



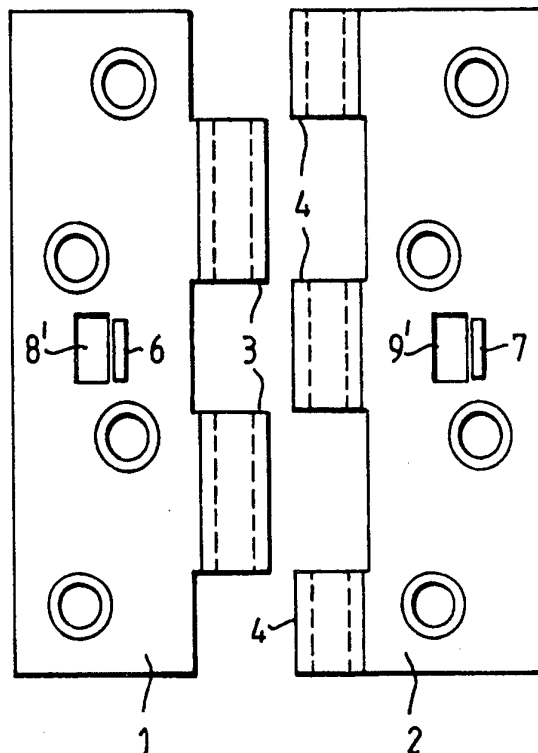
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB94/02060</p> <p>(22) International Filing Date: 21 September 1994 (21.09.94)</p> <p>(30) Priority Data: 9319823.2            23 September 1993 (23.09.93)    GB 9407227.9            12 April 1994 (12.04.94)        GB</p> <p>(71) Applicant (for all designated States except US): NICO MANUFACTURING LTD. [GB/GB]; 109 Oxford Road, Clacton-on-Sea, Essex CO15 3TJ (GB).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): RAWLINSON, Richard, John [GB/GB]; 100 Thorpe Road, Clacton-on-Sea, Essex CO15 4NT (GB).</p> <p>(74) Agent: GILL JENNINGS &amp; EVERY; Broadgate House, 7 Eldon Street, London EC2M 7LH (GB).</p>		<p>(81) Designated States: GB, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: HINGE

## (57) Abstract

In a butt hinge, an upstanding member (6, 7) is provided on each of the opposing inner surfaces of the two hinge plates (1, 2). The upstanding members are positioned to overlap when the hinge is closed with each member projecting into a recess or aperture in the opposing plate. In use, if the pin (5) is removed and the plates partially separated, one member engages the other to hold the plates against separation by relative movement in the plane generally parallel to the plates.



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HINGEBACKGROUND TO THE INVENTION

The present invention relates to a hinge, and in particular to a hinge designed to offer increased security when fitted, e.g. to a door or window.

Hinges commonly comprise a pair of plates provided with hollow cylindrical extensions on their abutting longitudinal edges. The hollow cylindrical extensions in combination form the eye of the hinge. To complete the hinge, a pivot pin is inserted through the eye. In use, one of the plates is fixed, for example, to a door frame and the other of the plates to an inner edge of the door.

It is sometimes convenient to form hinges of this sort with a free pin. In this case the two parts of the hinge can be fixed separately to the structural members which are to be hinged together and the pin dropped in place once those two members have been assembled. In the case of a door, for example, this facilitates the process of construction since the hinges can be pre-fitted off-site. It also makes it a simple matter to remove the door from the doorframe, for example when redecorating.

The pivot pin represents a significant weakness from the point of view of security. If a door is mounted using, e.g., a butt hinge having a free pin, then someone wishing to force entry can do so simply by removing the pin and lifting the door out of the frame. Even where the hinge is constructed so that the pin is captive to the hinge, it is still in general possible to force the pin out to allow separation of the two parts of the hinge.

