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(71) Applicant: **Sävsjö Platindustri AB**
576 22 Sävsjö (SE)

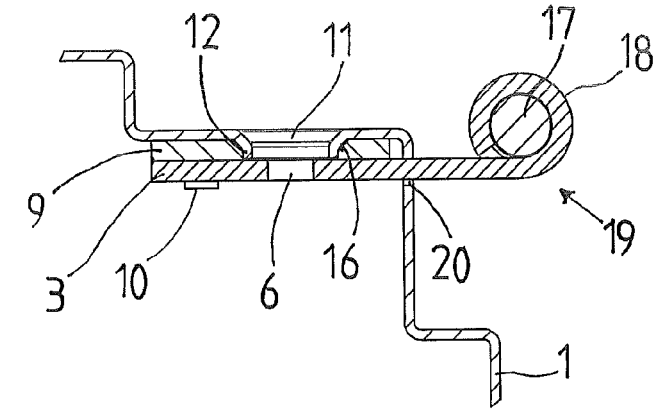
(72) Inventors:
- **Johansson, Sten-Ove**
  570 03 Vrigstad (SE)
- **Persson, Kennet**
  570 03 Vrigstad (SE)

(74) Representative: **Jacobsson, Peter**
Bergenstråle & Lindvall AB
P.O. Box 116
331 21 Vämamo (SE)

(54) **Hinge mount**

(57) A device for securing a hinge portion (3) in a sheet metal frame (1) includes, apart from the sheet metal frame (1) and the hinge portion (3), a spacer plate (9). The spacer plate (9) is to be positioned between the hinge portion (3) and the sheet metal frame (1). Both the sheet metal frame (1) and the spacer plate (9) as well as the hinge portion (3) include positioning means (10, 12, 16) for mutual positioning of the three components (1, 3, 9).

Fig 5



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Description

TECHNICAL FIELD

[0001] The present invention relates to a device for mounting a hinge portion in a sheet metal frame for a door, comprising a profiled sheet metal frame, a hinge portion and a spacer plate for positioning between the hinge portion and the sheet metal frame.

BACKGROUND ART

[0002] The use of metal door frames has per se long been known in the art. In a manner corresponding to that for wooden door frames, one half of each one of the hinges employed to suspend the door is secured in the frame, while the other half of the hinge is disposed on the door leaf. The method of securing the hinge half to the frame differs however from the method of fixing in a wooden door frame. The planar portion of the hinge portion, the plate, is inserted in an aperture in the frame. The aperture is placed so that an exact positioning of the hinge portion is achieved, so that the door may be suspended and used without difficulty and without excessively large apertures between door and door frame.

[0003] On the inside of the metal frame, i.e. that side which is secured against the wall and is concealed in daily use, a spacer plate is placed between the frame and the inserted plate of the hinge portion. The spacer plate ensures that the plate of the hinge is positioned at a determined distance from the inside of the door frame, and as a result the hinge is stabilised. The hinge portion is provided with threaded holes so that screws may be passed in through corresponding, non-threaded holes in the door frame and spacer plate, respectively, and be secured in the hinge portion. With the aid of the screws and the threads in the hinge portion, the latter will be drawn towards the frame and fixedly clamp the spacer plate between the hinge portion and the inside of the door frame.

[0004] One problem inherent in this prior art solution is that it has not been sufficiently strong and reliable. When vibrations occur on repeated closing and opening of the door leaf, it may happen that the screws which hold the hinges in place loosen, with the result that the hinge plate twists out of its position because of loading from the door leaf. This entails that the door function is no longer intact, at the same time as both hinge, frame and door leaf risk being damaged. In order to be able to retro-tighten the screws, it is then necessary that the door leaf be lifted off the hinges and realigned before tightening can take place. This is often neglected for reasons of convenience. Instead, the construction is often the subject of complaint to the supplier occasioning undesirable costs for the supplier. It might possibly be conceivable to replace the screws by welding of the hinge. However, this has proved to be less desirable, since it renders impossible any replacement of the hinge at a later stage, which restricts future repairs and the possibility of adapting the hinge to different types of doors. Surface treatment of the frame may also be impeded by a prefixed, welded hinge.

