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(11) **EP 0 741 223 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.11.1996 Bulletin 1996/45

(51) Int. Cl.⁶: **E05D 11/06**, E05C 17/24

(21) Application number: **96303066.3**

(22) Date of filing: **01.05.1996**

(84) Designated Contracting States:
DE ES FR SE

(30) Priority: **02.05.1995 GB 9508903**

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(54) **Vehicle door hinge**

(57) A vehicle hinge includes a stop mechanism 3 to restrict movement of the door in an opening direction through a first angular distance between a first closed position and a second open position, and a stop mechanism (3) is adapted to be released to permit the door to be moved angularly beyond the second open position after first moving the door through a small angular distance towards the closed position. The stop mechanism (3) comprises a guide track system (52, 54) mounted on one leaf (4) of the hinge and a track follower (30), adapted to follow the guide track system, and carried from the other leaf (2). The track system comprises a first track (52) for the follower (30) to follow in allowing the door to move angularly from the first position to the second position and a second (54) track for the follower to follow, allowing the door to open from the second position to a third open position, movement of the follower (30) between the two tracks being achieved by manual movement of the follower in a lateral direction after first moving the door towards the first closed position.

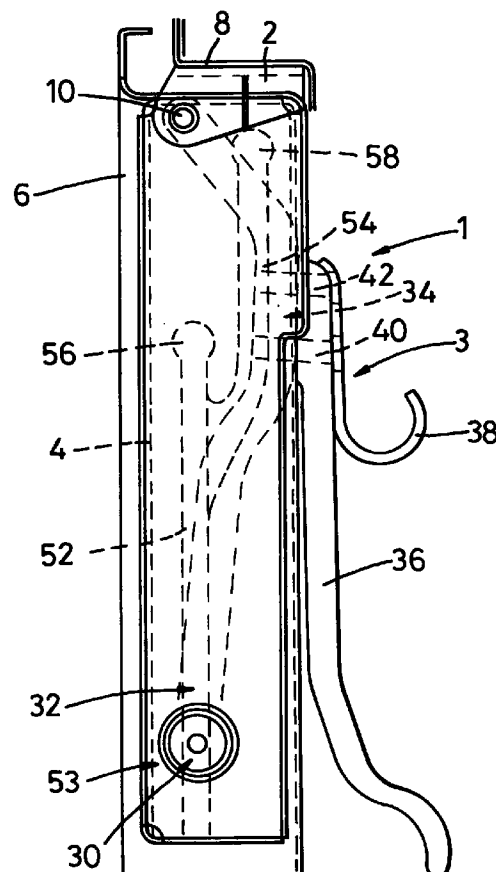


Fig. 1

Description

This invention relates to door hinges for vehicles of the kind in which a first leaf is adapted to be mounted on a vehicle, a second leaf is adapted to be mounted on a vehicle door, and stop means co-operate with at least one of the leafs to limit the extent to which the door can open.

Rear doors of vehicles, especially commercial vehicles, are often hinged to the body of the vehicle by at least two hinges spaced along the height of the door. At least one of the hinges usually includes a mechanism in the form of a restraining member for restricting the angular movement of the door in various ways. It is not uncommon, initially, to limit the door to opening substantially only to 90°, with further opening of the door being possible by releasing the restraining member, thereby allowing the door to rotate to say 180° or to 270°.

According to our invention, in a vehicle hinge of the kind set forth the stop means is adapted to restrict movement of the door in an opening direction through a first angular distance between a first closed position and a second open position, and the stop means is adapted to be released to permit the door to be moved angularly beyond the second open position after first moving the door through a small angular distance towards the closed position.

An advantage of such a design is that a restraint is provided which prevents the door from opening too far and damaging the hinges, but which can be overridden thereby allowing the door to open further. An advantage in requiring that the door be closed toward the first position, before being opened further, is that the door will not inadvertently be opened further, once it is at the second position, for example if wind were tending to blow the door open.

Preferably the stop means is also adapted to limit relative angular movement from the second open position into a third open position in which the door has moved through a second given angular distance in an opening direction.

