving the drive rack and, in turn, the respective shoe linearly along the respective track.

Optionally, the gear assembly comprises a rotatably mounted drive gear which is driven by the actuating member, and a rotatably mounted transmission gear which is in turn
10 driven by the drive gear and is operably coupled to the drive rack.

The drive gear may be carried on a drive shaft operably coupled to the actuating member. Preferably, the drive shaft has a square cross section.

15 In one embodiment of the invention the drive mechanism comprises a housing defining a hollow interior region for accommodating the drive gear and the transmission gear.

Preferably, movement of the actuating member in an arcuate first direction causes the drive rack to move in a linear first direction, and movement of the actuating member in
20 an arcuate second direction causes the drive rack to move in a linear second direction.

In another embodiment of the invention the shoe comprises at least one roller.

According to the present invention there is provided, in a second aspect, a hinge
25 comprising a track and a plurality of links, wherein the track comprises a shoe comprising at least one roller.

The drive mechanism may drive a plurality of hinges. Preferably, the hinges are coupled together by at least one drive bar and at least one corner drive.

30

Preferably, the drive mechanism comprises an indexing drive device.

In one embodiment of the invention the drive mechanism comprises a locking device, for example a key operated locking device.

In another embodiment of the invention the drive mechanism comprises a weather
5 sealing device.

According to the present invention there is provided, in a third aspect, a vent comprising a fixed frame and an opening member attached to the fixed frame by parallel hinges as herein claimed, the opening member being moveable between a position closing the vent
10 and an open position by the drive mechanism. Preferably, the vent comprises a window.

According to the present invention there is provided, in a fourth aspect, an indexing drive device for driving a shoe along a track of a parallel hinge, the indexing drive device comprising a drive rack for engaging the shoe, an actuating member for applying
15 an arcuate driving force, a gear assembly operably coupled to the drive rack and to the actuating member such that, in use, the arcuate driving force is translated into a linear driving force for driving the drive rack and, in turn, the shoe linearly along the track.

The invention will be more clearly understood from the following description of an
20 embodiment thereof with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a parallel hinge according to the invention;

Fig. 2 is an exploded perspective view of the drive mechanism shown in Fig. 1;

Fig. 3 is an exploded perspective view of the shoe of the hinge of Fig. 1; and

25 Fig. 4 is a perspective view of a parallel hinge shown in Fig. 1 with the drive mechanism removed for clarity.

Referring to the drawings and initially to Fig. 1 there is illustrated a parallel hinge according to the invention, indicated generally by the reference numeral 1. Although,
30 only one such parallel hinge 1 will be described below, it will be appreciated by those skilled in the art that a vent may comprise a plurality of parallel hinges 1. The parallel hinge 1 comprises first and second parallel mounts, namely, a pair of mounting tracks 3, 4 for mounting the hinge 1 to the vent (not shown). The first track 3 is for attaching to a

fixed frame 5 (shown by dashed lines) of the vent and the second track 4 is for attaching to an opening member (not shown) of the vent. A cross member comprises a pair of diagonally crossing links 7 pivotally connected to each track 3, 4 and to each other at a central pivot 9 for facilitating opening and closing of the vent. A drive mechanism 10 is mounted to the track 4 attached to the opening member for moving the vent between open and closed positions, as will be describe in detail below. The tracks 3, 4 are C-shaped in section and each accommodate a shoe 12, which each carries an end of one of the links 7. More particularly, one end of each link 7 is pivotally mounted to a respective shoe 12, thereby allowing the end of the link 7 to move back and forth along the tracks 3, 4 during use of the hinge 1 when moving the vent between open and closed positions. The other end of each link is fixed to a respective track 3, 4. In this embodiment of the invention, each of the shoes 12 carries a pair of annular rollers 14 which are fixed thereto as illustrated in Fig. 3. The rollers 14 significantly reduce the amount of friction generated as the shoes 12 move along their respective tracks 3, 4, and as a result the opening and closing of a heavy vent can be facilitated.

