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54 **Vehicle door hinge.**

57 A vehicle door hinge has two parts (10, 12) rotatable together about a hinge axis (32), one part carrying a roller (48) mounted on curved springs (36) and the other part carrying a curved plate (24), the arrangement having such that, during hinging, the curved plate (24) engages the spring mounted roller (48) to displace the roller on its mounting springs (36) and thereby give rise to a check action during a limited range of door opening movement.

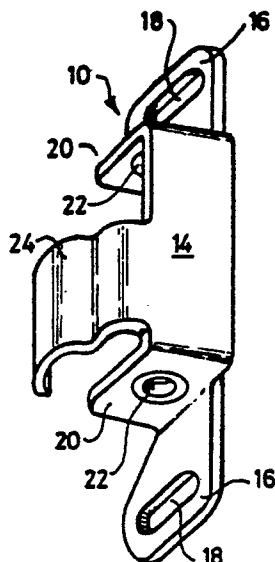


Fig.1

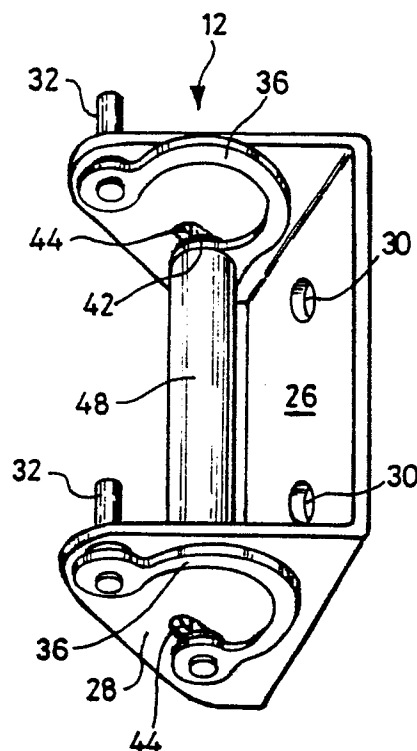


Fig 2

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Vehicle Door Hinge

Field of the invention

This invention relates to a vehicle door hinge.

Background to the invention

Various types of vehicle door hinge are known. Generally, the hinging action of the door is checked, at an intermediate point in its opening movement, by a door check mechanism formed separately from the hinge. It is an object of this invention to provide a car door hinge having an integrated door check.

The invention

According to the invention, a vehicle door hinge with integrated door check comprises two leaves one having a base part for fixing to the vehicle body and one having a base part for fixing to the vehicle door, one leaf incorporating an abutment mounted to the base through a spring mounting and the other leaf having a check-producing section fixed to the base, and means on the two leaves for connecting said two leaves together and defining a hinge axis, the arrangement being such that when the two leaves are hinged together and opened apart from a closed position to reach an intermediate position in the range of opening movement, the check-producing section comes into a condition of engagement with the abutment such that, at least for a limited range of further opening travel, the abutment is displaced against the biasing force of its spring mounting.

At the end of a limited range of further opening travel, the abutment may be displaced to a position in which the check-producing section is able to continue opening movement unopposed. This may be achieved in various ways, one of which will be apparent from the ensuing description.

In a preferred arrangement, the leaf incorporating the spring-mounted abutment is adapted for fixing to the vehicle body, the leaf incorporating the check-producing section fixed to the base being adapted for fixing to the vehicle door.

The abutment preferably comprises an element mounted between its ends on two similar arcuate or part-circular springs. One end of each spring is fixed to the base of the leaf on the hinge axis. The other end of the springs provides support for the abutment element, which may conveniently be in the form of a roller mounted for free rotation on a

spindle which extends parallel to the hinge axis.

For cooperation with the afore-mentioned abutment roller, the check-producing section on the other leaf preferably comprises an arcuately curved plate integrally formed with the base. During hinging, the exterior surface of this curved plate is brought into a condition of engagement with the abutment roller such as to displace the latter on the spring mounting, at the same time moving around the axis of the roller (accompanying turning of the roller is readily permitted by its spindle support). At the end of a limited range of further opening movement, the check-producing section can turn with the freely rotating roller without causing further displacement of said roller.

