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(54) **Hinging device for a vehicle side door.**

(57) Here is described a hinging device for a vehicle side door (5) consisting of a pair of internal hinges (12,14), which are fitted within the transverse bulk of a door opening with which said door cooperates, substantially coplanar with the door opening itself, and placed outside the longitudinal bulk of the door opening, laterally cantilever in relation to a perimeter edge of said door; the distance between the hinges is increased thanks to the fact that they are inclined, so as to define a door rotation axis oblique in relation to the vertical .

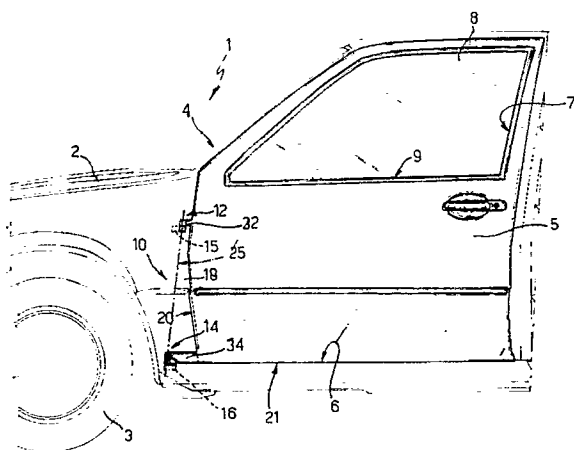


Fig.1

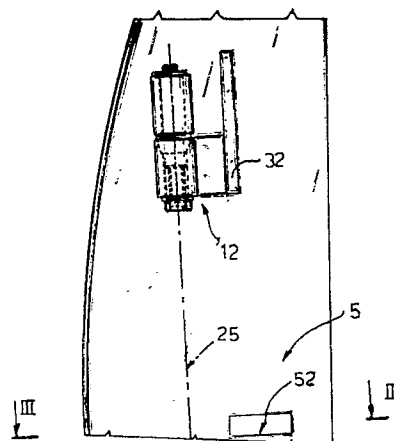


Fig.2

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HINGING DEVICE FOR A VEHICLE SIDE DOOR

The present invention relates to a hinging device for a vehicle side door, in particular for the front doors of a motor vehicle .

The side doors of a motor vehicle are known to be attached to the body by means of pairs of hinges which are mounted at the level of the front post of the door opening occupied by each door ; therefore the two hinges which support each door are fitted within the transverse bulk of the respective door opening, substantially coplanar with it, and within the longitudinal bulk of the door opening as well ; in practice, the hinges project internally cantilever within the door opening . Such a position means that when the door is rotated to open the door opening, the door front edge , up to the waist line, enters the door opening ; this fact causes various drawbacks : first of all the wheather strip with which the door opening front post is equipped has to be interrupted over all the lower portion of the post, or below the waist line defined by the lower edge of the door windows ; otherwise, actually, the antrifricion would interfere with the door front edge , preventing the door from opening . Moreover, this disposition forces to have a rather short distance between the hinges and consequently a body/door assembly of insufficient stiffness . On the other hand, the only solutions known to avoid these drawbacks without resorting to the use of sliding doors consist in using complex parallelogram-type hinges, or outer hinges, which project beyond the body surface and are totally unsuitable, for attractive reasons as well as for aerodynamic reasons, for a road vehicle and, in particular, a motor vehicle . The object of the present invention is to provide a hinging device for the side doors of vehicles which is of simple structure, which enables to use hinges internal to the vehicle body and obviates the aforesaid drawbacks and, in particular, which permits the extensive use of antifricion and is arranged to ensure a good structural stiffness . Said objet is attained according to the invention which relates to a hinging device for a vehicle side door cooperating with a door opening of the vehicle body, the device comprising a pair of internal hinges to fasten said door to said body, which are fitted mutually coaxial within the transverse bulk of the door opening, substantially coplanar with said door opening, characterized in that said hinges are placed outside the longitudinal bulk of the door opening, laterally cantilever in relation of a side edge of said door .