Referring now to Fig. 2, the drive mechanism 10 comprises a gear assembly 16 operably coupled between a longitudinally extending drive rack 18 which engages the shoe 12 of the track 4 mounted to the opening member, and an actuating member 20. The actuating member drives the gear assembly 16, which drives the drive rack 18 and in turn the shoe 12 for opening or closing the hinge/window. The gear assembly 16 is configured for translating an arcuate driving force applied to the actuating member 20 to a linear driving force for moving the drive rack 18 rectilinearly. In this embodiment of the invention, the gear assembly 16 comprises a drive gear 22 carried on a drive shaft 24 of square transverse cross section, and a rotatably mounted transmission gear 26 which engages the drive gear 22 such that the drive gear 22 can drive the transmission gear 26. The actuating member 20 comprises a handle portion 28 for receiving a driving force, and a pair of spaced apart arms 30 extending from the handle portion 28 defining openings of square cross sectional area for accommodating the drive shaft 24. The drive shaft 24 defines a pivot axis 32 about which the actuating member 20 is rotatable for facilitating arcuate movement of the actuating member 20 about the pivot axis 32. The drive rack 18 defines a serrated surface 34 for engaging the transmission gear 26, and an

opening 83 substantially adjacent an end thereof for receiving a drive pin 80 for coupling the drive rack 18 to the shoe 12.

A housing 36 is provided which comprises a main housing portion 37 open at one end 38 and defines a hollow interior region 39 for accommodating the drive gear 22 and the transmission gear 26. A discrete side wall 42 is provided for releasably coupling to the main housing 37 using a plurality of screws 46 for closing off the open end 38. A guide channel 50 is provided that extends through the main housing portion 37 below the transmission gear 26 for receiving the drive rack 18. A pair of shoulders 47 extending at
10 respective opposite sides of the main housing 37 are provided to limit the angular movement of the actuating member 20 to about 180° around the pivot axis 32. The drive gear has a circular lip 90 and a square hole 92. The main housing 37 and side wall 42 are each provided with a circular opening 94 which receives the circular lip 90 for mounting the drive gear 22 in the housing 36. The drive shaft 24 extends through the
15 square hole 92 of the drive gear 22. The transmission gear 26 is also provided with a circular lip 96. The lip 96 engages an inner indentation 31 in the main housing 37 and the side plate 42 for mounting the transmission gear 26 in the housing 36.

Referring again to Fig. 1, the C-sections of the track 3, 4 are oriented in opposite
20 directions. The second track 4 in use is fixed to an extrusion (not shown) forming a frame of the opening member. The first track 3 is intended to be attached to the fixed frame 5 of a building. The actuating member 20 and housing 36 extend from the inner face of the opening member so that the actuating member 20 can be easily accessed by an operator. The housing 36 which contains the gear assembly 16 extends into an
25 extruded section of the opening member. The drive rack 18 is accommodated in the extruded section. The extruded section is configured such that the drive rack 18 can be operably coupled to the shoe 12 of the track 4 attached to the opening member. Extruded sections of this kind are well known to those skilled in the art and it is not intended to describe them further.

30

Referring now to Fig. 3, in this embodiment of the invention each shoe 12 comprises an elongated carrier member 49 on which a pair of annular rollers 14 are rotatably mounted thereto. A hub 54 is provided for supporting each roller 14 and comprises an annular

portion 56 integrally formed with an extending circular stub shaft 58 which carries the corresponding annular roller 14 and abuts the carrier member 49. The roller 14 can freely rotate without friction about the hub 54 as the respective shoe 12 moves along the respective track 3, 4. The annular portion 56 of the hub 54 prevents the roller 14 from disengaging the hub 54. An orifice 64 extends through each hub 54 for receiving a fastening rivet 66, 67 for fastening the respective hub 54 to the carrier member 49. Openings 68 are provided on respective opposite ends of the carrier member 49 for receiving corresponding rivet pins 66, 67.

