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(11)

**EP 0 989 275 A2**

(12)

## EUROPEAN PATENT APPLICATION

(43) Date of publication:  
**29.03.2000 Bulletin 2000/13**

(51) Int Cl.7: **E06B 3/48, E05D 15/24**

(21) Application number: **99610053.3**

(22) Date of filing: **16.09.1999**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

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(30) Priority: **21.09.1998 DK 118598**

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### (54) A hinge assembly

(57) The invention concerns a hinge (1) for a hinge connection between door/gate sections comprising a first (2) and a second (3) hinge profile, said hinge profiles (2,3) comprising a link function (4) lying between the two profiles for the provision of an axis of rotation (5) and hinging around which the two profiles turn, said first hinge profile (2) comprising an outer profile (6), and said second hinge profile (3) comprising an inner profile (7) lying at a shorter distance to the link connection (4) than the outer profile (6) and with its outer surface (8) facing towards the outer profile (6), the inner surface (12) of said outer profile is substantially plane, and the outer surface (8) of said inner profile comprising a curved part (9) extending from the free concluding edge (10) of the profile and at a distance hereto.

The curved part (9) is concentric with the axis of rotation (5), and the remaining outer surface (11) is substantially plane and forms an angle of  $0 - |15^\circ|$  with the inner surface (12) of the outer profile, the inner surface of said outer profile being mainly plane parallel with the gate sections when the hinge (1) is in the closed position, said outer profile (6) substantially covering the inner profile (7) when the hinge (1) is in the closed position, and in that each hinge profile (2,3) respectively comprises a first (18) and a second (19) area for the mounting of securing elements (20) which connect each hinge profile to a section (26)/a frame (33).

There is hereby achieved a narrow profile hinge which, however, has room for mounting screws, and which at the same time provides optimum protection for the fingers.

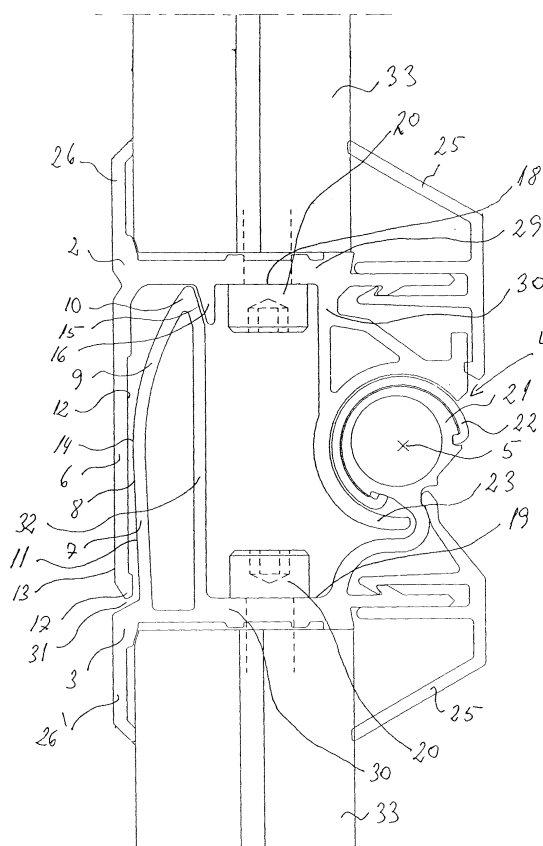


FIG. 1

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## Description

**[0001]** The invention concerns a hinge for a hinge connection between door/gate sections comprising a first and a second hinge profile, said hinge profiles comprising a link function lying between the two profiles for the provision of an axis of rotation and hinging around which the two profiles turn, said first hinge profile comprising an outer profile, and said second hinge profile comprising an inner profile lying at a shorter distance to the link connection than the outer profile and with its outer surface facing towards the outer profile, the inner surface of said outer profile being substantially plane, and the outer surface of said inner profile comprising a curved part extending from the free concluding edge of the profile and at a distance hereto. The invention also concerns the use hereof.