In the preferred arrangement, the hinge axis is defined, on the leaf adapted for fixing to the vehicle body and carrying the spring mounted abutment, by a pair of aligned upstanding hinge pins on the base. These hinge pins may also provide the means for fixing one end of the respective arcuately curved springs which support the abutment roller. The hinge axis on the other leaf, adapted for fixing to the vehicle door, is defined by a pair of aligned apertures in spaced parallel flanges forming part of the base.

When the hinge leaves are fixed in position therefore, on the vehicle body and the vehicle door, the latter may be attached to the body simply by lowering the door so that the aforesaid flange apertures drop over the hinge pins. Dis-assembly is equally readily enabled by raising the door so that its hinge leaf lifts off the hinge pins.

Circlips engaging in peripheral grooves in the respective hinge pins may serve to hold the door against accidental detachment. The readily detachable door is advantageous during vehicle production and if repair is necessary.

A vehicle door will usually be hinged to the vehicle body by means of upper and lower hinges. Possibly only the lower hinge may be equipped with the integrated door check, but the upper hinge may retain the structure which enables ready body/door separation. Thus, the invention also extends to a vehicle door hinge as above-described, but wherein the leaf for fixing to the vehicle body, although having an identical base part, has the abutment roller and spring mounting therefor omitted. The leaf for fixing to the vehicle body may likewise retain the arcuately curved plate for simplicity of manufacture, but in use free hinging is permitted due to absence of the abutment roller.

The invention also extends to a vehicle having a door hinged by means of the above-described hinge or hinges.

Brief description of drawings

The vehicle door hinge in accordance with the invention is exemplified with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a hinge leaf for fixing to the vehicle door;

Figure 2 is a perspective view of a hinge leaf for fixing to the vehicle body;

Figure 3 is a longitudinal cross-section through the assembled hinge, taken on the line 3-3 of Figure 4;

Figure 4 is an end view of the assembled hinge;

Figure 5 shows a fixing detail of the assembly;

Figure 6 relates to a modification and shows a pin assembly in detail; and

Figure 7 shows another possible modification.

Description of embodiment

Referring to Figures 1 and 2, the reference 10 generally denotes a hinge leaf for fixing to a vehicle door, e.g. car door, and reference 12 denotes a hinge leaf for fixing to a vehicle body.

Hinge leaf 10, conveniently made of zinc plated mild steel, comprises a base part having a wide U-section 14 and two oppositely directed webs 16. The webs 16 have slotted apertures 18 to enable the leaf 10 to be bolted to the vehicle door in the appropriate position thereon. The limbs of the U-section 14 constitute spaced parallel flanges 20 provided with aligned, bushed apertures 22 centred on an axis which corresponds to the axis of the hinge.

The crosspiece of the U-section 14 has a shaped, curved plate 24 integrally formed therewith. This curved plate 24 forms part of the check-producing arrangement of the hinge.

The hinge leaf 12 comprises a base part 26 which includes two triangularly shaped end flanges 28 in spaced parallel relationship. Apertures 30 in the base part 26 enable this leaf 12 to be bolted to the vehicle body. Hinge pins 32 are fixed in longitudinal alignment at corresponding corners of the triangular flanges 28. The pins 32 define the hinge axis on the leaf 12. The hinge pins have heads 34 and, as shown in Figures 3 to 5, one end of an arcuately curved spring 36 is fixed in position between the head of each pin and a weld 38 which fixes the pin to the base part 26 of the hinge leaf 12. Referring in this respect to Figure 5, in particular, reference 20 denotes one of the apertured flanges of the hinge leaf 10, which leaf is assembled with the hinge leaf 12 by locating the bushed

apertures 22 in the flanges 20 over the shanks 40 of the respective hinge pins 32.

The two curved springs 36 lie in planes parallel to the triangular flanges 28, one adjacent the inside face of one flange and one adjacent the outside face of the other flange, so that the other ends of said springs are aligned in the region of corresponding corners of said flanges. These other ends of the springs 36 serve to support between them a spindle 42 extending parallel to the hinge axis. The flanges 28 have slotted apertures 44 for passage of said spindle and for serving as a guide for displacement of the spindle when in use the springs 36 are flexed as part of the check-producing action. Guide bushes for said apertures may be of zinc-based die-cast alloy or of high density nylon. Reference 46 denotes these guide bushes employed in conjunction with the springs-to-spindle connections, said bushes 46 being positioned adjacent spindle grooves in which the spring ends are located.