Referring now to Fig. 4, each of tracks 3, 4 is provided with a slit 100 so that the drive mechanism 10 can be operatively coupled to the shoe 12 via the drive pin 80. An enlarged end 102 of the slit 100 is provided to allow the assembly of the drive pin 80 with the parallel hinge 1. Flanges formed on each track 3, 4 prevent the respective shoe 12 disengaging the respective track 3, 4. A coupling means, namely a cranked link member 70, is provided for coupling the drive rack 18 to one of the shoes 12 and comprises a base plate 72 defining a bore 74 for accommodating the first rivet pin 66 of the respective shoe 12 and an integrally formed offset plate 76 which defines a recess 78 for accommodating the drive pin 80. The drive pin 80 is fitted into the aperture 83 (shown in Figs. 1 and 2) formed on the end 84 of the drive rack 18 and a mushroom head of the drive pin 80 engages the recess 78 of the link member 70 through the aperture 102 formed in the track 4. The mushroom head of the drive pin is held in position by the flanges of the track 4 once the cross links 7 have been riveted to their respective tracks 3, 4 at their fixed ends. The second rivet pin 67 of the respective shoe 12 extends through an end of one of the cross links 7 about which the cross link 7 can pivot for coupling the shoe 12 to the cross link 7. A plastics washer 104 is fitted between the cross link 7 and the carrier member 49 to reduce friction as the hinge 1 moves. A limiting member 106 can be located in at least one of the tracks 3, 4 for limiting the movement of the shoe 12.

Optionally, an elongate thermal barrier plate 40 (shown in Fig. 2) is provided which is mounted between the housing 36 and the frame of the opening member for preventing condensation forming in the housing 36 which in turn prevents corrosion occurring to the gear assembly 16. An opening 41 is provided in the thermal barrier plate 40 through

which a portion of the housing 36 and the transmission gear 26 protrudes when engaging the drive rack 18.

In use, the track 4 of the hinge 1 carrying the drive mechanism 10 is mounted to the opening member of the vent. Referring again to Fig. 1, in order to open the vent, the actuating member 20 is pivoted in a first arcuate direction, indicated by arrow A, about the pivot axis 32 which causes the drive rack 18 and, in turn, the shoe 12 to move in a first linear direction indicated by arrow B for moving the vent to an open position. When in an open position, the serrated surface 34 of the drive rack 18 is still engaged by the transmission gear 26, thereby ensuring that the vent is held in the selected open position. In order to close the vent, the actuating member 20 is pivoted in the reverse direction, indicated by arrow C, about the pivot axis 32, which causes the drive rack 18 and, in turn, the shoe 12 to move in a second linear direction, indicated by arrow D, for moving the vent to a closed position.

15

Due to the positive drive provided by the transmission gear 26 engaging the drive rack 18, good weather sealing of the vent can be realised.

The invention is not limited to the embodiment hereinbefore described which may be varied in construction and detail within the scope of the following claims.

25

30

CLAIMS

1. A parallel hinge, comprising:
first and second parallel mounts;
5 a cross member coupled between the first and second mounts; and
a drive mechanism engaging the cross member to drive the first and
second mounts apart;
wherein the drive mechanism is mounted to the second mount.
- 10 2. A hinge as claimed in claim 1, wherein the first mount is fixed in use and the
second mount is movable.
3. A hinge as claimed in claim 1 or claim 2, wherein the cross member is a pair of
diagonally crossing links which are pivotally connected to each mount and to each other.
15
4. A hinge as claimed in claim 3, wherein the mounts are tracks which each
accommodates a shoe which carries a pivot connected to a respective link.
5. A hinge as claimed in claim 4, wherein the drive mechanism engages one of the
20 shoes for moving the respective shoe along the respective track.
6. A hinge as claimed in claim 5, wherein the drive mechanism comprises a drive
rack for engaging the respective shoe.
- 25 7. A hinge as claimed in claim 6, wherein the drive mechanism comprises a
coupling means for coupling the drive rack to the respective shoe.
8. A hinge as claimed in claim 6 or claim 7, wherein the drive mechanism
comprises an actuating member for applying a driving force to drive the drive rack.
30
9. A hinge as claimed in claim 8, wherein the actuating member is operable to move
in an arcuate manner.