An advantage of such a third open position is that the rear door of the vehicle can be open further to allow more convenient loading of the vehicle, whilst the doors are still restrained, thereby preventing the hinges from being damaged.

Preferably the third open position is such that the doors are allowed to open through substantially 180° from the first, closed, position. An advantage of allowing the doors to open substantially 180° is that the vehicle can be backed against a loading bay.

Preferably the stop means comprises a guide track system mounted on one of the leafs and a track follower, adapted to follow the guide track system, and carried from the other leaf.

Conveniently the track system comprises a first track for the follower to follow in allowing the door to move angularly from the first closed position to the sec-

ond open position and a second track for the follower to follow, allowing the door to open from the second open position to the third open position, movement of the follower between the two tracks being achieved by manual movement of the follower in a lateral direction after first moving the door towards the first closed position.

Preferably the track follower must be forcibly moved from the first track to the second track. An advantage of requiring a positive selection of the track, to be followed by the track following means, is that the door will normally open to the second position unless the user desires that it be opened to the third position.

Preferably the track following means returns automatically to the first track as the door is closed after being opened beyond the second position. Such an automatic change of track should allow for more convenient operation if no user manipulation of the stop means is required.

Preferably the track follower consists of at least one ball bearing, but preferably two. An advantage of ball bearings is that they offer relatively low frictional resistance to the motion of the track following means along the track, making the door relatively easy to open.

Preferably the two tracks are provided along the inside face of a housing. Providing the tracks in such a manner should allow for a device to be provided in which there are few external components, lessening the probability of the track following means being damaged.

The second position may substantially be an angular movement of 90° of the door from the first position.

The third position may substantially be an angular movement of 170° of the door from the first position.

Embodiments of our invention are illustrated in the accompanying drawings in which:-

Figure 1 is a plan view of a vehicle hinge for a rear door, shown in a closed position;

Figure 2 is a plan view of the vehicle hinge of Figure 1, showing the hinge open in a 90° position;

Figure 3 is a plan view of the vehicle hinge of Figure 1, showing the hinge open in a 170° position; and

Figure 4 is a view of the track following means used in the hinge;

Figure 5 is a view of a second embodiment of the track following means; and

Figure 6 is a plan view of a second embodiment of the vehicle hinge.

A door hinge 1 is illustrated in Figures 1-4 of the accompanying drawings. The door hinge is of the type for vehicles of the kind in which a first leaf 2 is adapted to be mounted on a vehicle with a stop means 3 co-operating with a second leaf 4 adapted to be mounted

on a vehicle door 6, the stop means 3 limiting the extent to which the door opens.

The first leaf 2 is attached to a door frame 8 of the vehicle and maintains a hinge pin 10 in a substantially vertical direction. The stop means connects to the hinge pin 10 and is free to rotate about the pin 10. The first leaf 2 is shaped so as to maintain the stop means 3 clear of the door frame 8 throughout the allowable rotation of the co-operating means 3 about the pin 10.

The second leaf 4 is a rectangular tube. As can be seen best in Figure 4 the second leaf is constructed from 2 "U" shaped channel sections 12,14.

The channel 14 has a larger width than the channel 12 so that the channel 12 fits inside the channel 14. The flanges of the channels overlap and lie substantially perpendicular to the door of the vehicle. The webs, 16,18 of the channels lie substantially parallel to the door of the vehicle.

Along the flanges 20,22 of the narrower channel 12 are linings 24,26 and along the surface of the linings are tracks 28. The tracks 28 are provided for a track follower 30 to follow, and thus a guide track system is provided.

The stop means 3 is visible in Figures 1 to 3, and comprises a link to link the first leaf 2 to the second leaf 4. A track follower 30 is attached to an end portion 32 of the stop means 3, and the stop means 3 is shaped so that a section 34 lies substantially parallel to the side wall of the second leaf 4.

Two handles 36,38 are attached to the section 34 of the co-operating means by bolts 40,42, and the handles lie substantially parallel to the second leaf 4 and the door 6, when the door is closed, as seen in Figure 1.