**[0002]** It should be noted that by the expression shorter distance it is to be understood that the outer and the inner profile are placed in such a manner that the outer profile covers over the inner profile when the gate is in the closed position, and that the distance is measured along a line at right-angles to the surface of the gate and through the axis of rotation.

**[0003]** A hinge system for use for door sections for linked hoist gates is known from EP-735226.

**[0004]** As it is seen disclosed in EP-735226, the hinge assembly consists of a profile part shaped as a nose and curved, which upon activation of the link connection turns past an outer profile having an inner surface which is curved, and which corresponds to the curve of the nose part. With this construction there is achieved a quite excellent protection for the fingers during the opening and closing of the gate, but the construction can not be used with gates consisting of sections where these sections are made of metal frames with fillings in between of the type consisting of glass, metal plates or the like, but exclusively for sandwich constructions consisting of a form of foam and coated on the surfaces with a metal plate, in that the mounting of securing elements e.g. in the form of screws will require not only that holes are drilled transversely through the curved areas, but also the provision of further measures in order to maintain the finger-protection function. Moreover, the construction demands very great production accuracy between the nose part and the inner surface of the outer profile in order that these shall have the necessary clearance between them.

**[0005]** From EP-787882 there is known a hinge which is screwed into the frame section. However, with this construction there is not provided an adequate protection for the fingers, and the fastening by means of screws takes place in an underlying part parallel with the front of the gate sections.

**[0006]** The object of the invention is thus to provide a hinge assembly between gate sections/parts which can be used e.g. for gates, for example as these are seen in EP-769605, and where optimum finger protection is

achieved while at the same time the construction can be made relatively narrow, whereby a radical saving in material is achieved, and where room is also provided for screws, bolts or similar securing elements for fastening the hinge assembly profile to the frame section, and without the necessity of having to drill clearance holes beforehand, and where the fastening is such that the longitudinal axis of the screws is placed parallel with the surface of the closed gate.

**[0007]** This object is achieved with a hinge assembly disclosed in the introduction, and where the curved part is concentric with the axis of rotation, and in that the remaining outer surface is substantially plane and forms an angle of  $0 - 15^\circ$  with the inner surface of the outer profile, the inner surface of said outer profile being substantially plane parallel with the gate sections when the hinge is in the closed position, said outer profile substantially covering the inner profile when the hinge is in the closed position, and in that each hinge profile comprises a first and a second area respectively for mounting of the securing elements which connect each hinge profile with a section/frame.

**[0008]** The function of the hinge assembly is thus that the two finger-protection profiles, the outer and the inner profile, are disposed in a mutually relative manner in such a way that the outer profile preferably covers almost the whole of the inner profile, and where the actual opening between the outer and the inner profile does not take place outside the link connection itself, but displaced from the actual position of the link connection. The opening slot thus lies at a distance from the rotation centre of the hinge. This is made possible as a consequence of the inner profile having a curved part which is concentric with the axis of rotation, and where the transition to the flat area lies directly opposite the axis of rotation of the hinge assembly.

**[0009]** The known assemblies have mainly an assembly which lies directly opposite the actual link connection, as opposed to the present invention which ensures precisely that this opening slot lies in a displaced manner, which is made possible by the inner profile having a flat part which is covered by the outer part. The opening slot will thus vary 1-6 mm during the opening. It is precisely due to this varying opening slot and the displacement where the two profiles are divided which has made it possible to achieve a flat finger-protection, while at the same time that the construction can make it possible for the hinge part to be fastened to the sections, in that this is made possible due to the mutual relationship of the profiles, and without the necessity of drilling holes beforehand for the mounting of the screws, in that there is direct access to the area for this mounting. This is due precisely to the construction of the flat finger protection.

**[0010]** By providing a hinge according to the invention and as further disclosed in claim 2, an optimum protection for the fingers is ensured so that this is active up to an opening of  $65-70^\circ$ , in which interval the slot will vary from 1-6 mm.

**[0011]** By providing a hinge according to the invention and as further disclosed in claim 3, a concealed point of assembly is achieved so that wear and cracked paint cannot be seen.