Reference 48 denotes a roller, for example of high density nylon or the like or possibly of stainless steel, which is mounted on the spindle 42 between the flanges 28, to turn freely thereon by means of low friction bushes 50.

The relative disposition of the two hinge leaves 10, 12, of the spring-mounted roller 48 and of the check-producing curved plate 24, is most clearly apparent from Figure 4. This Figure shows the hinge in an open position, i.e. vehicle door open position, in which the check-producing plate 24 is in engagement with the roller 48. Arrow 52 indicates the direction of rotation of the leaf 10 which occurs during door closure.

When the door is fully closed, plate 24 may be disengaged from roller 48, but in any event, after a predetermined opening movement has occurred, said plate is brought into a condition of engagement with said roller such as to cause the latter to be displaced by flexing of the springs 36 as opening movement continues. This requirement to flex the springs 36 results in the required check in door opening movement. This check may occupy a chosen distance of opening travel determined by the curvature of the plate 24. Following attainment of a position of maximum displacement of the roller 48, turning movement of the plate around the roller may continue without check, again due to the low friction bushes 50 used for mounting the roller 48 on the spindle 42. The plate 24 may possibly disengage from the roller beyond the intermediate range of door opening movement in which the check is operative.

An analogous check occurs during closing of the hinge, i.e. closing of the vehicle door.

Figure 6 shows a modification wherein a single hinge pin 60 is employed to define the axis of the

hinge. The pin 60 passes through bushed apertures in the base parts of the respective hinge leaves. The door check is incorporated in the same manner as has been described with reference to Figures 1 to 5, but it is to be noted that the spring mounted roller 62 is provided on the leaf 64 to be fixed by welding or bolting to the vehicle door, whilst the check-producing section 66 is provided on the leaf 68 to be fixed by welding or bolting to the vehicle body.

Figure 7 shows another possible modification, of the arrangement previously described with reference to Figures 1 to 5, wherein a modified roller mounting is employed. In this modification, the roller 48A turns on a low bush launch 50A carried by shaft 42A mounted at one end only to a pair of curved springs 36A, with the shaft 42A passing through a guide slot 44A in a guide bush in one end flange 28A of the hinge leaf 12A.

Various further modifications of the aforedescribed arrangements are possible within the scope of the invention defined by the appended claims.

Claims

1. A vehicle door hinge with integrated door check comprising two leaves one having a base part for fixing to the vehicle body and one having a base part for fixing to the vehicle door, characterised in that one leaf (12) incorporates an abutment (48) mounted to an integral base (26) through a spring mounting (36) and the other leaf (10) has a check-producing section (24) fixed to an integral base (14), means (22,32) on the two leaves serving to connect said two leaves together and defining a hinge axis, the arrangement being such that when the two leaves are hinged together and opened apart from a closed position to reach an intermediate position in the range of opening movement, the check-producing section (24) comes into a condition of engagement with the abutment (48) such that, at least for a limited range of further opening travel, the abutment (48) is displaced against the biasing force of its spring mounting (36).

2. A vehicle door hinge according to claim 1, wherein, at the end of a limited range of further opening travel, the abutment is displaceable to a position in which the check-producing section is able to continue opening movement unopposed.

3. A vehicle door hinge according to claim 1 or claim 2, wherein the abutment (48) is mounted between its ends on two similar arcuate or part-circular resilient spring members which comprise the spring mounting (36).

4. A vehicle door hinge according to any of claims 1 to 3, wherein one end of each of the two resilient spring members is fixed to the base of the leaf (12) on the hinge axis, and the other end of the springs provides support for the abutment element (48).

5. A vehicle door hinge according to any of claims 1 to 4, wherein the abutment (48) comprises a roller mounted for free rotation on a spindle which extends parallel to the hinge axis.