The track follower 30, as best seen in Figure 4, consists of two ball bearings 44,46, a ball bearing housing 48 and a spring 50. The housing 48 contains the two balls 44,46 with the spring 50 acting between them. The spring 50 urges the balls 44,46 outwardly so as to maintain the balls 44,46 in contact with the tracks 28.

The configuration of the tracks can be seen shown in outline in Figures 1-3 of the drawings. A first track 52 runs from the rest position 53 of the track follower means 30 substantially parallel to the second leaf 4 for roughly three quarters of the length of the second leaf. The second track 54 starts from an end portion of the first track 52 and runs for the remaining length of the second leaf 4.

When the door is closed, as shown in Figure 1, the track follower 30, lies at its rest position 53, in the first track 52. As the door 6 is opened the stop means 3 rotates about the pin 10 in a clockwise manner. The track follower 30 progresses along the first track 52 towards the junction with the second track 54.

Normally the track follower 30 passes the junction with the second track and stops at an end 56 of the first track 52. When the track following means arrives at the end 56 the door is opened by 90°, as seen in Figure 2. From this position the track follower 30 cannot be moved to the second track 52, because there is no connection to the second track 54. The door 6 is therefore pre-

vented from opening further because further motion of the track follower 30 is prevented by the engagement of the track follower 30 with a first stop face defined by the end 56 of the first track 52.

To open the door beyond the 90° open position, the door is first closed slightly. As the door is closed, the track follower 30 moves from the end 56 of the first track toward the rest position 53 of the track following means. After moving a short distance the track follower 30 is aligned with the junction between the first track 52 and the second track 54.

When the track follower is at this location, by applying a force to either or both of the levers 36,38, in a direction away from the second leaf 4, as viewed in Figure 2, the track follower 30 can be pulled, or pushed, as required, into the second track 54, thereby achieving a "points change".

As the track follower 30 changes track the ball bearings 44,46 are forced into the housing 48, against the force in the spring 50. Compression of the spring 50 requires a force to be applied to the mechanism to cause that the second track 54 to be selected.

Once the track follower 30 is in the second track 54, the door can be opened further, because the second track 54 is longer than the first track 52. When the track follower 30 arrives at an end 58, which defines a second stop face, of the second track 54 the door has opened through 170° as shown in Figure 3.

When the door is closed from the 170° open position, the track following means travels toward the first track 54. The track follower 30 arrives at the junction between the two tracks, and the force being applied to the door to close it is sufficient to compress the spring 50 thereby allowing the track follower 30 to change to the first track 52. The track follower 30 then proceeds to its rest position 53, when the door is fully closed.

Should the door only have been open to 90°, the track follower 30 is at the end 56 of the first track 54. When the door is closed the track follower 30 moves along the first track 54 to its rest position 53.

A second embodiment of the vehicle hinge is shown in Figure 6. In this embodiment the two handles 36 and 38 have been replaced with a single handle 37. The handle 37 is an integral piece of the co-operating means 3 and is formed at the section 34 of the co-operating means 3. This has the advantage that the number of manufacturing stages is reduced, and thus the cost of manufacture will also be reduced.

The layout of the tracks in the second embodiment differs from that shown in Figures 1 to 3. However, the hinge will function in the same manner. That is, the door will open to a 90° position unless the user pulls, or pushes, track following means 69 into the longer second track 72 from the first shorter track 70. It should be realised that the direction of the force needed to change tracks is substantially in an opposite direction in the two embodiments.

A second embodiment of the track following means is shown in Figure 5. This comprises a one piece press-

ing 60. Tracks 62 are formed in the top wall 64 and bottom wall 66 of the pressing 60. Two pairs of ball bearings 67, 68 are shown in the tracks. It should be realised that only one such pair of ball bearings 67 or 68 will be present, the other pair is provided simply by way of example. A mechanism similar to that of the track follower in Figure 4 will be used to maintain one such pair of ball bearings in the track. The second embodiment of the track following means will function in the same manner as the first embodiment.