In view of these known weaknesses in hinges, it has previously been proposed to construct a hinge which has a stud on one of the fixing plates which, when the hinge is closed, engages an aperture in the opposing plate. Examples of such hinges are disclosed in GB-A-1402487. Although this provides some resistance to movement as long as the plates are in close contact, as soon as the plates

are separated by more than the depth of the plate it again becomes possible to separate the two parts by moving one away from the other in the plane generally parallel to the plates. As an alternative approach, it has also been  
5 proposed to provide one of the plates with a projection which extends through an aperture in the opposing plate and on into a corresponding recess machined, for example, in the doorframe. However, this construction has not found commercial acceptance. The need to machine an aperture in  
10 the frame accurately aligned with the projection on the hinge makes the fitting of the hinge undesirably complex and time consuming. GB-A-2164089 discloses a hinge construction in which a projecting surface formed in one plate abuts a recessed surface in the other plate. Again  
15 this suffers the disadvantage of requiring a specially machined slot to accept the recessed surface.

#### SUMMARY OF THE INVENTION

According to the present invention a hinge comprising  
20 a pair of hinge plates and formations extending from opposing inner surfaces of the hinge plates, the formations inter-engaging to hold the hinge plates against separation in the closed position of the hinge by relative movement in the plane generally parallel to the plates, is  
25 characterised in that the formations comprise at least one pair of upstanding members, the upstanding member on each hinge plate extending towards the other hinge plate in the closed position and overlapping the other upstanding member.

30 The present invention provides a hinge offering greatly increased security without adding significantly to the cost of manufacture. The hinge remains simple to fit. The construction of the hinge is such that the two hinge plates need to be separated by a distance as great as the  
35 combined heights of the two upstanding members before it becomes possible to separate the plates by moving one past the other. In practice, in most situations where the hinge

might be fitted, there is insufficient play to allow this degree of movement and so the hinge remains secure even after the pin has been removed. A further important advantage of the present invention is that it allows the use of a free-pin construction without compromising security.

Preferably the upstanding members are tags formed integrally with the respective plates. Preferably each tag is formed by cutting a region of the plate and pressing it so that it extends generally at right angles to the plate.

Preferably the aperture in at least one plate for receiving the tag on the other plate is provided by the region cut away to form the tag on the at least one plate.

Preferably the apertures are both so formed, with the aperture on a first plate being formed on the side of the tag on the first plate away from the eye of the hinge and the aperture on the second plate being formed on the side of the tag on the second plate nearer the eye of the hinge, when the hinge is closed the tag on the first plate lying nearer the eye of the hinge than the tag on the second plate, in use the said first plate being fixed to a fixed structural member, such as a doorframe, and the second plate being fixed to a movable member, such as a door. Although described above in the context of a hinge, the upstanding inter-engaging tags can be used independently of the hinge to provide a security fitting or "dog bolt" suitable for a variety of applications.

According to a second aspect of the present invention a security fitting suitable for a door or window comprising a pair of plates arranged to be fixed to respective surfaces, and formations extending from opposing inner surfaces of the plates, the formations inter-engaging to hold the plates against separation by relative movement in the plane generally parallel to the plates in the closed position of the door or window and

is characterised in that the formations comprise a pair of upstanding members, the upstanding member on each

plate extending towards the other plate in the closed position of the door or window and overlapping the other upstanding member.

The present invention also encompasses methods of  
5 manufacture for the hinge and fitting of the first and second aspects.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be  
10 described in further detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is an exploded view;

Figure 2 is an end view;

Figure 3 shows the hinge fitted to a door;

15 Figure 4 is a view of the hinge plates of a second embodiment;

Figure 5 is an end view of the hinge of Figure 4;

Figures 6a and 6b are a dog bolt embodying the invention fitted to a door and a perspective view of one of  
20 the two plates making up the dog bolt respectively; and

Figures 7a to 7d are a plan view, end view, side view, and sectional view in a closed position of a third embodiment of a security hinge.