**[0012]** By providing a hinge according to the invention and as further disclosed in claims 4 and 5, a plane surface is achieved in the closed position so that the sealing lip against the outside of the gate surface also achieves an optimally good tightness.

**[0013]** By providing a hinge according to the invention and as further disclosed in claims 6 and 7, an area is made available for the fastening of the screws which are required to connect the hinge to the frames of the sections.

**[0014]** By providing a hinge element as disclosed in claim 8, it is achieved that rollers which are used to guide the gate leaf in the rails are coincident with the hinge axle, whereby it is not necessary to produce a separate roller holder.

**[0015]** By providing a hinge element as disclosed in claim 9, an optimisation of the space required for the screws is achieved, while at the same time the unique configurations of the inner and outer profiles can be maintained.

**[0016]** The invention also concerns the use of a hinge in the manner disclosed in claim 10.

**[0017]** The invention will now be explained in more detail with reference to the drawing, where

fig. 1 shows an example embodiment of a hinge according to the invention, seen in cross-section through the two hinged hinge profiles,

fig. 2 shows a second example embodiment of a hinge according to the invention, seen in cross-section through the two hinged hinge profiles,

fig. 3 shows a gate with which the hinge according to the invention finds appropriate application,

fig. 4 shows the hinge according to the invention placed in a gate, and where the function of the hinge profile is seen in cross-section during the opening movement.

**[0018]** Fig. 1 shows an example embodiment of a hinge 1 and comprising a first hinge profile 2 and a second hinge profile 3, said hinge profiles being pivotally connected to each other around a link function 4, and where the inside of said link function 4 comprises an axis of rotation 5 around which the whole assembly turns.

**[0019]** The first hinge profile 2 comprises an outer profile 6 consisting of a mainly plane rail which, when the gate is in the closed position, will lie substantially flush with the adjacent surfaces. The outer profile 6 extends directly over into a section profile 26 to which are secured the sections which form a gate 28 when fastened

together. The transition between the outer profile 6 and the section profile 26 is either invisible or marked merely with a small notch. The two parts are thus not angled in relation to each other and are extruded in one piece. At right-angles to the transition between the section profile and the outer profile 6, a 90° plate profile is connected, said plate profile 29 extending for a certain distance from the inner surface 12 of the outer profile 6, and which is extruded in one piece. The plate profile 29 comprises an area which forms a substantially plane surface 18, though possibly provided with grooves or the like, and where there is room for a securing element in the form of a screw 20 for mounting this second profile in firm connection with a frame 33 which constitutes one of the sections for the gate.

**[0020]** The plate profile 29 comprises a second plate profile 30 at right-angles hereto, and which ends in a further, partly cylindrical sleeve 23 which forms part of the actual link connection 4. The link connection 4 consists as mentioned of this outer, partly cylindrical sleeve 23, which is partly cylindrical in shape and surrounds an inner sleeve which is cylindrical and hollow on the inside, and which on its outer surface is partly cylindrical. Between the inner cylindrical sleeve 21 (a hollow profile) and the outer cylindrical sleeve 23 (a solid profile), there is a friction-reducing layer, a slide layer 22, the outer and inner surfaces of which conform respectively with the outer surface of the cylindrical sleeve 21 and the outer partly cylindrical sleeve's outer surface facing towards the inside, and preferably made of plastic material. The inner cylindrical sleeve 21 is connected to the second hinge profile 3 by an approximately S-shaped profile, which second profile will be explained in more detail.

**[0021]** The second hinge profile 3 comprises an inner profile 7 which upon closing is completely covered by the outer profile 6. This inner profile 7 is connected to a section profile 26' which section profile 26' has the same function as section profile 26. There is an edge in the transition between the two profile pieces, so that the outer surface 8 of the inner profile lies displaced from the outer surface of the section profile 26. It is hereby ensured that when the outer profile 6 covers the inner profile 7, there is a more or less smooth transition from the outer surface 13 of the outer profile 6 and the outer surface of the section profile 26.