The invention will be more apparent from the non-limiting description of one embodiment thereof given hereinafter by way of example, with reference to the accompanying drawings in which :

Figure 1 is an elevational view of a vehicle equipped with a device hinging the front door constructed in accordance with the invention ;

Figure 2 is a front elevational view, to an enlarged scale, of the vehicle front door of Figure 1 and, shown in part section, of the manner of fastening it to the body ;

Figure 3 is a section on the line III-III of the detail of Figure 2.

In Figures 1 to 3 the reference numeral 1 indicates overall a road vehicle of well-known type, in the present case a motor vehicle, of which only a portion of the front part is shown for simplicity ; the vehicle 1 comprises a body 2 supported by wheels 3 (of which only a front wheel, on the driver's side, is shown), said body delimits within itself a passenger compartment 4, and respective side doors 5, of which only a front door, on the driver's die, is shown for simplicity, arranged to cooperate in the shutting with respective door openings 6 of the body 2, each being provided with a window 7 shut by a glass 8 a lower edge 9 of which delimits the " waistline " of the vehicle 1, ideal line which subdivides the glazed part delimiting the passenger compartment 4 from the rest of the body 2 . Each door 5 is connected to the body 2 by means of a respective hinging device 10 which enables the door 5 to rotate, in relation to the body 2, towards the exterior of the vehicle (and vice versa) to let the door opening 6 free (occupy) in order to determine the opening (shutting) of the door to give (prevent) access to the passenger compartment 4.

The device 10 comprises a pair of internal hinges 12,14 of well-known type by means of which the door 5 is fastened to the body 2 ; said hinges 12,14 are fitted mutually coaxial in the transverse bulk (that is to say in the direction of the wheel gauge of the vehicle 1) of the door opening 6, substantially coplanar with said door opening 6, and are supported by a front post 18 of the door opening 6 by means of brackets 15, 16 . According to the invention, instead of being supported by the post 18 inside the door opening 6, the hinges 12, 14 are supported by the latter in an opposite position, that is to say placed outside the longitudinal bulk (namely in the direction of the wheel base of the vehicle 1) of the door opening 6, laterally cantilever in relation to a front side edge 20 of the door 5 adjacent to the post 18 ; in particular, the hinges 12, 14 are fitted so as to present a relatively long distance between them and, to that end, the lower hinge 14 is fitted substantially flush with a lower edge 21 of the door 5, in an advanced position in comparison with the

upper hinge 12, therefore the hinges 12, 14 are fitted at different distances from the door opening 6, the hinge 14 being closer to the front wheel 3 of the vehicle 1 in comparison with the upper hinge 12.

Besides, as it is well shown in Figure 1, the hinges 12, 14 are inclined in the plane of the door opening 6, so as to define a door rotation axis 25 which is oblique in relation to the vertical and downwardly diverging in relation to the door opening 6 and are placed forward in relation to the door opening 6, towards the front wheel 3, by an amount such as to determine (Figure 3) the exit of the edge 20 out of the door opening 6, further to a rotation of the door indicated by the arrow, in such a direction as to translate said door from the position shown in full line to the one shown by a short dashes line, so as to let the door opening 6 open; furthermore the hinges 12, 14 are also inclined in a plane perpendicular to the plane of the door opening 6 so that the axis 25 (Figure 2) is inclined transverse to the door opening 6 (and to the door 5), upwardly diverging in relation to said door opening, that is to say with the hinge 12 placed more towards the exterior of the vehicle in comparison with the hinge 14.

In order to allow the door 5 to open properly, the device 10 in accordance with the invention comprises, moreover, respective fastening brackets 32, 34 cantilever-fixed on the edge 20 to connect the door 5 to the respective hinges 12, 14, which obviously are of different length; said brackets 32, 34 are housed, together with the hinges 12, 14, within an opening 38 provided in the body 2 alongside the post 18, on the side opposite the door opening 6, for example directly within the post 18, provided with suitable apertures to enable the brackets 32, 34 to pass through towards the interior of the door opening 6. In that way, when the door 5 is shut (Figure 3) the front edge 20 of the latter directly cooperates in contact with the part of the post 18 delimiting the front inner portion of the door opening 6; in that way it is possible to provide, in that region too, a weather strip 40 of well-known type, fixed on the post 18, which, when the door is closed, is substantially tightened in a fluid-tight manner between the edge 20 and the post 18, while the more internal part of the door 5 is in contact with an ordinary perimeter seal 41, of well-known type, of the door opening 6.

