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(54) **Hinge for vehicle doors**

Scharnier für Kraftfahrzeugtüre

Charnière pour portes de véhicule

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Description

[0001] The present invention relates to a hinge for a vehicle door and is of the type that comprises a first hinge part and a second hinge part connected together by a hinge pin that can rotate relative to the first hinge part- and is disengageably to the second hinge part by a screw that extends parallel to the hinge axis.

[0002] Figure 1 of the attached drawings illustrates a hinge according to the prior art. In Figure 1 the first and second hinge parts are labelled 12 and 14, respectively. A hinge pin 16 has a cylindrical shank 18 able to rotate inside a hole 20 formed in the first hinge part 12. A bush 19 is inserted between the pin 16 and the hole 20 and its ends are bent out against both transverse ends of the first hinge part 12. The axis of rotation of the pin 16 defines a hinge axis 22. The pin 16 includes a frustoconical portion 24 from which a second cylindrical portion 26 containing a tapped hole 28 projects.

[0003] The pin 16 is fixed permanently to the first hinge part 12, such that it cannot move in the direction of the hinge axis 22, by upsetting an end portion 30 after insertion of the cylindrical shank 18 into the hole 20. The upset portion 30 grips a washer 31. In the upset portion 30 of the pin 16 is a centring hole 32 which is coaxial with the hinge axis 22.

[0004] The second hinge part 14 is secured detachably to the pin 16 by a screw 34 engaged in the tapped hole 28. The second hinge part 14 contains a frustoconical seat 36 which fits against the frustoconical portion 24 of the pin 16. The screw 34 includes a frustoconical centring portion 38.

[0005] The hinge 10 is mounted automatically on a vehicle using a numerical-control manipulator equipped with two opposed grippers 40, 42 which grasp the hinge 10 in the direction of the hinge axis 22. The grippers 40, 42 each have their own centring surfaces 44, 46 that engage with the centring hole 32 and with the centring surface 38. The grippers 40, 42 are aligned with a reference axis of the automatic manipulating device. In order that the mounting of the hinge 10 can be performed as accurately as possible, it is desirable to have the hinge axis 22 aligned as accurately as possible with the reference axis of the manipulating device. Consequently, in order to improve the accuracy with which the hinge 10 is mounted, the error of concentricity between the centring hole 32 and the centring surface 38 must be maintained within the lowest possible values.

[0006] In the known system described above the total error of concentricity E_t between the centring surfaces 32 and 38 is given by the sum of four partial errors of concentricity termed E_1 , E_2 , E_3 and E_4 :

E_1 : error of concentricity between the hole 32 and the hinge axis $22 \cong 0.1$

E_2 : error of concentricity between the frustoconical surface 24 and the hinge axis $22 \cong 0.05$

E_3 : error of concentricity between the tapped hole

28 and the hinge axis $22 \cong 0.3$

E_4 : error of concentricity between the reference surface 38 and the threaded portion of the screw 34 $\cong 0.3$.

E_t : total error of concentricity between the centring hole 32 and the centring surface 38 $\cong 0.75$.

[0007] The values indicated for the errors of concentricity are those obtained by normal mechanical working of the components in question.

[0008] The object of the present invention is to provide a hinge for a vehicle door of the type described earlier that has a total error of concentricity less than that of the known version.

[0009] According to the present invention this object is achieved with a hinge having the features forming the subject of the main claim.

[0010] The features and advantages of the hinge according to the present invention will be described below with reference to the enclosed drawings, in which:

- Figure 1, which has already been described above, is a diagrammatic axial section through a hinge in accordance with the prior art, and
- Figure 2 is a diagrammatic axial section through a hinge in accordance with the present invention.

[0011] In Figure 2, parts corresponding to those previously described are indicated by the same numerical references increased by 100. As in the case of the known hinge described above, the hinge of the present invention comprises a first hinge part 112 and a second hinge part 114. These are connected together by a hinge pin 116 that can rotate relative to the first hinge part 112 about the hinge axis 122.

[0012] The hinge 110 according to the present invention differs from the known hinge essentially in that it includes a centring part 150 that is not constrained by the screw 134. The centring part 150 has a hole 152 through which the shank of the screw 134 extends with play. The centring part 150 is positioned around the screw 134 before the threaded portion 154 is formed by conventional rolling. As is known, thread forming by rolling produces an increase in diameter and therefore, after the threaded portion 154 has been formed, the centring part 150 is held in place between the threaded portion 154 and the head 156 of the screw 134.