PROBLEM STRUCTURE

[0005] There is thus a need in the art to be able to realise a more reliable fixing of the hinge, at the same time as it is still possible to release and replace the hinge.

SOLUTION

[0006] The object forming the basis of the present invention will be attained if the device intimated by way of introduction is characterised in that both the sheet metal frame and the spacer plate as well as the hinge portion include positioning means for mutual positioning of the three components.

[0007] Further advantages will be attained if the device according to the present invention is moreover given any one or more of the characterising features as set forth in appended Claims 2 to 8.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0008] The present invention will now be described in greater detail hereinbelow, with reference to the accompanying Drawings. In the accompanying Drawings:

- Fig. 1 is a perspective view of the inside of a frame with a hinge which is mounted according to the present invention;
- Fig. 2 is a perspective view in detail of the frame before the spacer plate and the hinge portion have been mounted;
- Fig. 3a is a perspective view of the side of the spacer plate turned to face towards the door frame;
- Fig. 3b is a view corresponding to that of Fig. 3a of the opposing side of the spacer plate;
- Fig. 4 is a perspective view of the hinge portion included in the present invention; and
- Fig. 5 is a sectional view through the frame, the spacer plate and the hinge in the region of a fixing hole.

DESCRIPTION OF PREFERRED EMBODIMENT

[0009] Fig. 1 shows in perspective a door frame 1 which is manufactured from sheet metal, which may be steel sheet or any other type of sheet. The frame 1 is bent with mutually substantially parallel bends, so that it has been

given a certain profile, which makes possible fixing against a wall which lies adjacent an opening for a door 2. The frame 1 is shown in Fig. 1 obliquely from the inside, i.e. that wall on which it is intended to be mounted has been omitted from the Figure. On the other hand, the door 2 which is intended to be positioned in the opening surrounded by the door frame 1 is schematically visible in Fig. 1. The door frame 1 which is of sheet, is often employed together with safety doors, which are intended to afford improved burglary protection, or together with other doors which are classified to meet fire or noise standards. When the door 2 is closed, only the barrel of the hinge and a limited part of the plate of the hinge 3 are accessible exteriorly. If the door 2 is open, only those screws which retain the hinge plate 3 in the frame 1 are accessible, but neither the hinge plate 3 nor the spacer plate 9 which is disposed between the hinge plate 3 and the inside of the frame 1 are accessible exteriorly.

[0010] Thus, Fig. 1 shows the frame 1, the door 2, the hinge plate 3, the spacer plate 9 and a slot 20 through which the hinge plate 3 extends from the outside of the frame 1 to its inside. That part of the hinge which is secured in the frame 1 is the lower half 19 of the hinge, so that the door 2 may be suspended in the hinge butt or spindle in each respective hinge in the frame 1. The alignment of the hinge portion is such that the barrel of the hinge extends outside the frame 1 at such a distance that the door 2 may readily be suspended, but that the distance between the door 2 and the frame 1 is as limited as possible.

[0011] In addition, the frame has holes 4 for securing in the wall around the door aperture and holes 5 for aligning and positioning of the frame 1.

[0012] The hinge plate 3 has two holes 6 which are employed for fixing the hinge plate 3 in the frame 1. In the preferred embodiment, these holes 6 are the upper and lower hole, respectively, in Fig. 1. Between the two fixing holes 6 there is a further hole 7 in which a stub shaft for lift prevention is fixable. Such a stub shaft is fixable in the hinge plate 3, since all holes 6, 7 are threaded. A lift guard is quite simply a stub shaft which extends from the frame 1, transversely thereof, and into a recess provided for this purpose in the edge of the door 2. Since a lift guard is provided, a locked door cannot be forced by attacking the hinges and lifting the door away from them. Thus, the lift guard is one element in realising burglary protection. Positioning means in the form of recesses 8 are disposed at two of the edges of the hinge plate 3. In the preferred embodiment, the recesses 8 are substantially rectangular and open out towards the edges of the hinge plate 3. The recesses 8 cooperate with corresponding positioning means in the form of projections 10 which extend out of the plane of the spacer plate 9. By placing the projections 10 in the recesses 8, the hinge plate 3 will be positioned in the plane in relation to the spacer plate 9. This implies that the hinge plate 3 cannot be displaced in the lateral or vertical direction in the plane in relation to the spacer plate 9, nor is it possible to rotate the hinge plate 3 in relation to the spacer plate 9 about any axis which extends transversely of the hinge plate 3 and the spacer plate 9.