Claims

1. A door hinge for vehicles in which a first leaf (2) is adapted to be mounted on a vehicle, a second leaf (4) is adapted to be mounted on a vehicle door, and stop means (3) co-operate with at least one of the leafs to limit the extent to which the door can open, characterised in that the stop means (3) is adapted to restrict movement of the door in an opening direction through a first angular distance between a first closed position and a second open position, and the stop means is adapted to be released to permit the door to be moved angularly beyond the second open position after first moving the door through a small angular distance towards the closed position.

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2. A door hinge according to Claim 1, in which the stop means (3) is also adapted to limit relative angular movement from the second open position into a third open position in which the door has moved through a second given angular distance in an opening direction.

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3. A door hinge according to Claim 1, in which the third open position is such that the doors are allowed to open through substantially 180° from the first, closed, position.

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4. A door hinge according to any one of Claims 1-3, in which the stop means (3) comprises a guide track system (28) on one of the leafs and a track follower means (30), adapted to follow the guide track system, and carried from the other leaf.

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5. A door hinge according to Claim 4, in which the track system comprises a first track (52) for the follower (30) to follow in allowing the door to move angularly from the first closed position to the second open position and a second track (54) for the follower to follow, allowing the door to open from the second open position to the third open position, movement of the follower between the two tracks being achieved by manual movement of the follower in a lateral direction after first moving the door towards the first closed position.

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6. A door hinge according to Claim 5, in which the track follower (30) must be forcibly moved from the first track (52) to the second track (54).

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7. A door hinge according to Claim 5, in which the track following (30) returns automatically to the first track as the door is closed after being opened beyond the second position.

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8. A door hinge according to any of Claims 5-7, in which the track follower (30) consists of at least one ball bearing.

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9. A door hinge according to any of Claims 5-8, in which the two tracks (52 and 54) are provided along the inside face of a housing.

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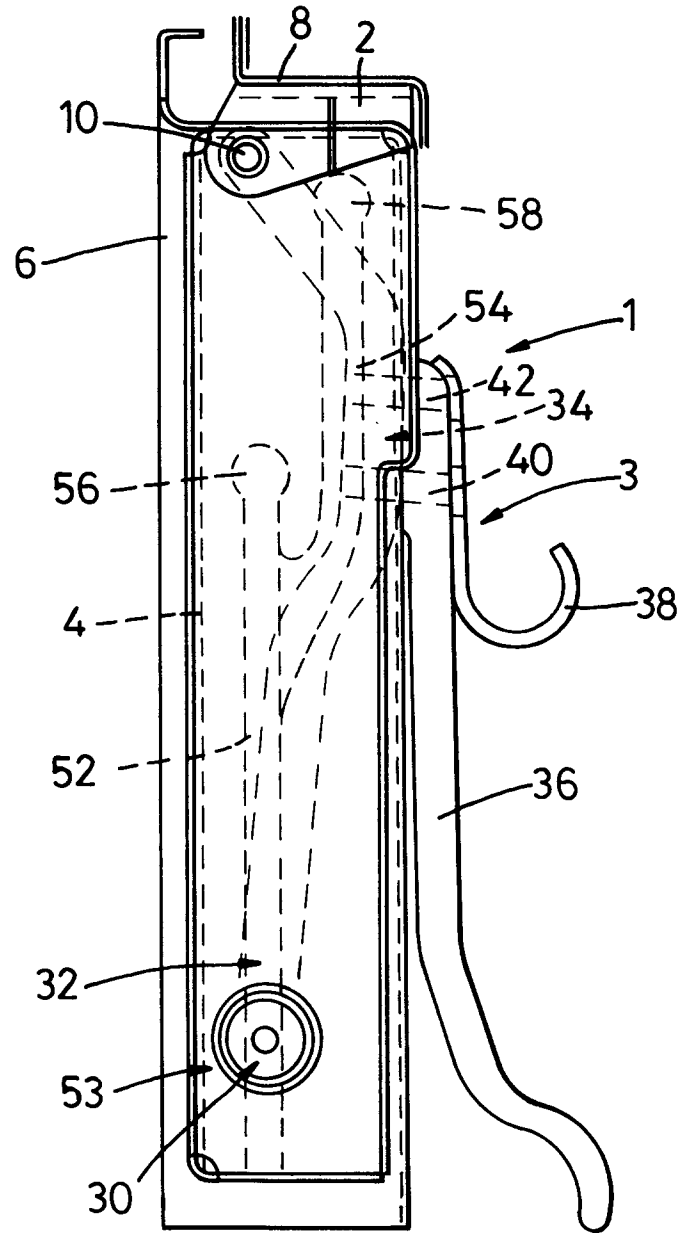