6. A vehicle door hinge according to claim 5, wherein, for cooperation with the aforementioned abutment roller, the check-producing section (24) on the other leaf (10) comprises an arcuately curved plate integrally formed with the base, whereby during hinging, the exterior surface of the curved plate is brought into a condition of engagement with the abutment roller such as to displace the latter on the spring mounting, at the same time moving around the axis of the roller.

7. A vehicle door hinge according to claim 5 or claim 6, wherein the hinge axis is defined, on the leaf adapted for fixing to the vehicle body and carrying the spring mounted abutment, by a pair of aligned upstanding hinge pins (32) on the base, said hinge pins also providing the means for fixing the fixed ends of the arcuately curved resilient spring members which support the abutment roller, whilst the hinge axis on the other leaf, adapted for fixing to the vehicle door, is defined by a pair of aligned apertures (22) in spaced parallel flanges integrally formed with the base.

8. A vehicle door hinge according to claim 5 or claim 6, wherein a common spindle is employed for hinging the two leaves together and for mounting the springs carrying the roller.

9. A vehicle door hinge according to claim 5 or claim 6, wherein the spindle supporting the roller is mounted to the base of the hinge leaf at one end only, and one or more roller supporting springs are also attached to said spindle at the one end thereof.

10. A vehicle having at least one door hinged by a door hinge according to any of claims 1 to 9.

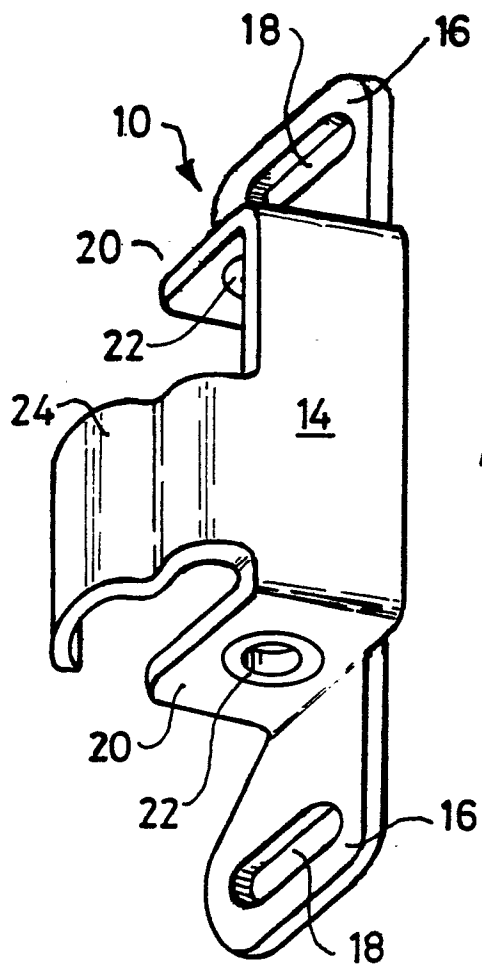


Fig. 1

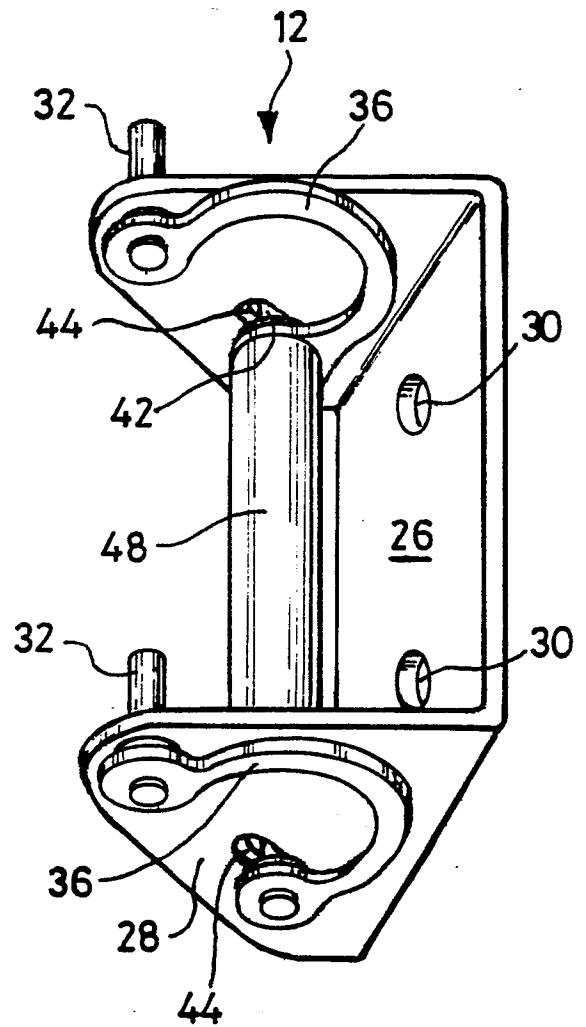