**[0022]** The inner profile 7 has a nose shape in the sense that the one half part consists of a curved part 9, and the second half part extends over into a second part which is approximately plane and constitutes the plate surface 11 of the inner profile. The transition 14 between the two geometrical shapes lies approximately opposite the axis of rotation 5 for the link function 4. The curved part has an arc which is concentric with the axis of rotation 5. During an opening movement, the slot between the outer and the inner profile will vary from 1-6 mm. The opening slot 31 thus lies displaced from and below that plane which arises when a line is drawn from the axis of rotation 5 forward to the transition area 14 between the

plane and the curved area for the inner profile 7. The distance between the slot 31 and this transition area 14 is approximately the same as the distance between the transition area 14 and that area where the outer profile 6 is connected to the section profile 26. The axis of rotation 5 is thus disposed in a centre plane in relation to the starting point and the end point of the outer and the inner profile.

**[0023]** The inner profile 7 has a concluding edge 10 which lies opposite to the concluding edge 17 of the outer profile 6. The underside of the concluding edge 10 of the inner profile, i.e. the side facing towards the link function 4, is configured with a facet 15 which abuts against the ledge 16 when the hinge and the gate are closed. The outer profile is configured as a form of hollow profile with the upper part, which as mentioned consists of a flat part and a curved part, the lowermost end of which is preferably a plane plate 32. The inner profile 7 is connected at right-angles to the second plate profile 30 and is extruded in one piece herewith. In the area between the inner profile 7 and the S-shaped connection which connects the inner cylindrical sleeve of the link function 4 with the second profile 30, there is an area 19 which forms a plane surface, though possibly provided with grooves or the like, and where there is room for a securing element in the form of a screw 20 for mounting this second profile in firm connection with a frame 33 which constitutes one of the sections for the gate.

**[0024]** The dimension of the actual hinge part/link part itself is determined by the need for mounting a roller axle of up to Ø 11mm in the centre of the hinge part/link part. This cylindrical centre is used for the mounting of the rollers which are used when the gate leaves are required to run in rails, such as is seen in fig. 4, which hereafter will be described in more detail.

**[0025]** Fig. 4 shows the rails 34 used for a gate 28, such as this is seen in fig. 3, and where the gate is opened by way of rollers 35 mounted in a rail 34 at each side of the gate 38. This rail 34 supports a roller 35 which is fastened to an axle 36 which lies inside the inner part of the link connection 4. There is hereby achieved an effective guiding of the opening and closing of the gate 28. Fig. 4 also shows the mutual relationship between the inner profile and the outer profile during an opening movement, in that a larger and larger slot of 1-6 mm appears during a 65-70° opening of this.

**[0026]** Fig. 3 shows the individual sections 26 in which such a gate is divided, and which in the horizontal plane are hinged to over- and under-lying profiles by means of hinges according to the invention, while in the vertical plane they are fastened to one another in an unmoveable manner. The sections thus consist of a kind of filling in the form of glass or metal plates 37 which are surrounded by a rectangular frame 38, and where upper and lower frames are fastened to the hinge according to the invention by means of screws or the like.

**[0027]** There is thus provided a gate which has good finger protection, and which in a simple manner can be

mounted in the associated rails with a minimum of play, which entirely accommodates the conditions with regard to installation and production.

**[0028]** It is thus important that between the hinge part and the finger protection, which is brought about by the outer and the inner profile, there is room for mounting the screws which hold the gate frames together, in that said screws can be mounted without the drilling of clearance holes. When the gate is in the closed position, and it is desirable to have a plane surface towards the outer side, a relatively good tightness can be achieved by means of a sealing lip 31 against the outside of the gate leaf. It is thus desirable to have a finger protection function which is as flat as possible. This is achieved by displacing that position in which the two profiles are separated from the hinge's axis of rotation 5 downwards to the position as mentioned earlier and marked 31, and in that the outer surface of the outer profile is plane parallel with the gate sections when these are closed/not turned. The inner surface of the outer profile is substantially plane parallel with the outer surface. The opening slot achieved between the two profiles is one which varies between 1-6 mm, whereby good protection is provided against clamping of the fingers.