10. A hinge as claimed in claim 9, wherein the drive mechanism comprises a gear assembly operably coupled to the drive rack and to the actuating member such that, in use, rotational force applied to the actuating member is translated into a linear driving force for driving the drive rack and, in turn, the respective shoe linearly along the
5 respective track.

11. A hinge as claimed in claim 10, wherein the gear assembly comprises a rotatably mounted drive gear which is driven by the actuating member, and a rotatably mounted transmission gear which is in turn driven by the drive gear and is operably coupled to the
10 drive rack.

12. A hinge as claimed in claim 11, wherein the drive gear is carried on a drive shaft operably coupled to the actuating member.

15 13. A hinge as claimed in claim 12, wherein the drive shaft has a square transverse cross section.

14. A hinge as claimed in any one of claims 11 to 13, wherein the drive mechanism comprises a housing defining a hollow interior region for accommodating the drive gear
20 and the transmission gear.

15. A hinge as claimed in any one of claims 8 to 14, wherein movement of the actuating member in an arcuate first direction causes the drive rack to move in a linear first direction and movement of the actuating member in an arcuate second direction
25 causes the drive rack to move in a linear second direction.

16. A hinge as claimed in any one of claims 4 to 15, wherein the shoe comprises at least one roller.

30 17. A hinge comprising a track and a plurality of links, wherein the track comprises a shoe comprising at least one roller.

18. A hinge as claimed in any preceding claim, wherein the drive mechanism drives a plurality of hinges.

19. A hinge as claimed in claim 18, wherein the hinges are coupled together by at least one drive bar and at least one corner drive.