#### 25 DESCRIPTION OF EXAMPLES

A butt hinge comprises a first hinge plate 1 and a second hinge plate 2 each having extensions 3, 4 on their respective inner longitudinal edges. The extensions 3, 4 are bent over to form bearing surfaces of a generally  
30 hollow cylindrical shape. In use, the two hinge plates 1, 2 are brought together with their inner longitudinal edges abutting and the respective extensions interleaved to form the eye of the hinge. A pivot pin 5 is then inserted through the eye of the hinge.

35 In the present example the hinge is formed of mild steel 2mm thick. The process of manufacture takes as its raw material steel coil strip of a width corresponding to

the desired width for the hinge. The strip is fed from a loading cradle into a blanking press which in a single operation presses from the blank the two hinge plates complete with the extensions 3,4, a number of countersunk screw holes and the apertures and tags 6,7,8,9. After each blanking operation the strip is indexed by a distance corresponding to the desired length for the hinge. The extensions are rolled to form the eye of the hinge. The two plates are then assembled and, in the case of a captive pin hinge, the pin inserted and the head of the pin spun. The tags are then bent upwards to lie at right angles to the plates.

When the hinge is used, for example, to mount a door to a doorframe, the first plate is screwed to the inside edge of the door and the second plate is screwed to an opposing surface of the doorframe, as seen in Figure 3.

As discussed in the introduction above, hitherto, with conventional butt hinges it has been possible to force entry through a locked door by removing the pivot pins from the hinges and then separating the two parts of the hinge, sliding the first hinge plate on the door past the fixed hinge plate on the frame in the direction marked by the arrow in the Figure. To prevent this, the presently described hinge includes on each plate an upstanding tag 6, 7 and an aperture 9, 10 for receiving the corresponding tag on the other plate. Alternatively a recess having a depth less than that of the plate might be used.

When the hinge is in the closed position shown in Figure 3 then the tags are located so that they overlap in the longitudinal direction and are positioned close to each other, but not necessarily touching, with the smaller tag on the second plate nearer the inner edge of the hinge. This smaller tag on the second plate is received within a specially cut aperture 10 in the first plate. The tag 6 on the first plate is received within the aperture 9 on the second plate formed in the process of cutting that plate's tag.

Using the construction described, if now an attempt is made to force the door by removing the pivot pin and separating the hinge plates, then engagement between the tags holds the plates against relative movement in the direction indicated in Figure 3. The hinge, and the door as a whole, therefore remain secure.

Although in this example the tags and apertures are placed centrally in the hinge plates, other positions, such as towards an upper edge of the hinge plates, are also possible. Equally, although the upstanding members are in this example formed as tags cut and pressed from the material of the plates other types of construction are also possible. For example, the tags might be formed as extensions on a screw fitting attached to each plate.

Figures 4 and 5 show a second and preferred embodiment. In this embodiment, each of the hinge plates has a tag and an aperture 8', 9' formed by the process of cutting and pressing the tag. When the hinge is closed the tag on one plate projects into the aperture on the other plate. On one plate the aperture is on the side of the tag nearer the eye of the hinge, and on the other plate the aperture is on the side away from the eye of the hinge.

Although described above with respect to a butt hinge, the present invention may also be used with other hinge constructions, such as the "invisible" hinges described in GB-A-1402487.

Figures 7a to 7c show a third example of a hinge embodying the present invention. For clarity, the hinge pin is omitted from these views. In this example, a pair of upstanding tags 6a, 6b, 7a, 7b are provided on each hinge plate. The use of two pairs of inter-engaging tags further increases the strength of the hinge and its ability to resist attempts to force the hinge apart.

One example of a dog bolt embodying the second aspect of the present invention is shown in Figures 6a and 6b below. In this example, the two identical plates making up the dog bolt are attached respectively to inner surfaces of

a door frame and a door. They are configured so that with the door closed the tag on each of the bolt members extends into the aperture on the opposing bolt member. The inter-engagement of the upstanding tags on the bolt members holds  
5 the door against being lifted out of the frame, even after an external hinge has been removed.