Moreover, during the opening process (Figure 3), the door 5 can be snap-locked and in a thrust-releasable manner in an intermediate position (shown by short dashes) and in an extreme position of maximum opening (shown by dashes and dots) by means of a stopping device 50, of well-known type, consisting of a cam lever 51 hinged on the post 18 and which is inserted into the door 5

through a slit 52, where it cooperates with a stopping roller 53 supported by a bracket 54 in a suitable position and arranged to snap-cooperate with two respective successive concavities 55 of the lever 51. According to a possible variant of the invention, not shown for simplicity, the device 50 can possibly be integrated into the hinge 14 and the bracket 34 concerned which, owing to its oblong shape, lends itself to be substituted for the cam lever 51.

The advantages connected with the invention are apparent from the description given above; actually there is constructed a hinging device easy to obtain, which enables to use the well-known door stopping devices used at present and which, while enabling the door to be opened in the usual way (the double inclination of the hinges 12, 14 together with the differentiated length of the brackets 32, 34 actually permits to compensate the trajectory variations which would normally be transmitted to the door, in comparison with a traditional hinging with axially vertical hinges, if these means were not jointly used), allows the door front edge to come out of the door opening bulk: therefore a weather strip of a length equal to that of the post 18 can be adopted and, furthermore, a higher overall stiffness of the body 2 is obtained by increasing the distance between the hinges.

Claims

1. Hinging device for a vehicle side door cooperating with a door opening of the vehicle body, the device comprising a pair of inner hinges fastening said door to said body, which are fitted mutually coaxial within the transverse bulk of the door opening, substantially coplanar with said door opening, characterized in that said hinges are placed outside the door opening longitudinal bulk, laterally cantilever in relation to a side edge of said door.
2. Device as claimed in claim 1, characterized in that said hinges are fitted so as to present a relatively long distance between them, one of said hinges, the lower one, being fitted substantially flush with a lower edge of said door.
3. Device as claimed in claim 1 or 2, characterized in that said hinges are inclined in the plane of said door opening, so as to define a door rotation axis oblique in relation to the vertical and downwardly divergent in relation to said door opening.
4. Device as claimed in claim 3, characterized in that said hinges are inclined in a plane perpendicular to said plane of the door opening, so that said door rotation axis is inclined at right angles to said door opening, upwardly diverging in relation to it.
5. Device as claimed in anyone of the previous claims, characterized in that said hinges are placed

to the front in relation to said door opening by an amount such as to determine the exit of a front edge of said door out of the door opening further to a rotation of said door, in such a direction as to let the door opening open .

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6. Device as claimed in claim 5, characterized in that said hinges are fitted at different distances from the door opening, a lower hinge of the door being closer to a front wheel of the vehicle in comparison with an upper hinge of the door ; moreover, said device comprising respective fastening brackets to connect said door to said hinges, said brackets having different lengths.