20. A hinge as claimed in any preceding claim, wherein the drive mechanism comprises an indexing drive device.

21. A hinge as claimed in any preceding claim, wherein the drive mechanism comprises a locking device.

22. A hinge as claimed in any preceding claim, wherein the drive mechanism comprises a weather sealing device.

15

23. A parallel hinge substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

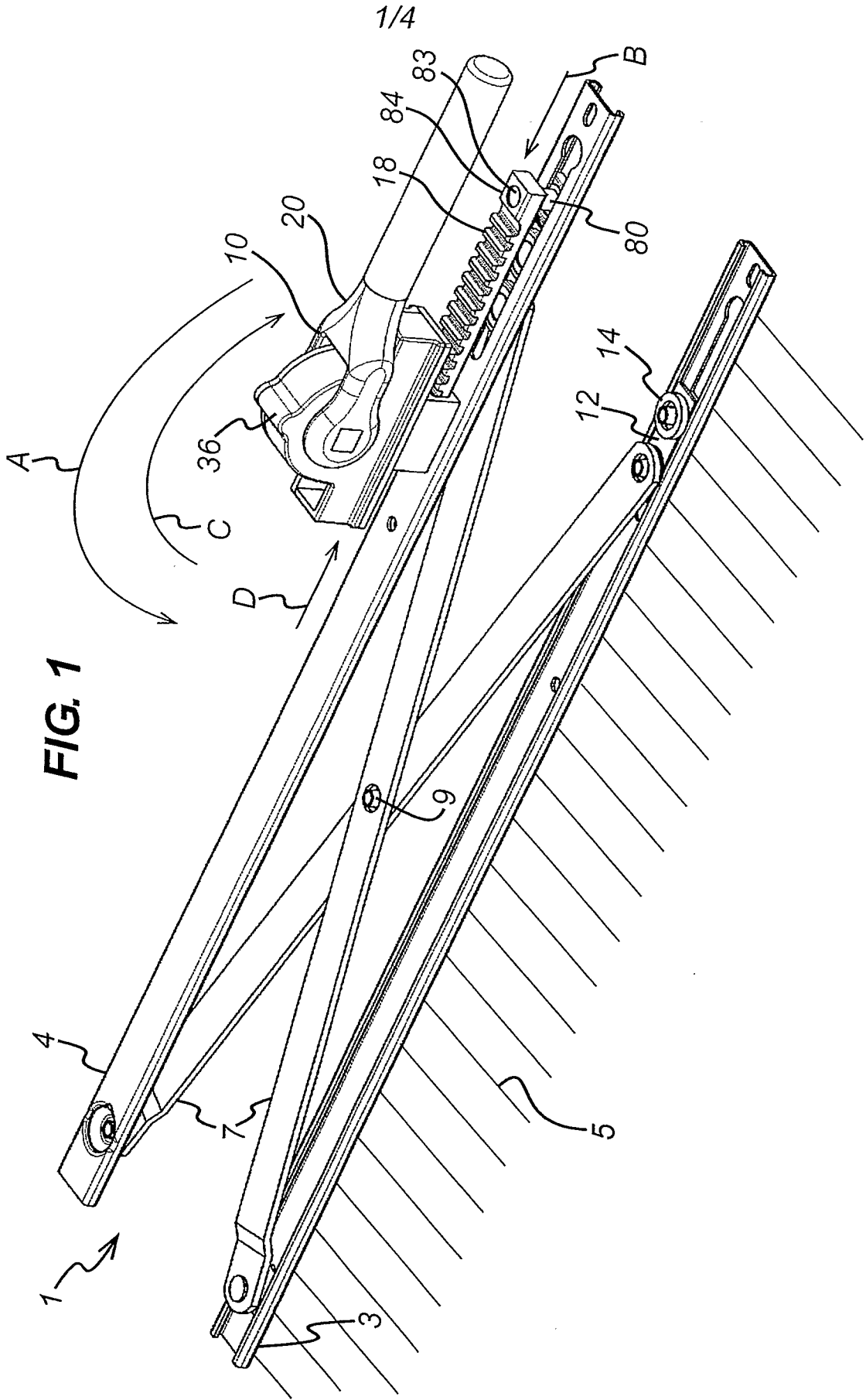
24. A vent comprising a fixed frame and an opening member attached to the fixed frame by parallel hinges as claimed in any preceding claim, the opening member being moveable between a position closing the vent and an open position by the drive mechanism.

25. A vent as claimed in claim 24, wherein the vent comprises a window.

25

26. A indexing drive device for driving a shoe along a track of a parallel hinge, the indexing drive device comprising a drive rack for engaging the shoe, an actuating member for applying an arcuate driving force, a gear assembly operably coupled to the drive rack and to the actuating member such that, in use, the arcuate driving force is translated into a linear driving force for driving the drive rack and, in turn, the shoe linearly along the track.