CLAIMS

1. A hinge comprising a pair of hinge plates (1,2) and formations (6,7) extending from opposing inner surfaces of the hinge plates, the formations inter-engaging to hold the hinge plates against separation in the closed position of the hinge by relative movement in the plane generally parallel to the plates characterised in that the formations (6,7) comprise a pair of upstanding members, the upstanding member on each hinge plate extending towards the other hinge plate in the closed position and overlapping the other upstanding member.
2. A hinge according to claim 1 including a recess or aperture (8,9) formed in each hinge plate for receiving the upstanding member projecting from the opposing hinge plate.
3. A hinge according to any preceding claim, in which the upstanding members are tags formed integrally with the respective plates.
4. A hinge according to Claim 3, in which an aperture on at least one plate for receiving the tag on the other plate is provided by the region cut away to form the tag on the at least one plate.
5. A hinge according to Claim 4, in which each tag is formed by cutting a region of the plate and pressing it so that it extends generally at right angles to the plate.
6. A hinge according to Claim 4 or 5, in which apertures on both plates are provided by regions cut away to form the tags, the aperture on a first plate being formed on the side of the tag on the first plate away from the eye of the hinge, and the aperture on the second plate being formed on the side of the tag on the second plate nearer the eye of the hinge, when the hinge is closed the tag on the first plate lying nearer the eye of the hinge than the tag on the

second plate, in use the said first plate being fixed to a fixed structural member such as a doorframe, and the second plate being fixed to a movable member, such as a door.

5 7. A hinge according to any one of the preceding claims including a free hinge pin (5) which, in use, is inserted in the hinge after the fixing of the hinge plates, thereby holding the plates together.

10 8. A security fitting suitable for a door or window comprising a pair of plates (61,62) arranged to be fixed to respective surfaces, and formations (63,64) extending from opposing inner surfaces of the plates, the formations inter-engaging to hold the plates against separation by  
15 relative movement in the plane generally parallel to the plates in the closed position of the door or window and

characterised in that the formations (63,64) comprise a pair of upstanding members, the upstanding member on each plate extending towards the other plate in the closed  
20 position of the door or window and overlapping the other upstanding member.

9. A fitting according to claim 8, in which each tag is formed by cutting a region of the respective plate and  
25 pressing it so it extends generally at right angles to the plate.

10. A fitting according to claim 9, in which an aperture on at least one plate for receiving the tag on the other  
30 plate is provided by the region cut away to form the tag on the said at least one plate.

11. A dog bolt comprising a security fitting according to any one of claims 8 to 10.

35

12. A method of manufacturing a hinge comprising:  
forming a pair of hinge plates:

locating an upstanding member on each of the hinge plates with the upstanding member on each plate extending towards the other hinge plate in the closed position of the hinge and positioned to overlap the upstanding member  
5 located on the other hinge plate in the said closed position, thereby holding the hinge plates against separation by movement in the plane generally parallel to the plates; and

linking the plates together.

10

13. A method according to claim 12, in which the upstanding members are formed by cutting and pressing a region of each respective hinge plate to produce an upstanding tag, at least one of the apertures thereby  
15 formed in a hinge plate serving to receive the tag extending from the other hinge plate in the closed position.

14. A method of manufacturing a security fitting  
20 comprising:

forming a pair of plates:

locating an upstanding member on each of the plates with the upstanding member on each plate extending towards the other plate in the closed position of the fitting and  
25 positioned to overlap the upstanding member located on the other plate in the said closed position, thereby holding the plates against separation by movement in the plane generally parallel to the plates.

30 15. A method according to claim 14, in which the upstanding members are formed by cutting and pressing a region of each respective plate to produce an upstanding tag, at least one of the apertures thereby formed in a plate serving to receive the tag extending from the other  
35 plate in the closed position.

Fig.1.