[0013] The centring part 150 has two coaxial frustoconical centring surfaces, one at either end, marked 158 and 160, respectively. The surface 158 sits in a centring seat 162 formed on the second hinge part 114 and coaxial with the hinge axis 122. The centring surface 160 meanwhile is intended to fit into the reference surface 146 of the gripper 142. The screw 134 pushes the centring part against the centring seat 162 of the second hinge part 114. The centring part 150 therefore assumes a position with respect to the hinge axis 122 that is independent of the error of concentricity of the tapped hole

128 and of the threaded portion 154.

[0014] In the solution according to the present invention the total error of concentricity between the centring hole 132 and the centring surface 160 is given by the sum of the following elements:

E1: error of concentricity between the hole 132 and the hinge axis $122 \cong 0.1$

E2: error of concentricity between the frustoconical surface 124 and the hinge axis $122 \cong 0.05$

E3: error of concentricity between the frustoconical surface 136 and centring seat 162 of the second hinge part 114 $\cong 0.1$

E4: error of concentricity between the frustoconical surfaces 158, 160 of the centring part 150 $\cong 0.1$

Et: total error of concentricity between the centring hole 132 and the centring surface 160 $\cong 0.35$.

[0015] The present invention thus provides a reduction of more than 50% in the error of concentricity between the reference surfaces of the hinge for very little increase in cost due to the presence of the centring part 150.

Claims

1. Hinge for a vehicle door, comprising:

- a first hinge part (112) and a second hinge part (114) that can rotate relative to each other about a hinge axis (122),
- a hinge pin (116) mounted in the first hinge part (112) so that it can rotate about the hinge axis (122) and is constrained permanently by the first hinge part (112) in the direction of its own axis (122), and
- a screw (134) coaxial to the hinge axis (122) for fixing the second hinge part (114) detachably to the pin (116),

the said hinge being **characterized in that** it includes a centring part (150) mounted with clearance on the shank of the screw (134) and held on the screw (134) between the threaded portion (154) and the head (156), the centring part (150) having two frustoconical surfaces (158, 160), one on either end, forming a first centring surface (158) and a second centring surface (160) coaxial with each other, wherein the first centring surface (158) sits in a corresponding centring seat (162) formed in the second hinge part (114) and coaxial with the hinge axis (122), and the second centring surface (160) is intended to fit into a reference surface (146) in a gripper (142).

2. Hinge according to Claim 1, **characterized in that** the second hinge part (114) has, coaxial with the

hinge axis (122), a frustoconical centring surface (162) against which one centring surface (158) of the centring part (150) is pushed by the tension of the screw (134).

Patentansprüche

1. Scharnier für eine Kraftfahrzeugtür, umfassend:

- ein erstes Scharnierteil (112) und ein zweites Scharnierteil (114), die um eine Scharnierachse (122) zueinander drehen können,
- einen Scharnierbolzen (116), der in dem ersten Scharnierteil (112) montiert ist, so daß er um die Scharnierachse (122) drehen kann und durch das erste Scharnierteil (112) permanent in die Richtung seiner eigenen Achse (122) gezwungen wird, und
- eine Schraube (134), die koaxial zu der Scharnierachse (122) ist, um das zweite Scharnierteil (114) abschraubbar an dem Bolzen (116) zu befestigen,

wobei das Scharnier **dadurch gekennzeichnet ist, daß** es ein Zentrierteil (150) einschließt, das mit Spiel auf dem Schaft der Schraube (134) montiert ist und zwischen dem Gewindeabschnitt (154) und dem Kopf (156) auf der Schraube (134) gehalten ist, wobei das Zentrierteil (150) zwei kegelstumpfförmige Flächen (158, 160) aufweist, eine an jedem Ende, die koaxial zueinander eine erste Zentrierfläche (158) und eine zweite Zentrierfläche (160) bilden, wobei die erste Zentrierfläche (158) in einem entsprechenden Zentriersitz (162) sitzt, der in dem zweiten Scharnierteil (114) und koaxial zu der Scharnierachse (122) geformt ist, und die zweite Zentrierfläche (160) in eine Bezugsfläche (146) in einem Greifer (142) hineinpassen soll.

2. Scharnier gemäß Anspruch 1, **dadurch gekennzeichnet, daß** das zweite Scharnierteil (114) koaxial zu der Scharnierachse (122) eine kegelstumpfförmige Zentrierfläche (162) aufweist, gegen die durch die Zugkraft der Schraube (134) eine Zentrierfläche (158) des Zentrierteils (150) gedrückt wird.