Fig. 1

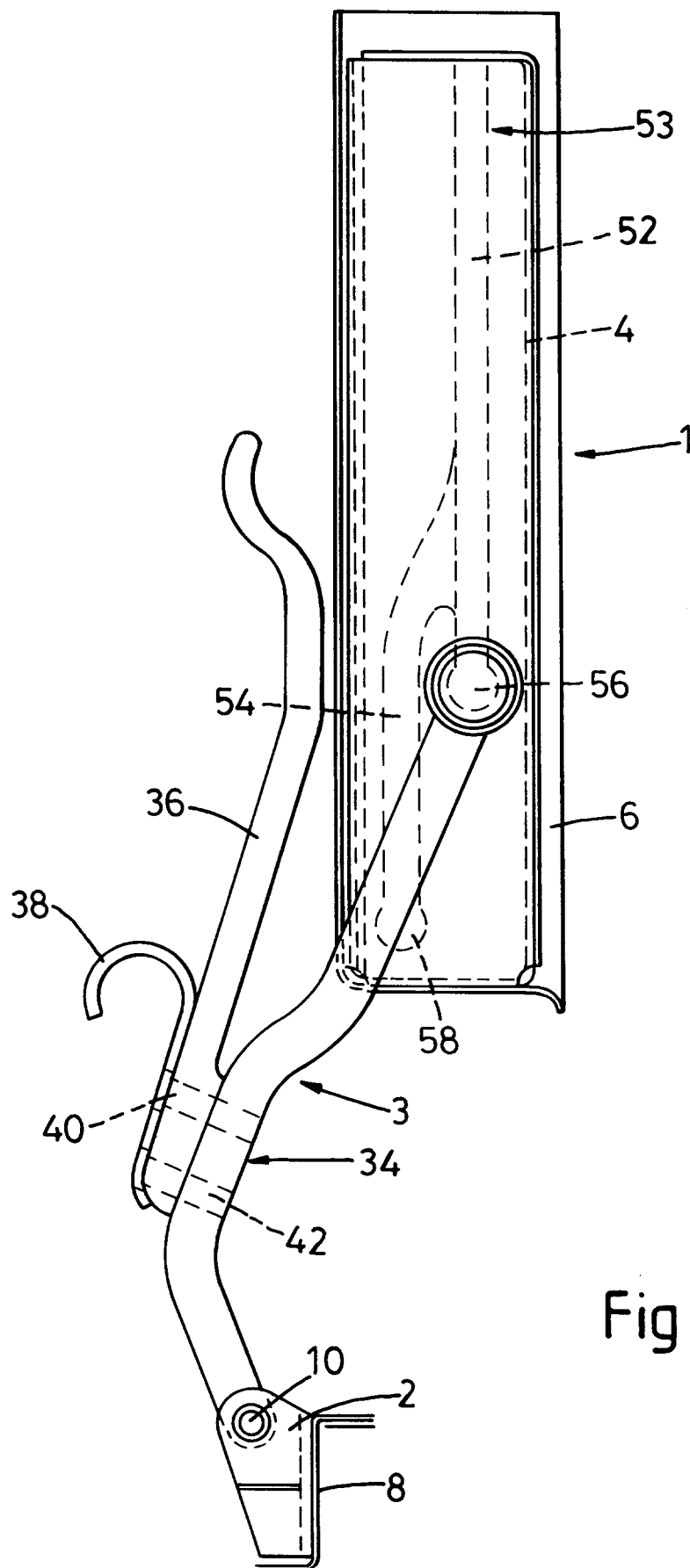