[0013] Fig. 2 shows in detail the inside of the frame 1 in the region of the mounting of the hinge plate 3. The frame 1 has, in this region, three holes 11, 13, substantially corresponding to the holes 6, 7 in the hinge plate 3 as shown in Fig. 1. Two of the holes 11 are fixing holes and, in the preferred embodiment, they are the upper and lower, respectively, of the three holes 11, 13. The fixing holes 11 have inwardly opening collars 12 extending about them. The purpose of the collars 12 is to cooperate with the spacer plate 9 for a predetermined positioning thereof in one plane. The collars 12 also function for realising a countersink in the frame 1 of the anchorage screws which are screwed in from outside through the holes 11 into mesh with the threads in the fixing holes 6 of the hinge 3.

[0014] The positioning is ensured in that at least two of the holes are provided with collars 12 in order to prevent the hinge plate 3 from being rotated about only one of the collars 12. Per se, it is not impossible that the intermediate hole 13 in the frame 1, i.e. the hole which is intended for screwing in of a lift guard in the hinge plate 3 could also be provided with a collar. However, it is sufficient that two of the holes 11 in the frame 1 have collars 12, in order to make it possible to prevent rotation of the spacer plate 9.

[0015] Fig. 3a shows the spacer plate 9 with that side abutting against the frame 1 being visible. The spacer plate 9 has two holes 14 through which the fixing screws are intended to extend for anchorage in the fixing holes 6 of the hinge plate 3. These holes 14 have bevels 16 around their edges, which implies that they fit snugly together with the corresponding collars 12 on the inside of the frame 1. The spacer plate 9 also has an intermediate hole 15 in order to permit any possible lift guard to extend therethrough, for fixing in the threaded hole 7 of the hinge plate 3.

[0016] By cooperation between the collars 12 on the frame 1 and the bevels 16, the spacer plate 9 will be stabilised in a predetermined position in relation to the frame 1 and its hole pattern. The spacer plate 9 cannot, thus, be moved either in the longitudinal direction of the frame 1 or transversely thereof in the plane. Nor can the spacer plate 9 rotate about any axis which extends transversely thereof.

[0017] The spacer plate 9 has an additional set of positioning means 10 in the form of a pair of upwardly bent projections 10. These projections are upwardly bent so that they extend substantially transversely of the major plane of extent of the spacer plate 9, and their height corresponds approximately to the sheet metal thickness of the hinge plate 3. This additional set of positioning means has for its purpose to cooperate with corresponding positioning means on the hinge plate 3 so that as exact a positioning as possible of the hinge plate in relation to the spacer plate 9 will be achieved. Since the

spacer plate 9 is, in its turn, positioned in relation to the frame 1, the hinge plate 3 will also be well positioned in relation to the frame 1.

[0018] Fig. 3b shows the spacer plate 9 from that side which is turned to face away from the frame 1 and on which the hinge plate 3 is intended to abut. This side has a substantially smooth surface, in which the three holes 14, 15 are provided, and the projections 10 are bent up.

[0019] Fig. 4 shows a hinge portion 19 according to the present invention in perspective. The hinge portion 19 has in largely conventional design with a hinge plate 3, a spindle or shaft 17 and a barrel 18. As was previously mentioned, the hinge plate 3 has three through-going holes, more precisely two holes 6 for fixing of screws and one hole 7 for possible fixing of a lift guard.

[0020] The two recesses 8 which operate as positioning means, are particularly clearly visible in Fig. 4. As was mentioned earlier, the two recesses 8 cooperate with projections 10 on the spacer plate 9 so that this is fixed in the plane against both rotation and displacement in the lateral direction. On the other hand, anchoring in the depth direction, transversely of the frame 1, the spacer plate 9 and the hinge plate 3 takes place with the aid of fixing screws which extend through the holes 11 in the frame 1, the holes 14 in the spacer plate 9 and are secured in the threaded holes 6 in the hinge plate 3. The positioning means 12, 16, 10, 8 take up the greater part of the loadings which occur on use of the door 2 which is suspended by the hinge 19. As a result, on the one hand the risk is reduced that the fixing screws through the holes 6, 11, 14 were to come loose and, if this were nevertheless to take place to some degree, the spacer plate 9 and the hinge plate 3 will be held in position in relation to the frame 1 to a considerable extent. As a result, the hinge 19 will, even though the screws have come loose, continue to be loaded in the intended manner and the risk of damage to the hinge 19, or quite simply failure, is in principle eliminated. As a result, the risk of related damage to the door 1 or the frame 1 is also reduced.