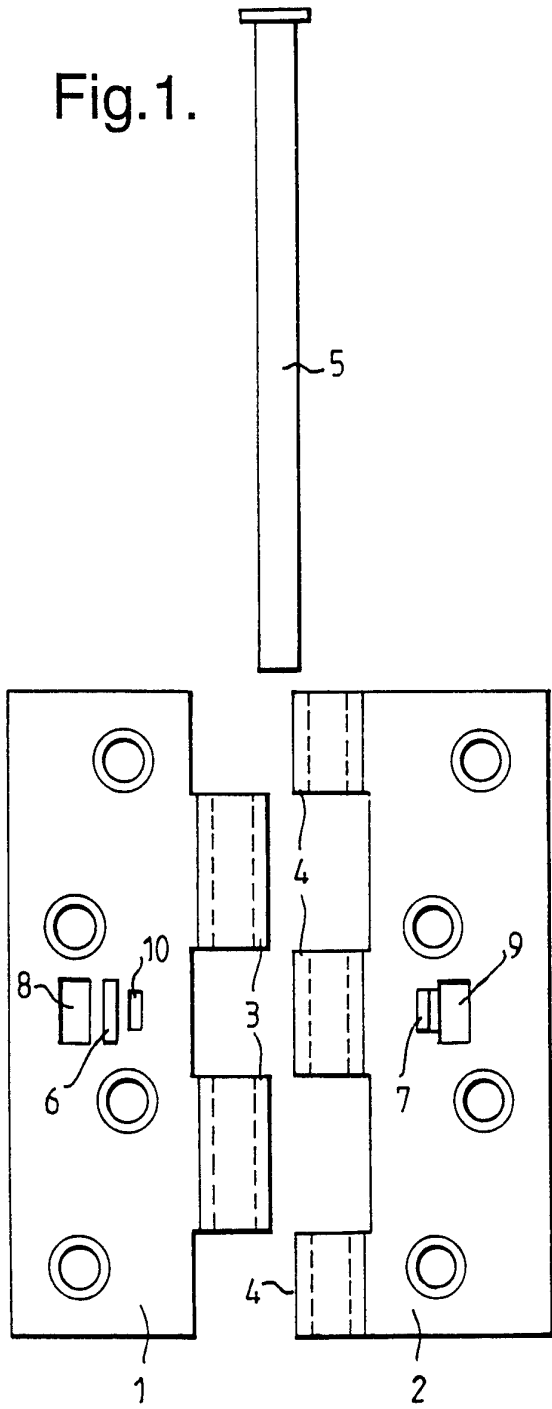


Fig.4.

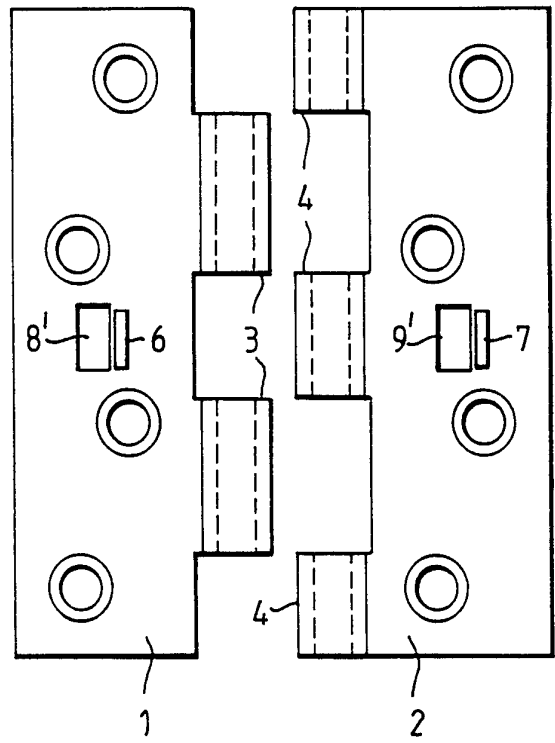


Fig.2.