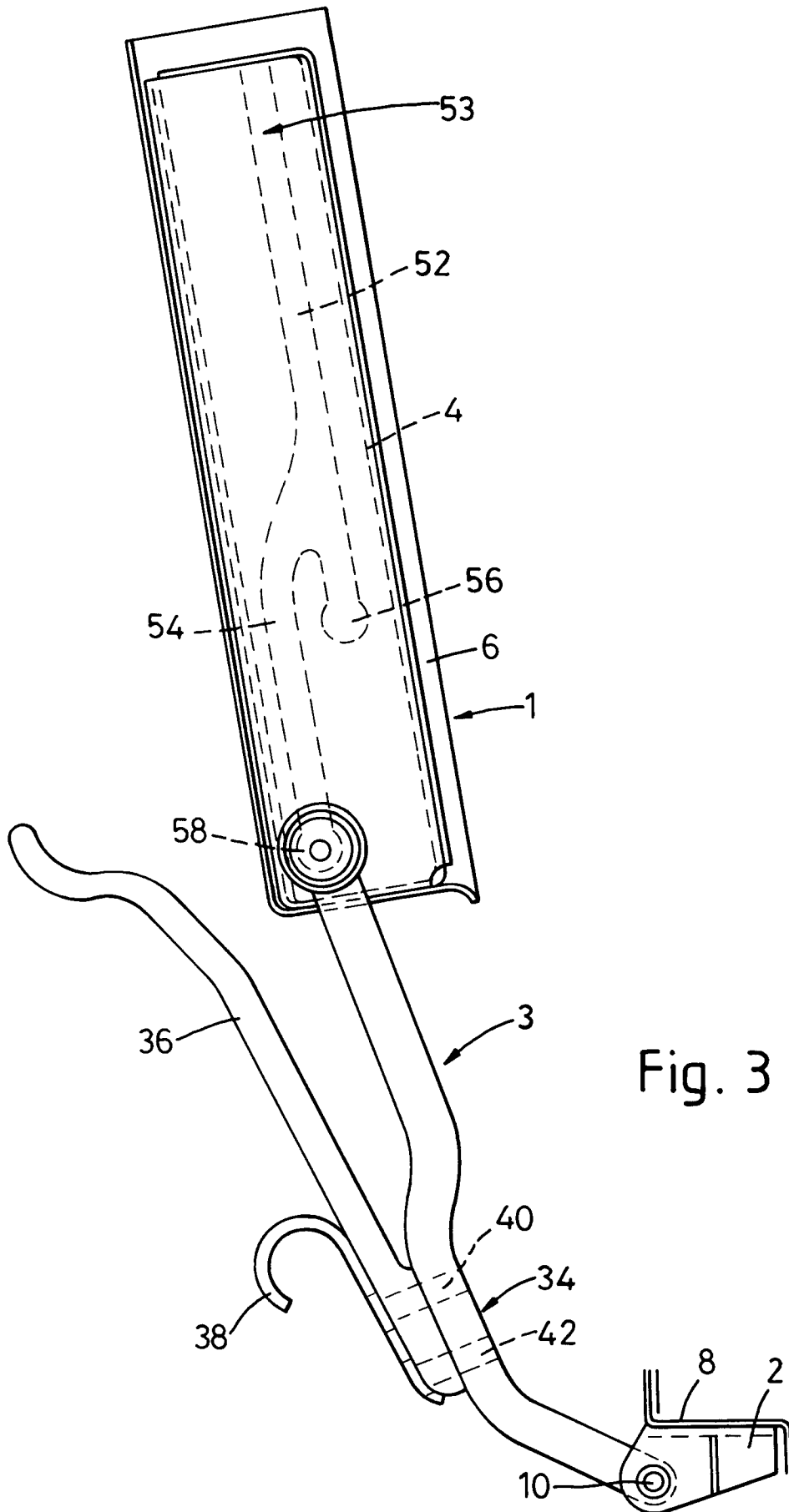
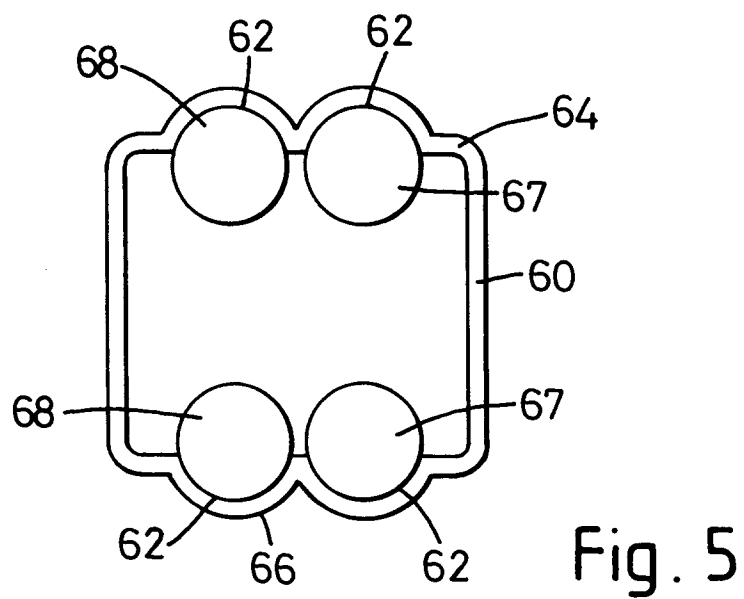