**[0029]** Finally, it should be noted that the construction distinguishes itself in that when the gate is in the closed position, it has a closing-together point which is concealed, in that the inner profile 7 has a facet 15 on its nose which abuts against the ledge 16 during the closing. By varying the size and position of the nose, a change can be achieved in the angle between the surfaces of the two hinge profiles, so that a crossing-over can take place, which can be expedient in certain situations. An over-closed position of about 3-4° can thus arise by using the construction as shown in fig. 1 instead of that in fig. 2, where the facet has another distance and position in relation to the ledge 16, and where the mutual relationships between position 15 and 16 and the slot opening 31 are adjusted.

**[0030]** It should also be noted that the first and the second profiles have some configurations which make it possible to fasten plastic profiles/panels 25, which are removable, and which provide an attractive surface facing the inside of the room. At the same time, by producing these profiles in plastic a better insulation is achieved. Moreover, it is avoided that condensation occurs when there are great differences in temperature between the two gate surfaces. Furthermore, these can secure either double-glazing or filling (e.g. aluminium plates with foam in between) in the frames.

**[0031]** The invention is for use especially in relation with gates, but it can naturally find application in other places where a good tightening function is desired, at the same time that the hinge shall be able to be mounted with connection elements.

**[0032]** Both the first and second hinge profiles are extruded in one piece.

## Claims

1. A hinge (1) for a hinge connection between door/gate sections comprising a first (2) and a second (3) hinge profile, said hinge profiles (2,3) comprising a link function (4) lying between the two profiles for the provision of an axis of rotation (5) and hinging around which the two profiles turn, said first hinge profile (2) comprising an outer profile (6), and said second hinge profile (3) comprising an inner profile (7) lying at a shorter distance to the link connection (4) than the outer profile (6) and with its outer surface (8) facing towards the outer profile (6), the inner surface (12) of said outer profile is substantially plane, and the outer surface (8) of said inner profile comprising a curved part (9) extending from the free concluding edge (10) of the profile and at a distance hereto, **characterized** in that the curved part (9) is concentric with the axis of rotation (5), and in that the remaining outer surface (11) is substantially plane and forms an angle of  $0 - |15^\circ|$  with the inner surface (12) of the outer profile, the inner surface of said outer profile being mainly plane parallel with the gate sections when the hinge (1) is in the closed position, said outer profile (6) substantially covering the inner profile (7) when the hinge (1) is in the closed position, and in that each hinge profile (2,3) respectively comprises a first (18) and a second (19) area for the mounting of securing elements (20) which connect each hinge profile to a section (26)/a frame (33).
 

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2. Hinge according to claim 1, **characterized** in that the curved part (9) extends from the concluding edge (10) and forward to the area (14) on the profile which lies in the area opposite the centre axis of the axis of rotation and at right-angles to the inner surface of the outer profile when the hinge is in the closed position.
 

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3. Hinge according to claim 1 or 2, **characterized** in that the surface of the inner profile (7) facing towards the axis of rotation (5) in the area towards the concluding edge (10) comprises an area, preferably a facet (15), which abuts up against a ledge (16) associated with the first profile.
 

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4. Hinge according to any of the preceding claims, **characterized** in that the free concluding edge (17) of the outer profile (6) lies at a distance from and opposite to the free concluding edge (10) of the inner profile when the hinge is in the closed position.
 

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5. Hinge according to any of the preceding claims, **characterized** in that the outer surface (13) of the inner profile is substantially plane and parallel with the inner surface (12) of the same profile.
 

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6. Hinge according to any of the preceding claims, **characterized** in that in the area between the outer profile (6) and the link connection (4), the first profile comprises a substantially plane area (18) connected to the outer profile and connecting this with the link connection in the provision of a first area.
 

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7. Hinge according to any of the preceding claims, **characterized** in that in the area between the link connection (4) and the inner profile (7), the second profile comprises a substantially plane area (19) connected at right-angles to the lower surface of the inner profile and connecting this with the link connection in the provision of a second area.
 

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8. Hinge according to any of the preceding claims, **characterized** in that a guide roller is provided in the centre of the link function.
 

