

HINGE CONNECTION

The invention relates to a hinge connection according to the pre-characterizing claims of Claim 1.

Such a hinge connection is described in DE-Gms No. 7,918,759. In this case the tongues protrude from the stiffening strip independently of one another.

It is an object of the invention to provide a hinge connection of this kind which can be snapped into engagement more reliably and assembled more easily.

According to the invention there is provided a hinge connection comprising a one-piece hinge part of synthetic plastics material and a separate part to which the hinge part is fittable,

wherein the hinge part comprises an elastic joint film forming a joint axis and stiffening strips extending on both sides thereof parallel to the joint axis and formed by material thickenings and on at least one stiffening strip there are formed two resilient tongues protruding with mutual spacing and in one common plane, on the ends of which tongues there are formed projections pointing away from one another, and wherein the separate part comprises an insertion socket into which the tongues can be inserted until the projections engage, in the assembled condition of the hinge connection, behind opposite side wall sections of the insertion socket, characterised in that an

elastically flexible crossing piece connecting the ends of the tongues is formed thereto.

The crossing piece, when it extends straight in the installed condition, serves as locking bolt for the engaged projections, which thus are fixed extremely reliably in the insertion socket. It is therefore possible to use shorter projections and accordingly the side wall sections of the insertion socket can also be made thinner. Often in fact their wall thickness is determined only in that they need to be made so thick that the engaging projections do not protrude beyond the outer surface. While conventional hinges have projections protruding by 1.5mm., with the consequence of corresponding wall thicknesses, now a projection of 0.5mm. is sufficient. Smaller projections also have the consequence that the tongues have to be

bent inwards less for pushing into the insertion socket. Furthermore the two tongues can be drawn towards one another by the crossing piece by action at one single point, similarly to a chord of an arc, whereby for example

5 mechanical assembly is facilitated.

If the crossing piece does not extend straight and parallel to the joint axis (Claim 2), but is somewhat curved towards the joint axis between the tongues (Claim 3), it acts upon the tongues after the style of a toggle lever and
10 holds the projections securely in engagement. However the curvature renders it possible to press the projections inwards from the exterior, with the crossing piece springing inwards. Thus according to need dismantlement of the hinge is possible, even if the space or installation conditions do
15 not permit one to press in the crossing piece itself in the middle.

In that a somewhat rectangular frame is produced by the crossing piece (Claim 4), the hinge parts, if they are stored as loose bulk goods, cannot hook into one another.

20 In order to draw the tongues inwards for the purpose of fitting or dismantling the hinge, the crossing piece must be capable of being bent through with its middle region towards the stiffening strip, for which a corresponding free space is to be left between crossing piece and stiffen-
25 ing strip. If however space not necessary for this purpose is occupied according to Claim 11 with support wings (without hindrance to the mobility of the tongues and the crossing piece) thus a higher stability of the stiffening

strip is gained thereby. Moreover the side flanks of the support wings which face the crossing piece can act (Claim 12) as wedge sliding faces which favour the drawing-in of the tongues.

5 The invention will now be described by way of example with reference to the accompanying drawings in which :-

FIGURE 1 shows a plan view of a hinge part according
10 to the invention on an enlarged scale,

FIGURE 2 shows a lateral elevation in the direction of the arrow 2 in Figure 1,

FIGURE 3 shows a view corresponding to Figure 1 with the upper hinge half shown fitted in an insertion
15 socket of a box part,

FIGURE 4 shows a lateral elevation in the direction of the arrow 4 in Figure 3,

FIGURE 5 shows a view corresponding to Figure 1 with the crossing piece bent,

20 FIGURE 6 shows a plan view of a hinge part with formed-on catch part on an enlarged scale,

FIGURE 7 shows a lateral view in the direction of the arrow 7 in Figure 6.

The hinge part as represented in Figures 1 and 2 has
25 an elastic joint film 11 forming a joint axis, which extends over the whole length of the hinge part and is about 0.2 mm. in thickness. It consists of a suitable elastic synthetic plastics material so that the joint film 11 withstands an adequate number of articulation movements.

Stiffening strips 12 and 13 formed by material thickenings are formed on to both sides of the joint film 11 at an interval of about 1 mm. In this example of embodiment the hinge part is made symmetrical in relation to the joint axis and the joint film 11, so that the description can be limited to the upper part.

Resilient tongues 14 and 15 each tapering towards the end are formed on both ends of the stiffening strip 12. On their ends there are formed projections 16, 17 pointing away from one another and between the ends there extends a crossing piece 18 in this case slightly bent towards the stiffening strip 12.

On the stiffening strip 12 there are further formed two triangular support wings 19, 21 attached symmetrically in relation to one another and laterally of the centre, the side flanks 22, 23 of which wings are adequately spaced from the facing surfaces 24, 25 of tongue 14, 15 and crossing piece 18 not to hinder flexure of the crossing piece 18 and inward bending of the tongues 14, 15 into the position as represented in Figure 5.