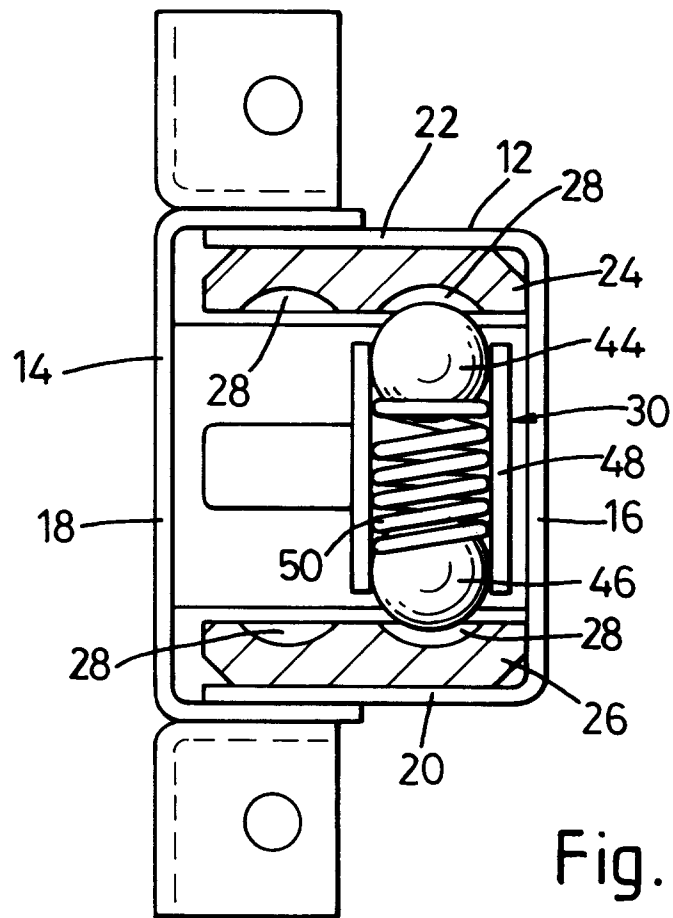