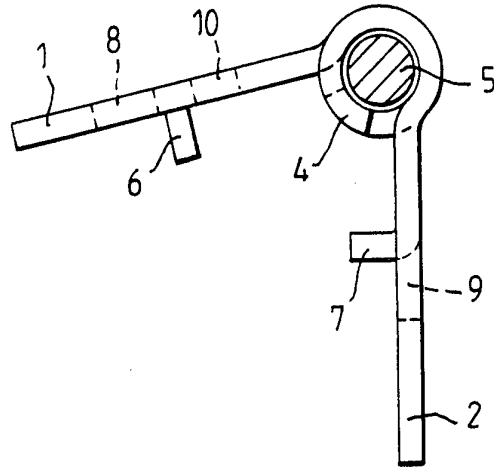


Fig.3.

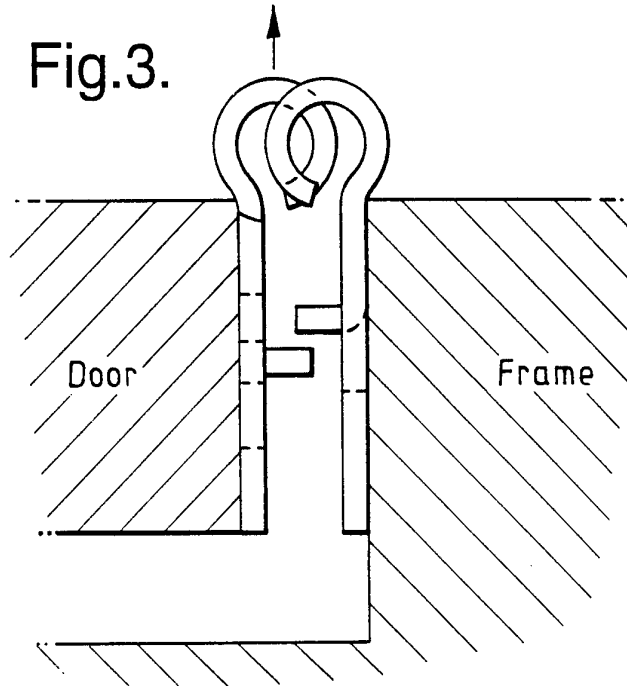


Fig.5.

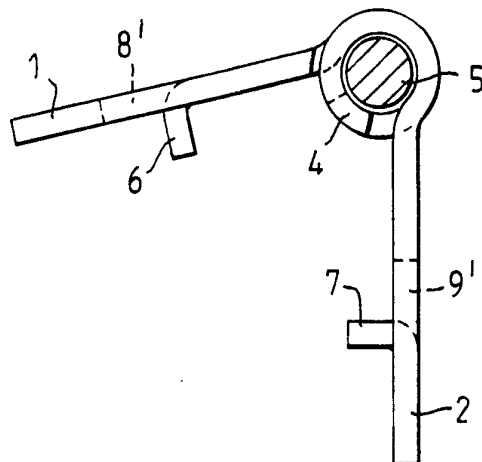


Fig.6a.