The tongues 14, 15, the support wings 19, 21 and the crossing piece 18 lie in one common plane and are also of equal thickness (in the view in Figure 2), namely 2 mm. The tongues 14, 15 are about 2.5 mm. wide at the base on the stiffening strip and taper at the level of the projection 16, 17 to a width of 2 mm. The projections 16, 17 protrude by 0.5 mm. beyond the outer faces 26, 27 of the tongues 14, 15, which extend perpendicularly of the stiffening strip 12. The projections 16, 17 each form a

catch face 28, 29 protruding approximately perpendicularly from the outer face 26, 27 in each case, from which in each case an approximately semi-circularly curved sliding face 31, 32 starts upward, merging into the upper outer face 33 of the crossing piece 18. In the regions of transition into the tongues 14, 15 the crossing piece 18 is 2 mm. in width and thickens to 2.5 mm. in the middle zone. It is understood that the transitions between the faces 24 and 25 and between the face 25 and the side flank 22 are rounded. The sag or flexure of the crossing piece 18 in the relaxed condition according to Figure 1 amounts to about 1 mm. The crossing piece 18 with the tongues 14, 15 and the stiffening strip 12 form a somewhat rectangular frame, the crossing piece 18 being about 28mm. in length between the tongues 14, 15 and the tongues extending up about 6mm. from the stiffening strip to the catch face 28, 29. The crossing piece maybe about four times as long as the tongues.

As may be seen from Figure 2, the stiffening strips 12 and 13 protrude by 2 mm. from the common plane of the tongues 14, 15 and of the crossing piece 18, and the joint film 11 extends between the longitudinal edges of the stiffening strips lying above the plane.

According to Figures 3 and 4 the hinge part as described hitherto is shown secured with its upper half to a separate part 34, for example a box lid. For this purpose, in a manner known per se, the part 34 has on its rear wall 35 an insertion socket 36 which comprises two side wall sections 37, 38, two transverse wall sections 39, 41 and a cover wall 42 lying parallel to and spaced from the rear

wall 35, the spacing amounting to 2 mm. Behind the side wall sections 37, 38 the insertion socket 36 is open, so that the projections 16, 17 can snap with their detent faces 28, 29 behind the end faces 43, 44 of the side wall

5 sections 37, 38.

In the fitted condition according to Figures 3 and 4 the longitudinal edge 45 of the stiffening strip 12 is supported on the longitudinal edge 46 of the cover wall 42, while in the opposite direction the detent faces 28, 29 lie
10 on the end faces 43, 44. The lateral retention results from the fact that the outer faces 26, 27 of the tongues 14, 15 rest inwardly on the side wall sections 37, 38.

Hinge parts of the kind as described are used for accessory boxes, such as screw assortment boxes, spare
15 bulb boxes for cars or small demonstration cases etc., that is wherever metal hinges or PVC pin/sleeve hinges of conventional style are too expensive. Since the hinge part is separated from the container part, consideration does not need to be given to the different functions, in the
20 selection of materials on both sides. The above-mentioned boxes are mostly specifically mass-produced articles, and for this purpose easy make-up, that is assembly, is very important.

As both tongues 14 and 15 ~~are drawn symmetrically inwards as~~
25 ~~shown in Figure 5 by pressing-in of~~ the crossing piece 18 at the same time, almost with one action, the hinge part can be introduced into the corresponding insertion socket 36 in a simple rectilinear movement, for example in the direction of the arrow 47. On account of the simplicity of the

movements¹ it is here especially possible to have this assembly effected by a robot. As indicated the latter, apart from grippers not especially illustrated for the sake of better clarity, comprises a ram 48 which bends the crossing piece 18 through towards the stiffening strip 12. As soon as the face 24 of the crossing piece 18 lies on the side flanks 23 of the support wings 19, 21, the outer parts of the crossing piece 18 slide inwards on these inclined side flanks 23, so that the inward drawing of the tongues 14, 15 thus takes place more effectively.

The opening 49 between the transverse wall sections 39, 41 of the insertion socket 36 is capable of facilitating the action of such a ram 48 in assembly. However this opening 49 also proves favourable for the purpose of dismantlement. Admittedly dismantlement as for the purpose of replacement of a defective hinge part comes into question more rarely, but even this operation is substantially facilitated by minimal expense, specifically by the provision of the opening 49. By pressure with a simple ram through the opening 49 upon the crossing piece 18, the projections 16, 17 snap free from the side wall sections 37, 38 and at the same time the hinge part is pressed out of the insertion socket.

It is understood that the lower half of the hinge part according to Figure 3 is inserted into a similar insertion socket of a further part completing the box.

In the example of embodiment according to Figures 6 and 7 the upper hinge part is made just as in the previous example. However the lower stiffening strip 13 continues

as a plate 51 which is formed in known manner as a catch part. For this purpose it carries a hooked strip 52 and possibly two lateral stiffening ribs 53, 54. This case is concerned with a hinge connection for example of a box lid with the catch part, the fitting of the hinge part on the box lid taking place in the same simple manner as that of the hinge parts on the rear of the box.