30



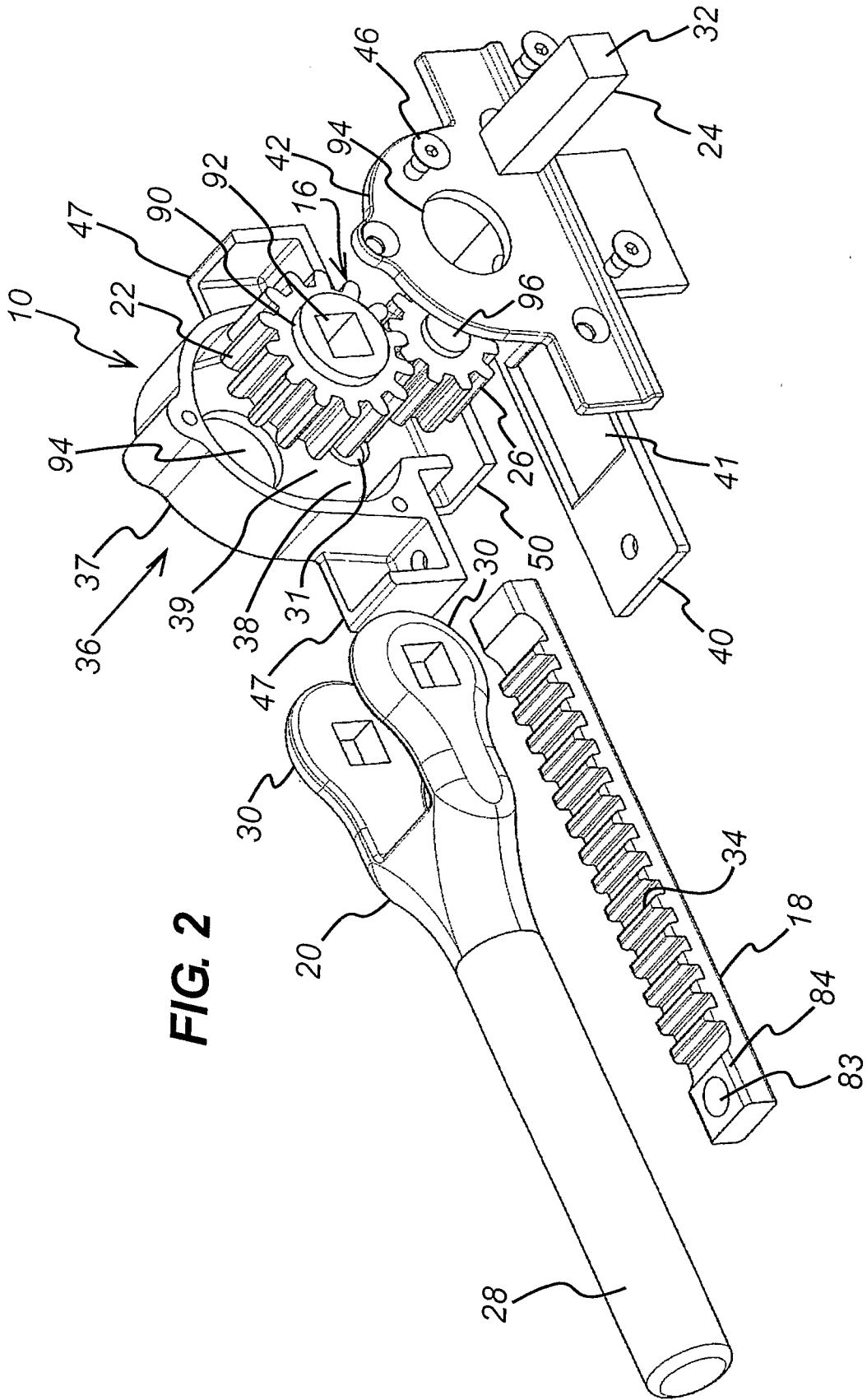