Fig. 2





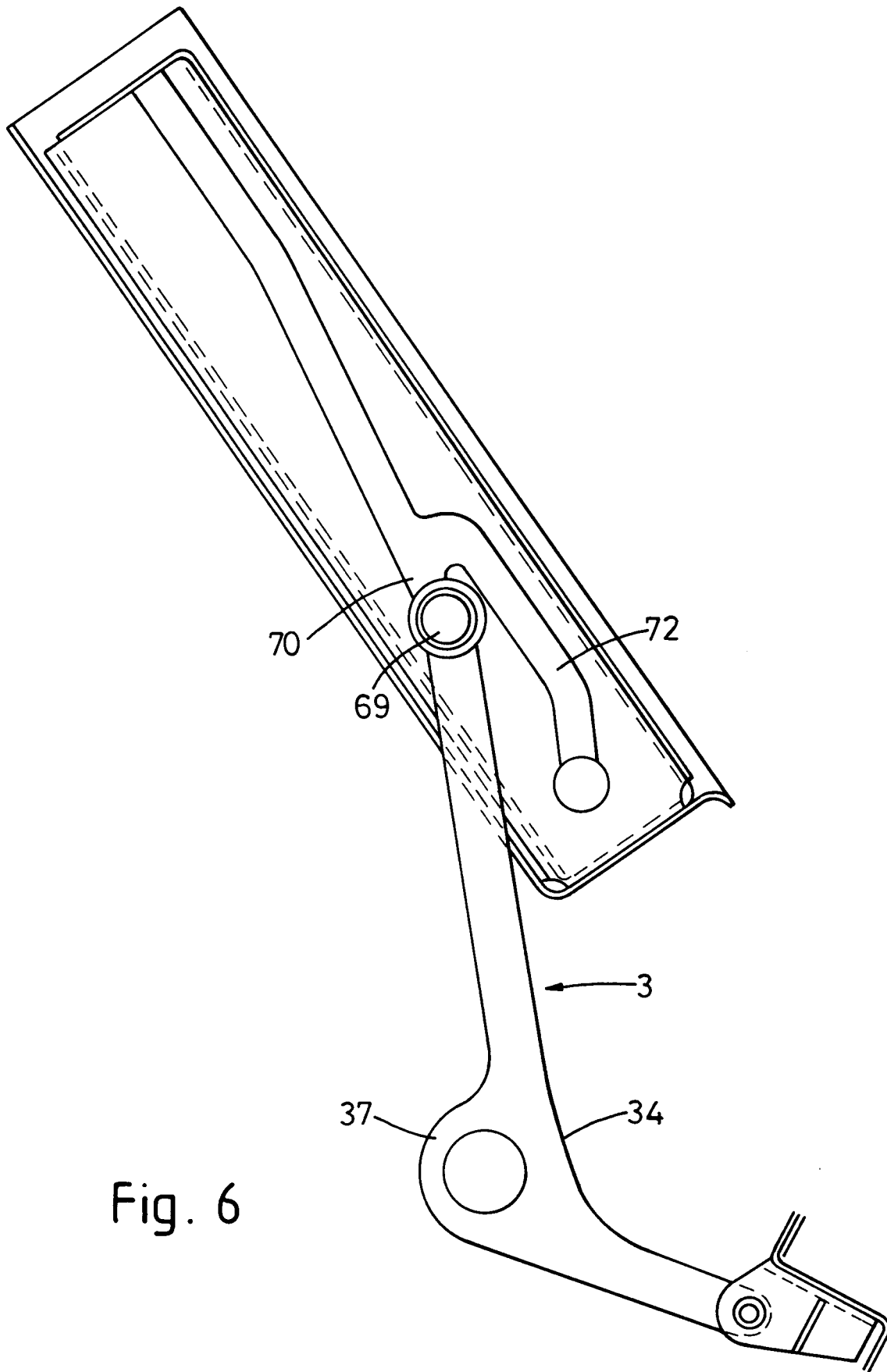


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 3066

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.6)
X	DE-C-43 20 641 (MERCEDES-BENZ) * column 2, line 32 - line 34 * * column 3, line 7 - line 16; figures * ---	1,3	E05D11/06 E05C17/24
Y	GB-A-2 079 361 (S.A.DEVILCA-FB) * page 1, line 77 - page 2, line 5; figures * ---	1,2,4,5, 7	
Y	GB-A-428 105 (HOPE) --- * page 2, line 19 - line 31 * * page 2, line 118 - page 3, line 2; figures * ---	1,2,4,5, 7	
A	US-A-3 000 044 (ALLEN ET AL) * column 1, line 16 - line 24 * ---	1-3	
A	FR-A-2 326 561 (RENAULT) * page 1, line 28 - line 32 * * page 3, line 9 - line 10; figures * ---	3,9	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	FR-A-2 546 047 (JARDEL) * page 3, line 2 - line 24; figures * -----	5,7	E05D E05C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 August 1996	Examiner Van Kessel, J
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