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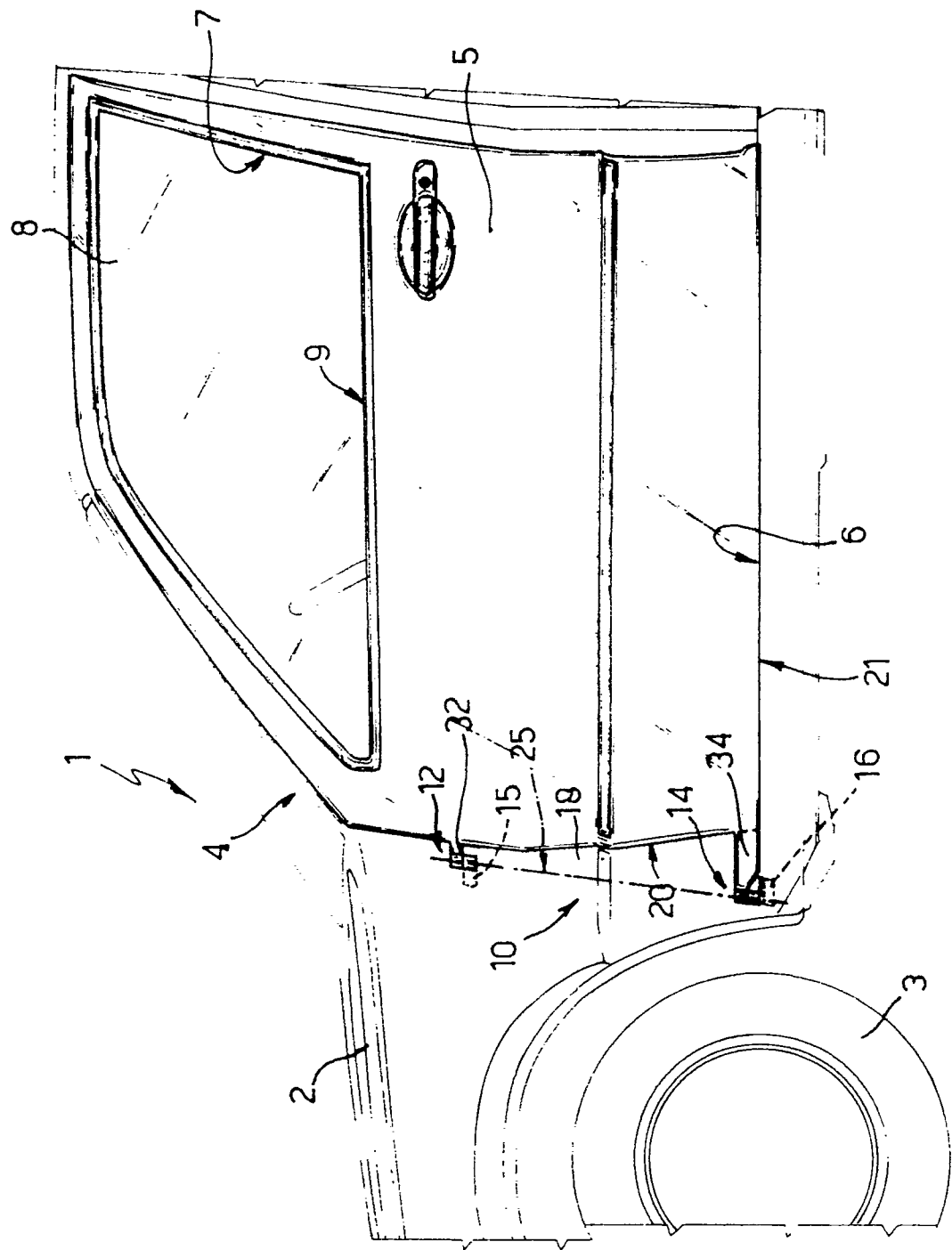