[0021] In one preferred embodiment, the tolerances on production of the recesses 8 in the hinge plate 3 are disclosed so that it is slightly easier to rotate the hinge 19 a very short distance in the plane in a direction which is opposite to that direction corresponding to a door being suspended on the hinge 19. This implies that the design and construction are stable on mounting and disposal of a door 2 on the hinge 19, while the limited play in the opposite direction facilitates the mounting operation.

[0022] Finally, Fig. 5 shows a sectional view through the frame 1, the spacer plate 9 and the hinge 19 in line with a set of fixing holes 6, 11, 14. In such instance, the collar 12 and the corresponding bevel 16 are clearly visible, at the same time as the projection 10 may be discerned above the plane of the hinge plate 3. It is also clear that the threads in the fixing holes 6 of the hinge plate 3 are readily accessible through the hole 11 in the frame 1 and the hole 14 in the spacer plate 9. The corresponding situation also applies to those holes 7, 13, 15 which are provided for mounting of any possible lift guard, even if a collar 12 were not to be provided around one of these holes.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

[0023] The present invention may be modified without departing from the scope of the appended Claims. Certain modifications appear natural and imply that there is no deviation from the inventive concept. Such adaptations are a modification of size by means of adaptation according to door type and the weight of the door, mirror reversement of hinges for realising left- and right-hand hung hinges and corresponding modifications to door frames so that both inwardly and outwardly opening doors may be realised. Whatever is preferred is to a very high degree dependent upon the market and dependent upon field of use.

[0024] Safety classification of doors may also result in modifications in choice of materials and dimensions.

[0025] A further type of modification which is intended to lie within the scope of the present invention is that the functions of the cooperating positioning means may be reversed, i.e. the collar 12 and the bevel 16 change place with one another. Correspondingly, the projections 10 and the recesses 8 may also change place with one another.

[0026] The present invention may be further modified without departing from the scope of the appended Claims.

Claims

1. A device for fixing a hinge portion (3) in a sheet metal frame (1) for a door, comprising a profiled sheet metal frame (1), a hinge portion (19) and a spacer plate (9) for positioning between the hinge portion (3) and the sheet metal frame (1), **characterised in that** both the sheet metal frame (1) and the spacer plate as well as the hinge portion (3) include positioning means (8, 10; 12, 16) for mutual positioning of the three components (1, 3, 9).

2. The device as claimed in Claim 1, **characterised in that** the sheet metal frame (1) and the hinge portion (3) include at least one set of positioning means (12, 8) each, and the spacer plate (9) includes at least two sets of positioning means (10, 16).

3. The device as claimed in Claim 1 or 2, **characterised in that** the sheet metal frame (1) includes two or more holes (6, 7), and that the positioning means (12) of the sheet metal frame (1) include collars around at least two of the holes (6).

4. The device as claimed in Claim 3, **characterised in**

that the spacer plate (9) includes at least two holes (14, 15) whose edges (16) are bevelled for positioning cooperation with the collars (12) of the sheet metal frame (1).

5. The device as claimed in any of Claims 1 to 4, **characterised in that** the positioning means of the hinge portion (3) include at least two recesses (8) in the hinge portion (3).

6. The device as claimed in Claim 5, **characterised in that** the spacer plate (9) includes at least two projections (10) for positional cooperation with the recesses (8) in the hinge portion (3).

7. The device as claimed in Claim 5 or 6, **characterised in that** the recesses (8) are disposed at the edges of the hinge portion (3).

8. The device as claimed in any of Claims 1 to 7, **characterised in that** the hinge portion (3) includes threaded holes (6) for screws which are disposed, in their longitudinal direction, to hold the sheet metal frame (19), the spacer plate (9) and the hinge portion (3) in mutual abutment against one another.