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9. Hinge according to any of the preceding claims, **characterized** in that the axis of rotation (5) of the hinge is placed in a centre plane in relation to the starting points of the outer (6) and the inner (7) profiles.
 

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10. Use of a hinge according to any of the preceding claims for a sectionalised gate/door produced in sections comprising frames of metal or metal and plastic, to which frames the hinge is connected with screws, bolts or similar securing elements.
 

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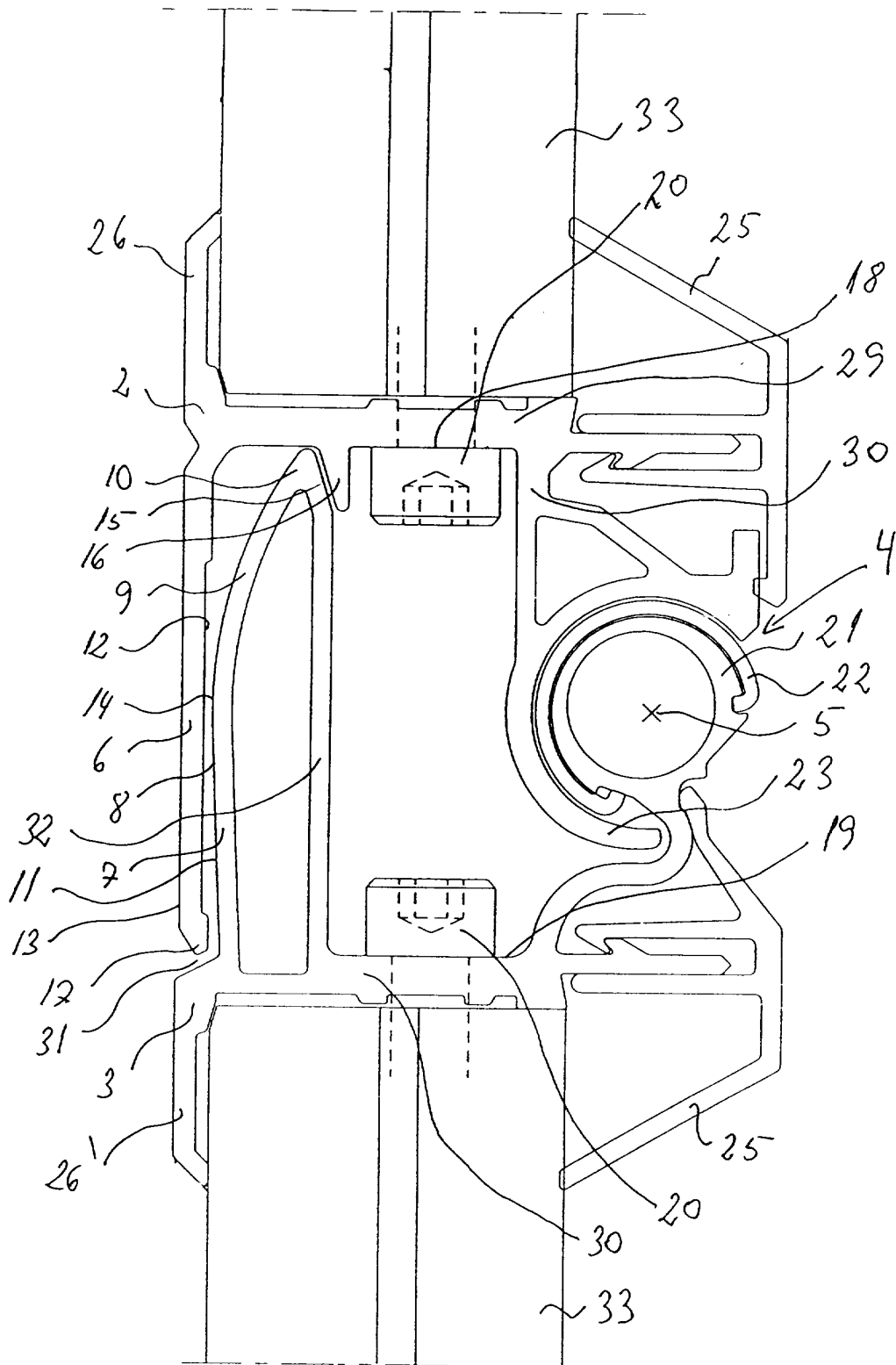