Fig.1

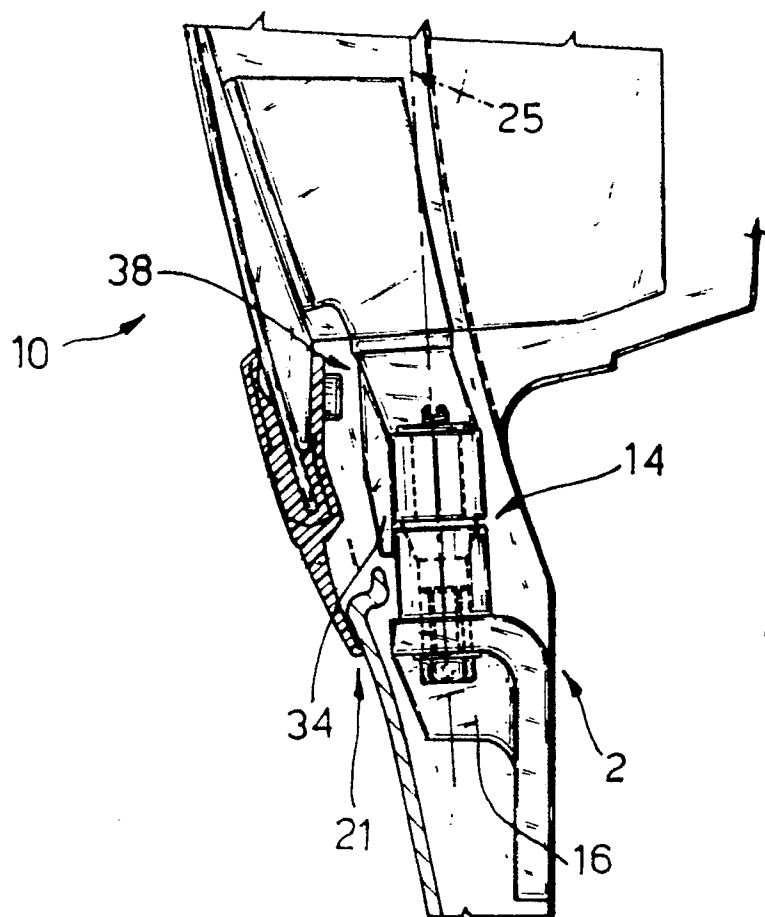
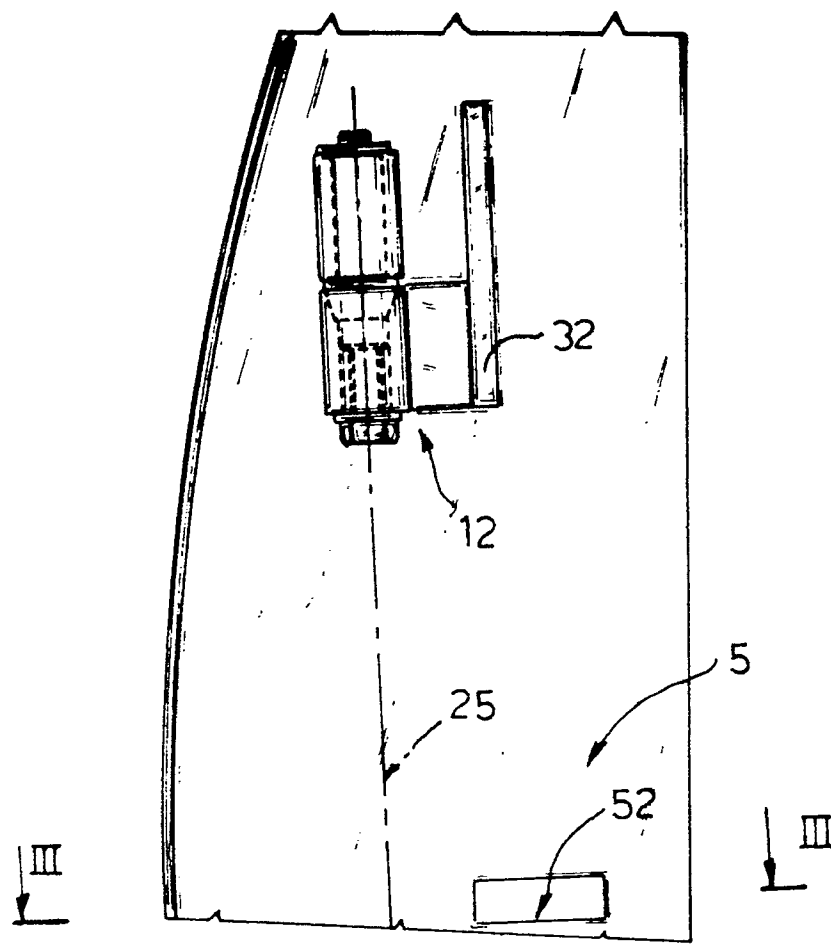