Fig 1

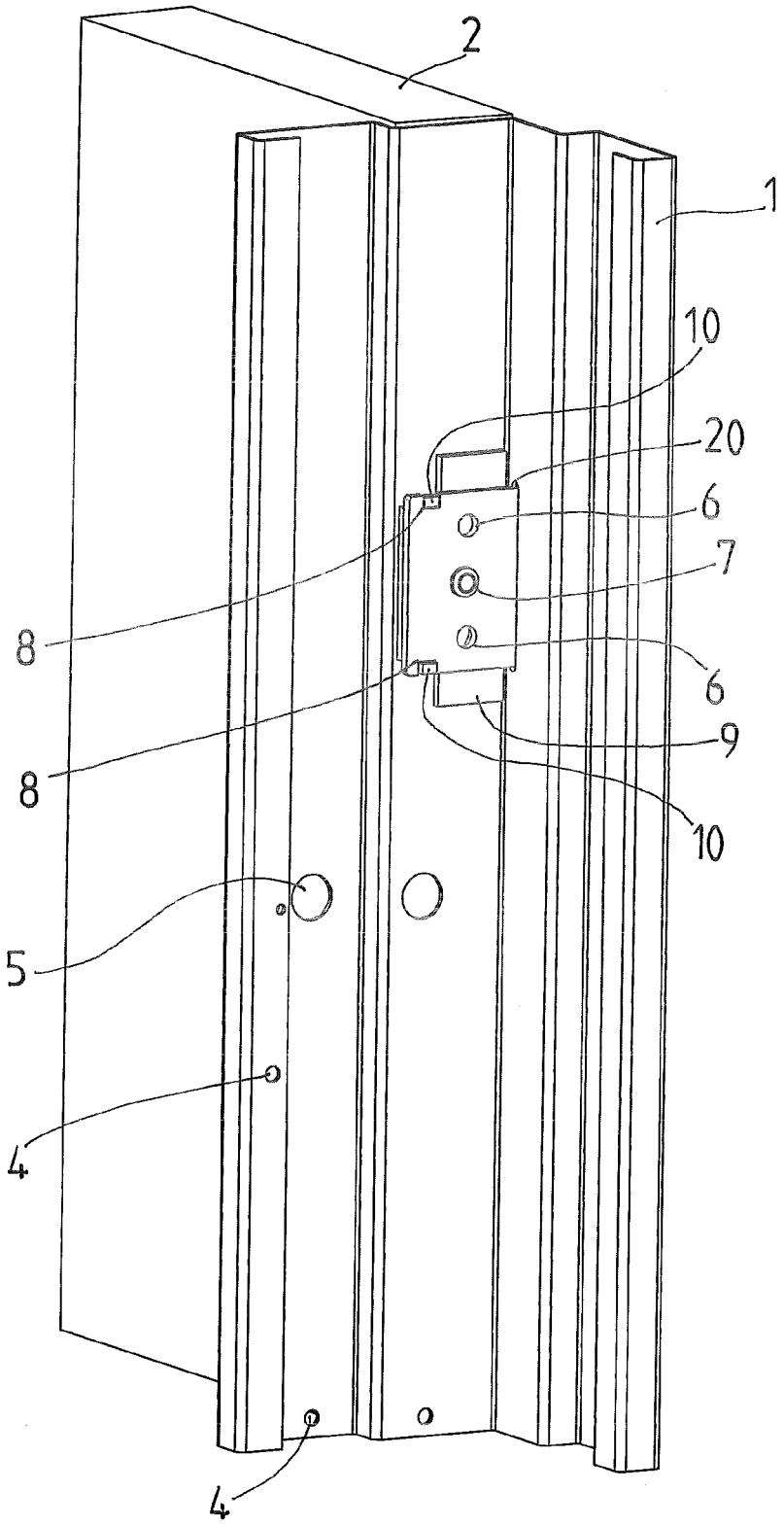

Fig 2

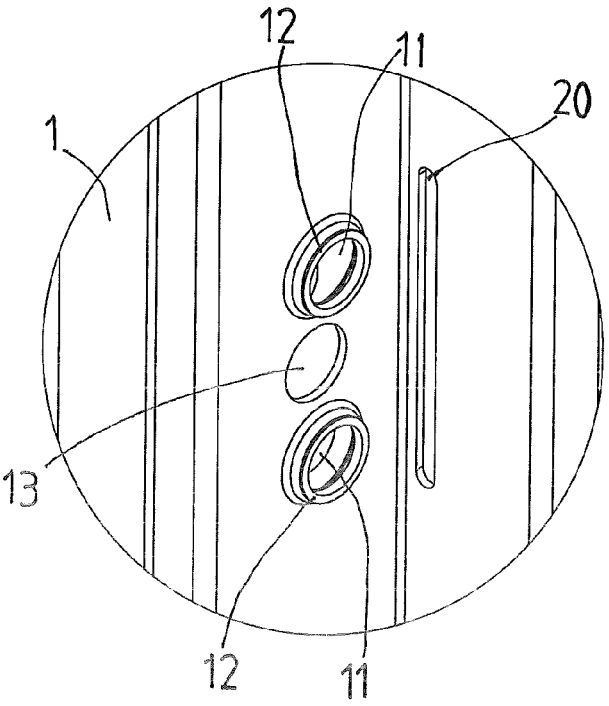

Fig 3a