FIG. 1

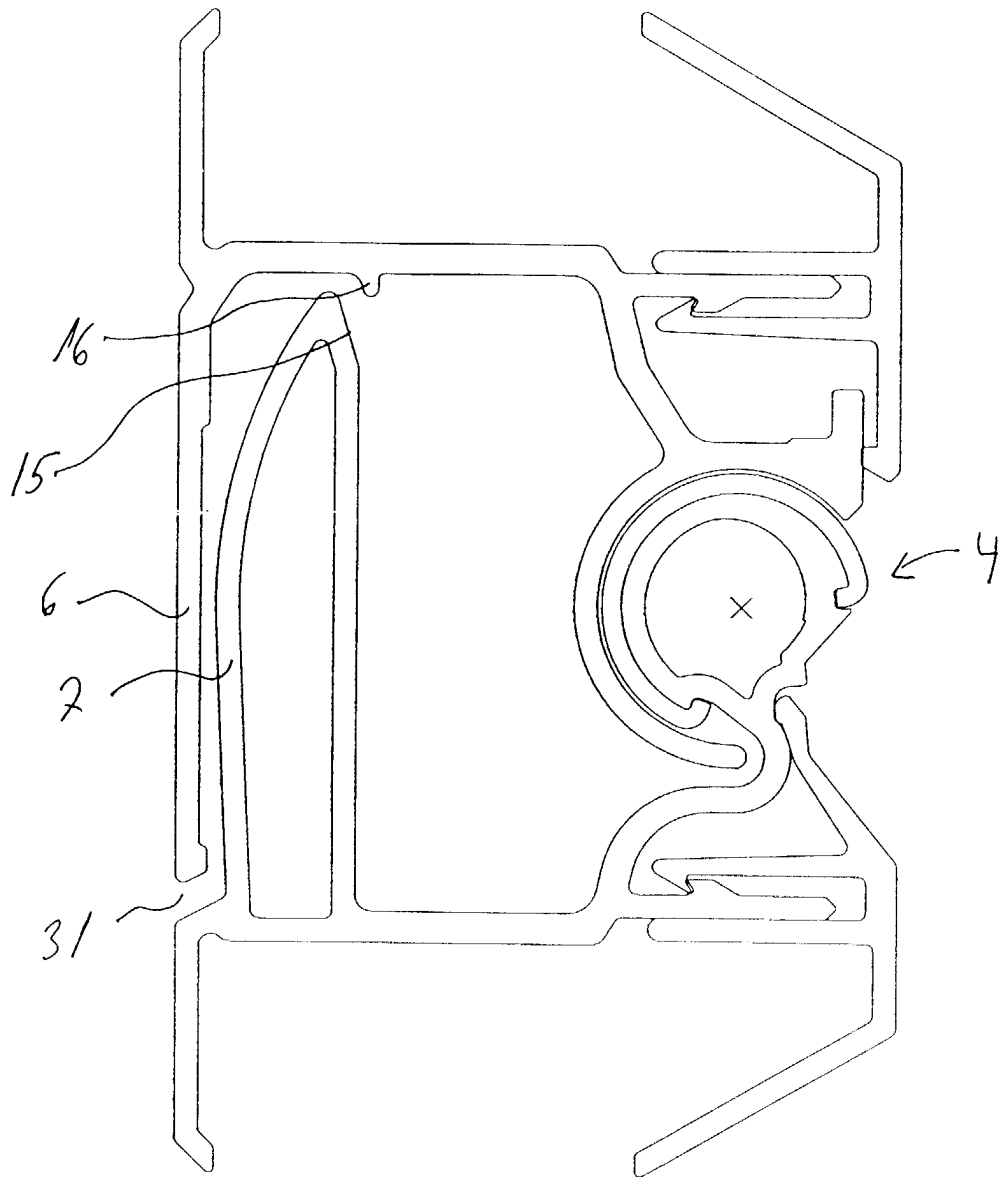


FIG. 2