Fig. 2

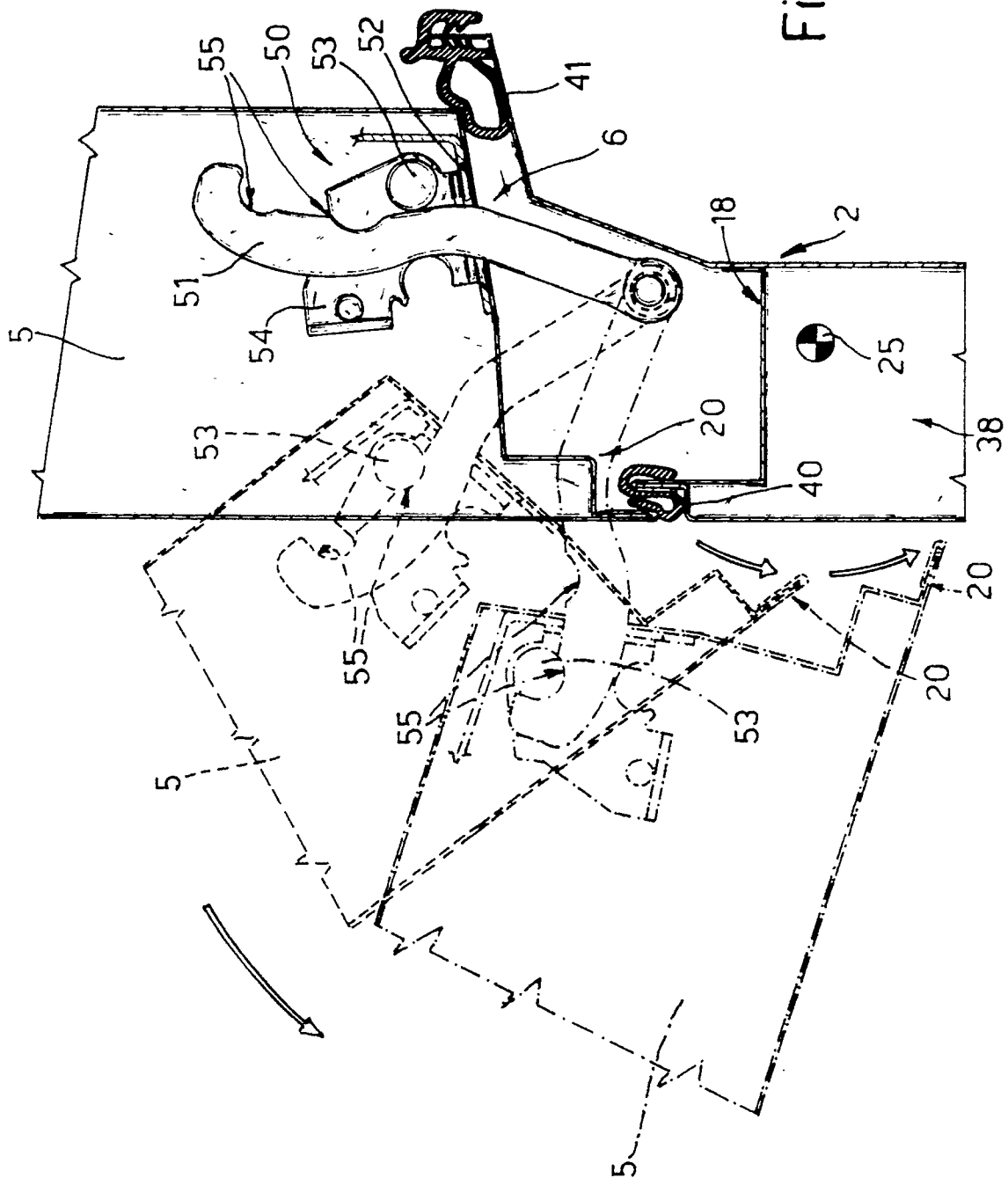


Fig. 3



EUROPEAN SEARCH REPORT

EP 90 12 0110

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.5)
X	DE-A-3 537 303 (PORSCHE) * Figures 1,2 * -- --	1,5	E 05 D 7/06 B 60 J 5/04
Y		2,3	
Y	EP-A-0 088 015 (S.A. AUTOMOBILES CITROEN) * Page 3, lines 8-14; figure 1 * -- --	2,3	
A	DE-C-7 256 38 (AUTO-UNION) * Page 2, lines 1-25; figure 1 * -- --	3	
A	DE-A-3 810 762 (PORSCHE) * Abstract; figure 2 * -- --	1	
A	US-A-2 138 463 (VINCENT) * Figures 1-4; page 2, column 1, line 31 - page 3, column 1, line 6 * -- --	1,2,5	
A	DE-A-3 341 922 (AUDI AG) * Figure 1; page 4, lines 1-14 * -- --	1,2,5	
A	GB-A-2 176 835 (BRITISH-GATES & TIMBER) * Figures 7,9; page 2, lines 67-120 * -- --	3,6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E 05 D B 60 J
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 26 February 91	Examiner NEYS B.G.
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			