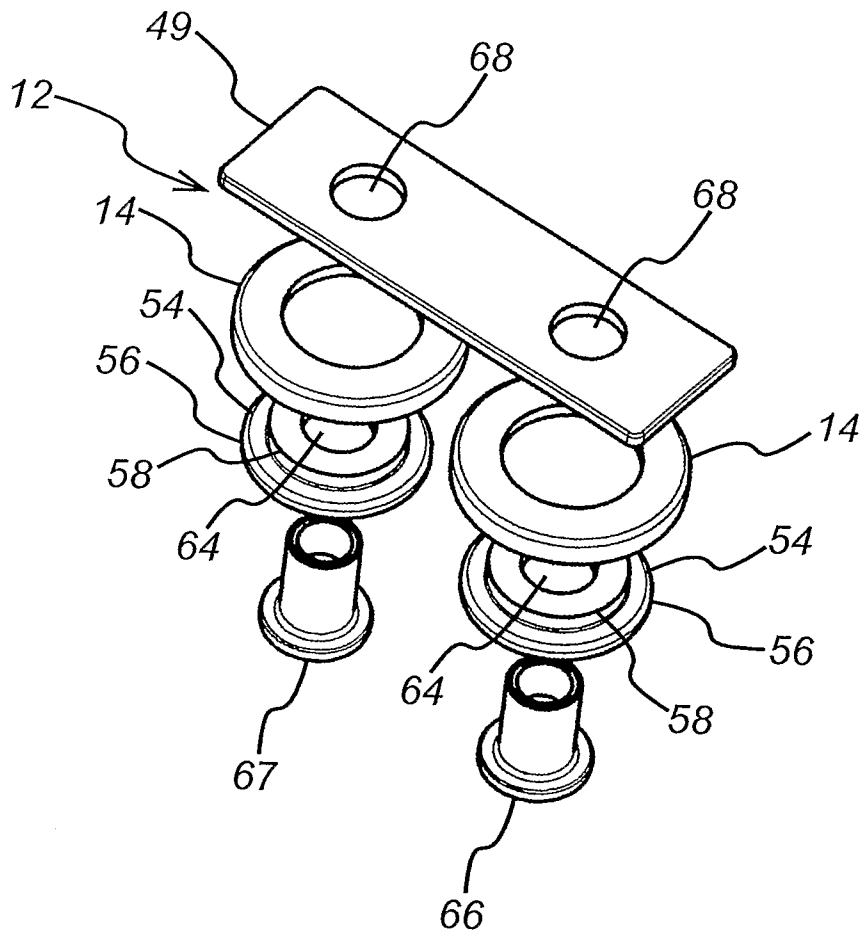
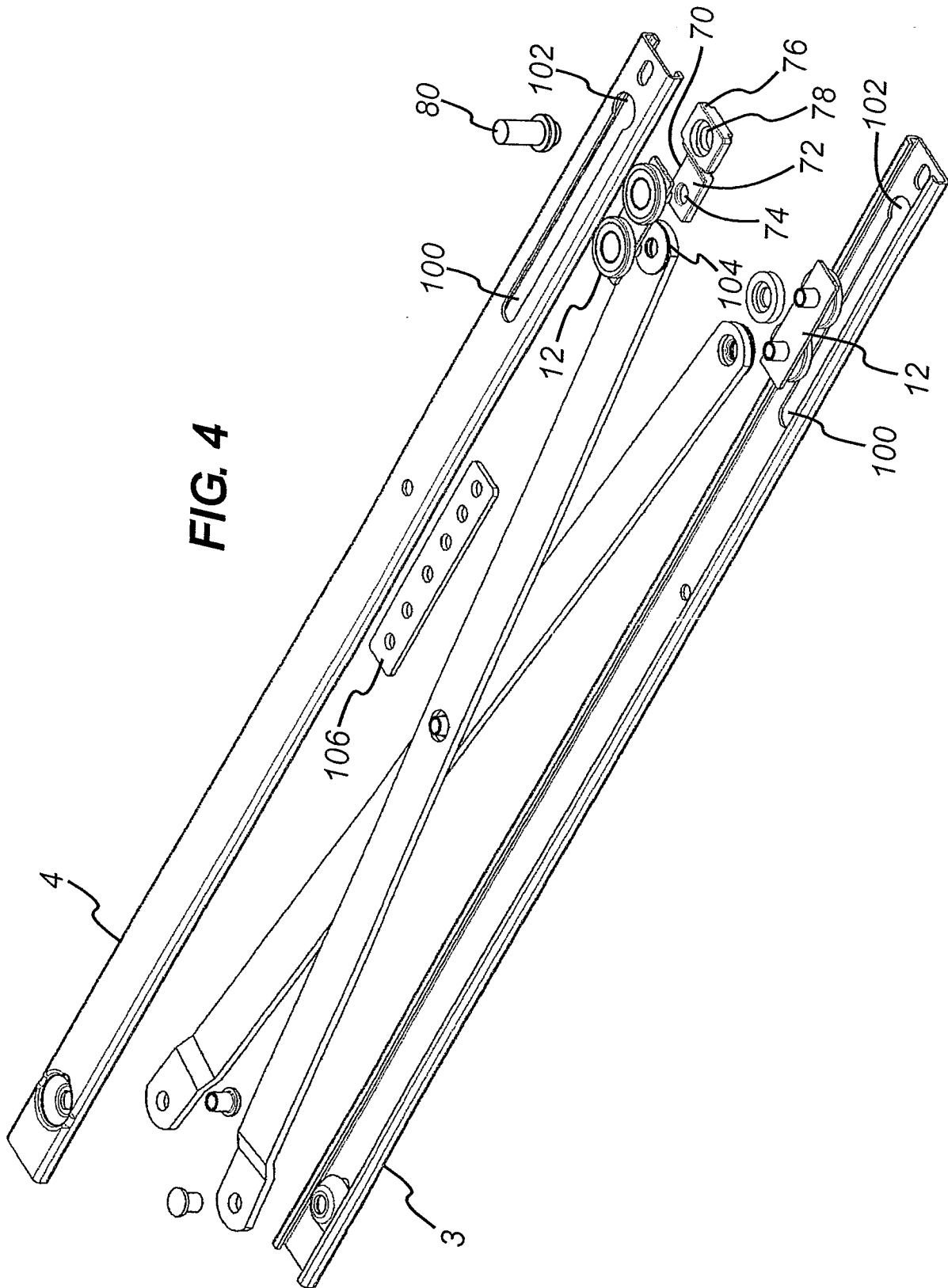