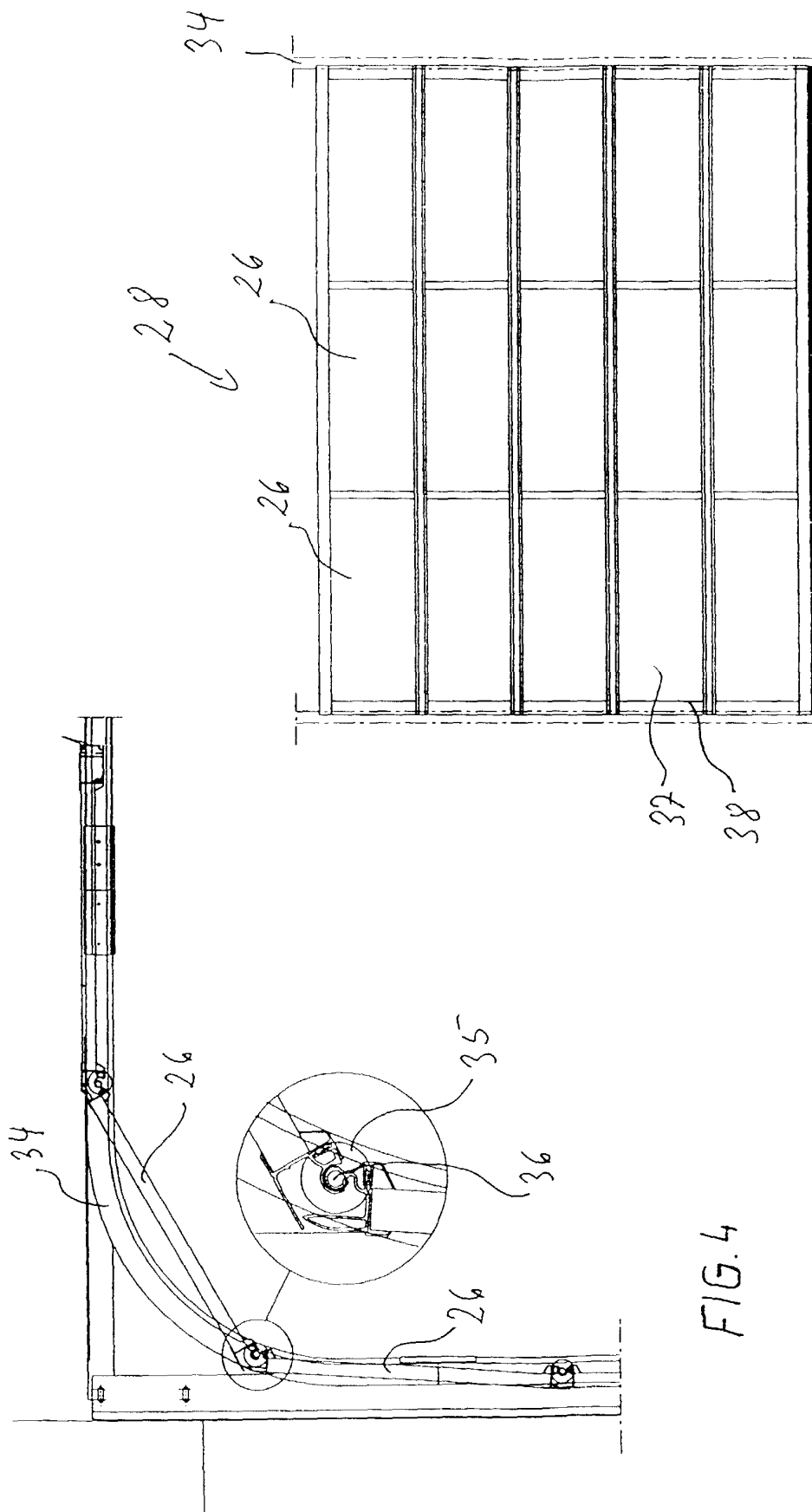


FIG. 3

FIG. 4