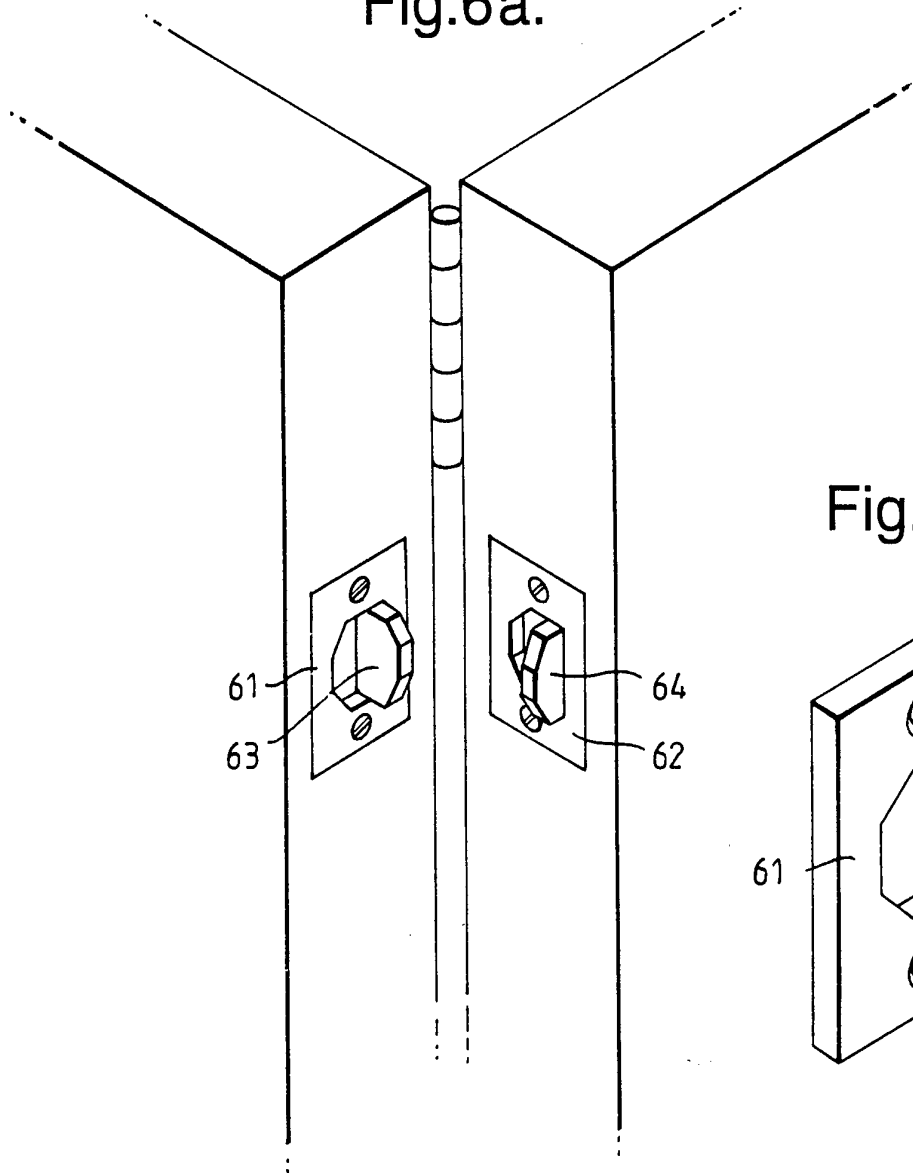


Fig.6b.

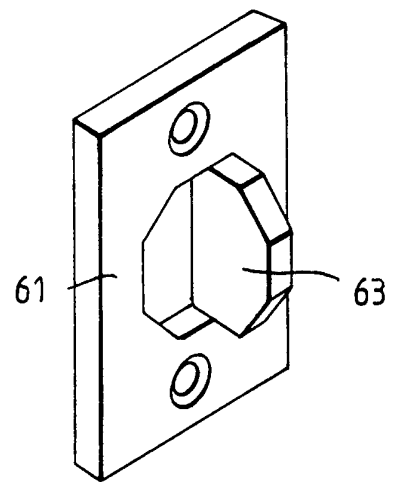


Fig.7a.

Fig.7b.