Revendications

1. Charnière pour porte de véhicule, comprenant :

- une première partie (112) et une seconde partie (114) de charnière qui peuvent tourner l'une par rapport à l'autre autour d'un axe de charnière (122),
- une broche (116) de charnière montée dans la

première partie (112) de charnière afin qu'elle puisse tourner autour de l'axe (122) de charnière et soit retenue de façon permanente par la première partie (112) de charnière dans la direction de son propre axe (122), et
une vis (134) coaxiale à l'axe (122) de charnière et destinée à fixer la seconde partie (114) de charnière de façon amovible à la broche (116), la charnière étant **caractérisée en ce qu'elle** comprend une partie de centrage (150) montée avec du jeu sur la tige de la vis (134) et maintenue sur la vis (134) entre la partie filetée (154) et la tête (156), la partie de centrage (150) ayant deux surfaces tronconiques (158, 160), une à chaque extrémité, formant une première surface de centrage (158) et une seconde surface de centrage (160) coaxiales l'une à l'autre, et **en ce que** la première surface de centrage (158) est en appui dans un siège correspondant de centrage (162) formé dans la seconde partie (114) de charnière et coaxial à l'axe (122) de charnière, et la seconde surface de centrage (160) est destinée à s'ajuster dans une surface de référence (146) d'un organe de saisie (142).

2. Charnière selon la revendication 1, **caractérisée en ce que** la seconde partie (114) de charnière possède, coaxialement à l'axe (122) de charnière, une surface tronconique de centrage (162) contre laquelle est poussée une surface de centrage (158) de la partie de centrage (150) sous l'action de la traction de la vis (134).

Fig - 1

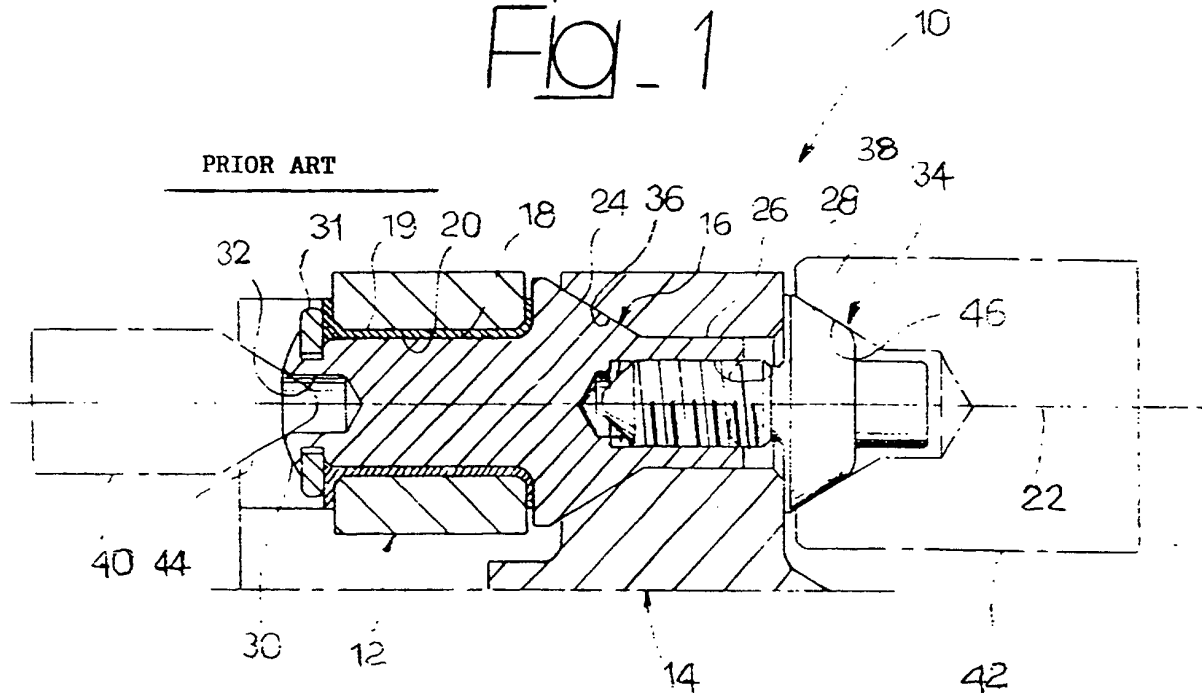


Fig. 2