Fig 2

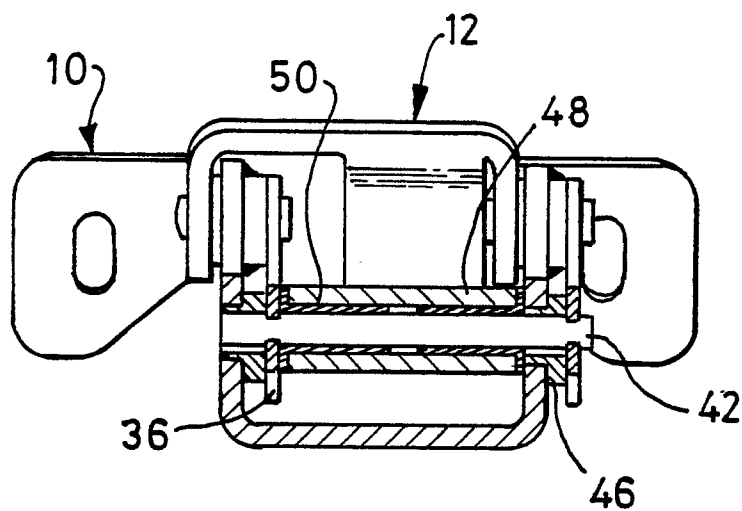


Fig. 3

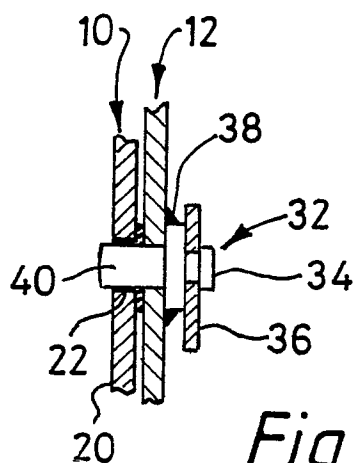


Fig.5

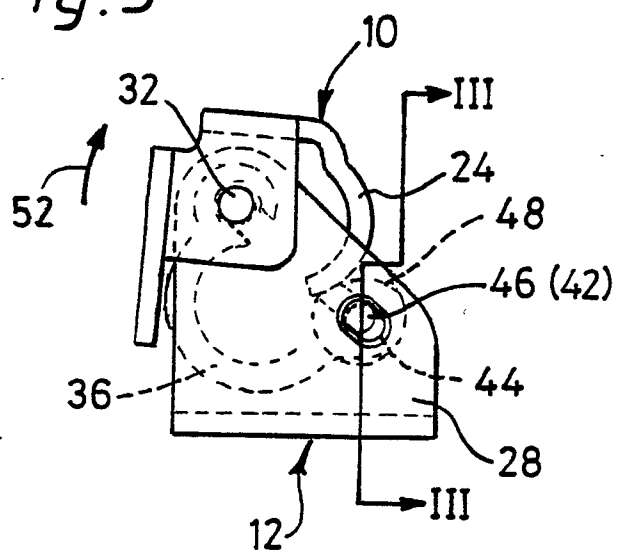


Fig.4

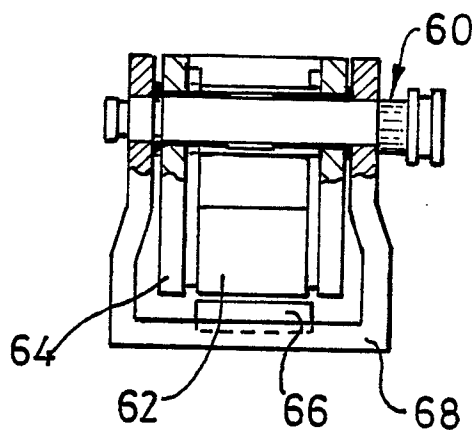


Fig.6

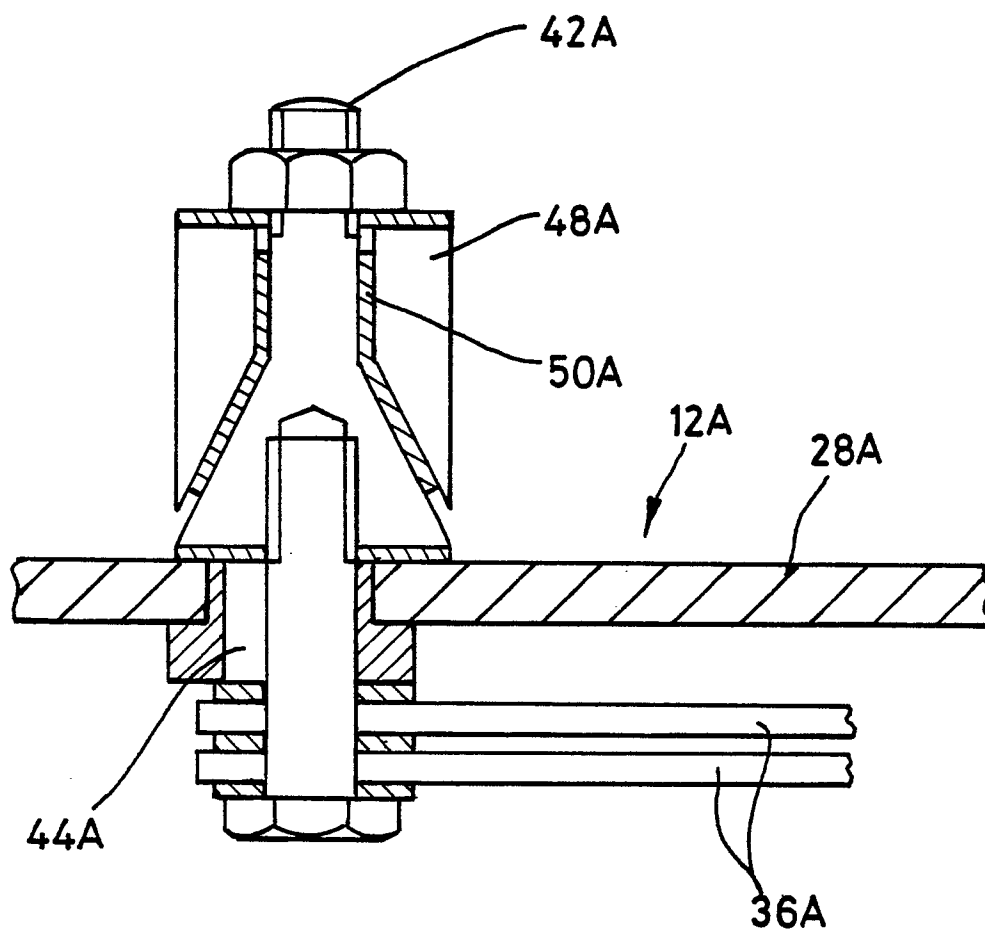


Fig. 7



EP 87 31 1085

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	FR-A-2 316 420 (SCHARWÄCHTER KG) * Figures 1,2; page 2, line 26 - page 3, line 25 *	1,5,6,9	E 05 D 11/10
Y		2	
A		3,4	
Y	FR-A-1 315 015 (J.H. DELHASE) * Figure 2; page 1, column 2, lines 7-13 *	2	
A	FR-A-2 265 953 (L. PINET S.A.) * Figures 1-3; page 2, line 19 - page 3, line 27 *	3,4,6	
A	DE-A-2 420 295 (SCHARWÄCHTER KG)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 05 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-04-1988	Examiner SCHEIBLING C.D.A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			