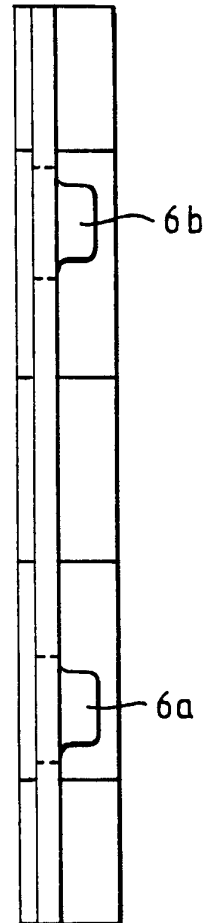
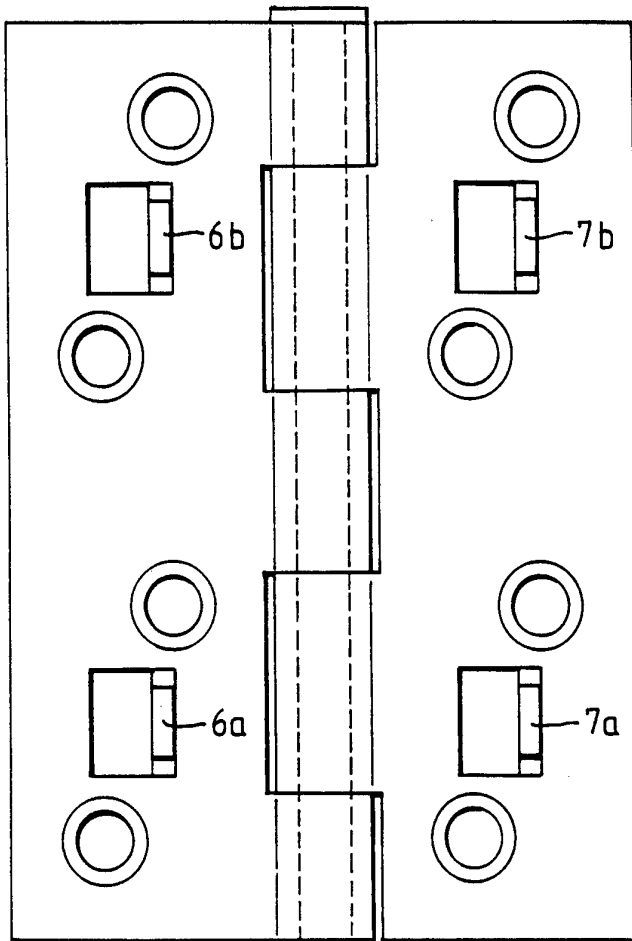


Fig.7c.

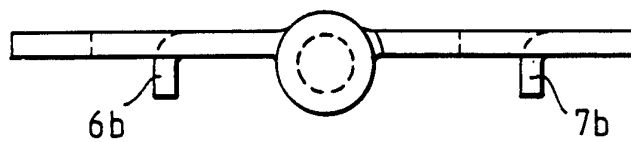
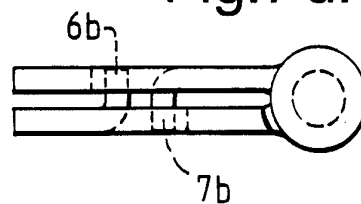


Fig.7 d.



## INTERNATIONAL SEARCH REPORT

 International Application No  
 PCT/GB 94/02060

 A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 6 E05D11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

 Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,2 571 633 (VOGEL) 16 October 1951	1,3,7,8, 11,12,14
Y	see column 1, line 40 - column 2, line 43; figures 1-4	2,4-6,9, 10,13,15
Y	--- US,A,1 412 875 (KNUTH) 18 April 1922  see page 1, line 94 - line 111; figures 6,7	2,4-6,9, 10,13,15
A	--- US,A,2 526 209 (DURUP) 17 October 1950 see column 3, line 27 - line 37; figures 6-9	1,6,8
A	--- DE,A,28 45 938 (FA. KARL FLIETHER) 30 April 1980 see claim 1; figures 1-7 -----	8-11,14, 15

 Further documents are listed in the continuation of box C.

 Patent family members are listed in annex.

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Date of the actual completion of the international search

7 December 1994

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 94/02060

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-2571633		NONE	
US-A-1412875		NONE	
US-A-2526209		NONE	
DE-A-2845938	30-04-80	NONE	