In departure from the examples of embodiment as illustrated, the crossing piece 18 can also extend straight between the tongues 14, 15. In this case dismantlement is possible only by pressing-in of the crossing piece 18, because the straight crossing piece 18 acts like a bolt and cannot be caused to yield solely by lateral pressure against the projections 16, 17.

As Figure 3 shows, the wall thickness of the side wall sections 37, 38 is made so stout that the projections 16, 17 do not protrude beyond their outer side, because this would result in unpleasant possibilities of snagging cleaning cloths etc. Since as a result of the strong detent force due to the crossing piece 18 (whether slightly curved or straight) slightly protruding projections 16, 17 are sufficient, the insertion socket 36 can likewise be made thinner. This can be important above all for the achievement of a better appearance of boxes.



C l a i m s :

- 1.) Hinge connection comprising a one-piece hinge part of synthetic plastics material and a separate part to which the hinge part is fittable,
- 5 wherein the hinge part comprises an elastic joint film forming a joint axis and stiffening strips extending on both sides thereof parallel to the joint axis and formed by material thickenings and on at least one stiffening strip there are formed two resilient tongues protruding with mutual spacing
- 10 and in one common plane, on the ends of which tongues there are formed projections pointing away from one another, and wherein the separate part comprises an insertion socket into which the tongues can be inserted until the projections engage, in the assembled condition of the hinge connection,
- 15 behind opposite side wall sections of the insertion socket, characterised in that an elastically flexible crossing piece (18) connecting the ends of the tongues (14, 15) is formed thereto.
- 2.) Hinge connection according to Claim 1, character-
- 20 ised in that the crossing piece (18) is extending generally parallel to the joint axis.
- 3.) Hinge connection according to Claims 1 or 2, character-
- ised in that the crossing piece (18) is slightly curved towards the joint axis between the tongues (14, 15).
- 25 4.) Hinge connection according to Claim 2 or 3, characterised in that the stiffening strip (12) with the tongues (14, 15) protruding therefrom and the crossing



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piece (18) connecting their ends constitute a somewhat rectangular frame.

5 5.) Hinge connection according to Claim 4, characterised in that the crossing piece (18) is longer than the lateral tongues (14, 15).

6.) Hinge connection according to Claim 5, characterised in that the crossing piece (18) is about four times as long as the tongues (14, 15).

7.) Hinge connection according to Claim 6, characterised in that the crossing piece (18) is about 28 mm. long.

8.) Hinge connection according to Claim 1, characterised in that the cross-section of the crossing piece (18) in width and thickness is approximately equal with that of the tongues (14, 15).

15 9.) Hinge connection according to Claim 8, characterised in that the crossing piece (18) is somewhat wider in the middle, measured in the common plane, than in the regions of transition to the tongues (14, 15).

10.) Hinge connection according to Claim 9, characterised in that the crossing piece (18) is 2 mm. thick, 2 mm. wide in the transition zones and 2.5 mm. wide in the middle region.

11.) Hinge connection according to Claim 4, characterised in that two triangular support wings (19, 21) attached symmetrically with one another and laterally of the middle are formed on the stiffening strip (12), of which the triangle apices point each to the region of transition of the crossing piece (18) to the respective tongue (14,



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15), while the side flanks (22, 23) of the support wings (19, 21) have a spacing from the faces (24, 25), facing them, of tongue (14, 15) and crossing piece (18).

12.) Hinge connection according to Claim 11,
5 characterised in that the crossing piece (18), in the elastically fully flexed condition, is applicable with its inner face (24) facing the stiffening strip (12) to the side flanks, facing it, of the support wings (19, 21).

13.) Hinge connection according to Claim 12,
10 characterised in that when the crossing piece (18) is bent in until it abuts on the support wings (19, 21), each tongue (14, 15) is drawn inwards by at least the amount which corresponds to the overhang of the projection in relation to the tongue.

15 14.) Hinge connection according to Claims 7 and 13, characterised in that the overhang of the projections (16, 17) amounts to about 0.5 mm.

15.) Hinge connection according to one of the preceding Claims, characterised in that the hinge part is
20 made in mirror-symmetry in relation to the joint axis and is fittable in mirror-image manner to two separate parts (34), articulatedly connecting these.

16.) Hinge connection according to Claim 15,
characterised in that the stiffening strips (12, 13) stand up
25 beyond the common plane of the tongues (14, 15) and of the crossing piece (18) and in that the joint film (11) extends between the longitudinal edges of the stiffening strips (12, 13), which edges lie above this plane.



17.) Hinge connection according to one of Claims 1 to 14, characterised in that the tongues (14, 15) and the crossing piece (18) are formed on only one stiffening strip (12), while a catch part (51, 52) is formed on the opposite
5 stiffening strip (13), in relation to the joint axis.

18. Hinge connection as claimed in Claim 1 substantially as described with reference to the accompanying drawings.