FIG. 2

FIG. 3





INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/000823

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05F11/24 E05F11/34 E05D15/30

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)
E05F E05D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/29192 A (CALDWELL MFG COMPANY [US]; HARKINS PETER W [AU]; TIMOTHY E ERIK [US];) 11 April 2002 (2002-04-11) abstract figures 1,9 page 9, lines 3-8 page 13, lines 24-31	1-15, 18-22, 24-26
Y	figures 1,9	16,17
Y	EP 0 968 349 A1 (SECURISTYLE LTD [GB]) 5 January 2000 (2000-01-05) cited in the application the whole document	1-15, 18-22, 24-26
A	figure 3 claim 1	16,17
	----- -/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *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.
- *Z* document member of the same patent family

Date of the actual completion of the international search

19 June 2007

Date of mailing of the International search report

09/07/2007

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Schnedler, Marlon

INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2007/000823

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 241 311 A2 (MANZELLA FRANCIS [US]) 18 September 2002 (2002-09-18) abstract figures 5-11 page 5, paragraph 30	1-15, 18-22, 24-26
X	US 6 374 544 B1 (FREDERICK ELLIS [CA]) 23 April 2002 (2002-04-23) the whole document	17
Y	figure 1; compound 24 column 5, lines 43-45	16,17
A	DE 197 41 728 A1 (ESCO METALLBAUBESCHLAG HANDEL [DE]) 1 April 1999 (1999-04-01) abstract figures 2,4; compound 118 column 5, lines 17-26	18,19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/GB2007/000823
--

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
WO 0229192	A	11-04-2002	NONE	
EP 0968349	A1	05-01-2000	AT 245246 T AU 6413298 A DE 69816428 D1 DE 69816428 T2 GB 2323407 A WO 9842941 A1 HK 1024282 A1	15-08-2003 20-10-1998 21-08-2003 13-05-2004 23-09-1998 01-10-1998 31-10-2003
EP 1241311	A2	18-09-2002	AT 338873 T CA 2375729 A1 DE 60214458 T2 US 2002124468 A1	15-09-2006 12-09-2002 26-04-2007 12-09-2002
US 6374544	B1	23-04-2002	CA 2355572 A1	18-03-2002
DE 19741728	A1	01-04-1999	AU 9175098 A CA 2303998 A1 EP 1017921 A1 WO 9915750 A1 JP 2001517748 T	12-04-1999 01-04-1999 12-07-2000 01-04-1999 09-10-2001