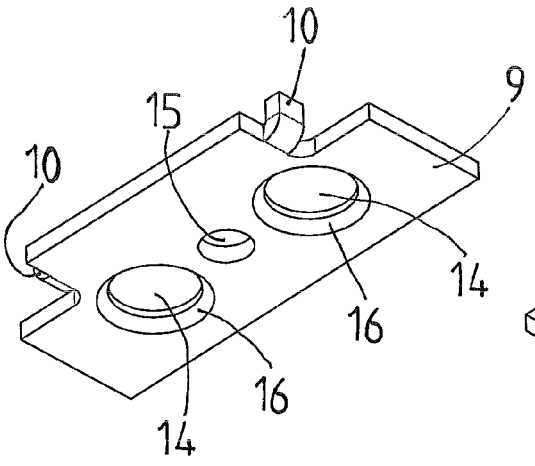

Fig 3b

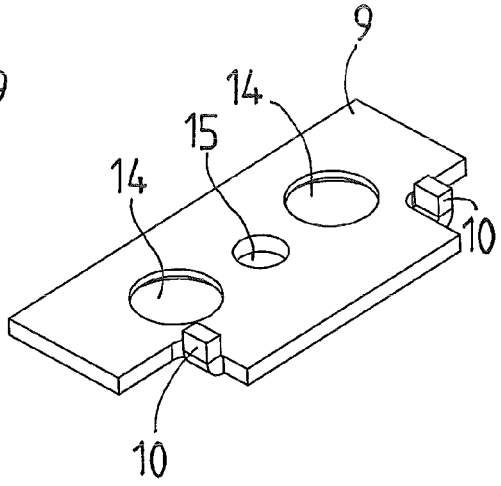

Fig 4

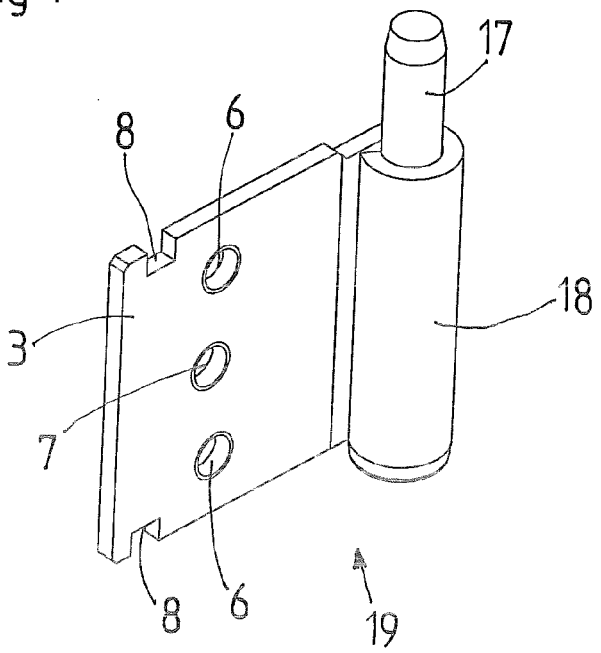

Fig 5