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<p>(21) International Application Number: PCT/US94/13302</p> <p>(22) International Filing Date: 18 November 1994 (18.11.94)</p> <p>(30) Priority Data: 08/155,123 19 November 1993 (19.11.93) US</p> <p>(71) Applicant: FEDERAL-HOFFMAN, INC. [US/US]; 900 Ehlen Drive, Anoka, MN 55303-7504 (US).</p> <p>(72) Inventors: JEGERS, Viktor, J.; 9948 Windsor Terrace, Eden Prairie, MN 55347 (US). LAU, Robert, G.; 3428 West Mineral Pond Boulevard, Anoka, MN 55303 (US). SWAN, David, A.; 5545 Asbury Street, Shoreview, MN 55126 (US).</p> <p>(74) Agent: BRUESS, Steven, C.; Merchant, Gould, Smith, Edell, Welter & Schmidt, 3100 Norwest Center, 90 South Seventh Street, Minneapolis, MN 55402 (US).</p>		<p>(81) Designated States: CA, JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: HINGE SYSTEM</p>		
<p>(57) Abstract</p>		
<p>A hinge includes a first leaf member (12) with a pair of knuckles (20) receiving a hinge pin (14) therethrough. The knuckles (20) include a retainer member (22) which extends into the path of the pin. Annular grooves (38, 40) formed in the pin (14) receive the retainer member (22) to keep the pin from easily sliding in and out of the hinge. One of the grooves (40) includes a straight side (44) and a tapered side (46) while the second groove (38) includes a pair of tapered sides (42) for allowing the retainer member to slide over the second groove (38) but not over the first groove (40). In this manner, the pin (14) may not be forced beyond the retainer member (22) and is held in place even when pulled out of the first knuckle for removing secondly.</p>		

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HINGE SYSTEM**BACKGROUND OF THE INVENTION**1. Field of the Invention

The present invention relates to a hinge, and
5 in particular to a self retaining hinge having a single
piece hinge leaf.

2. Description of the Prior Art

Hinges having a hinge body and a pin inserting
therein are well known. Hinges having a pin retaining
10 feature provide advantages as the pin may be removed for
several reasons, such as to remove a leaf, or to remove
a cover or door. However, when the pin is removed, it
may be easily misplaced or lost. Therefore, it is
advantageous to provide a hinge which allows the pin to
15 be slid out from the hinge body to allow separation of
the two portions pivoting about the hinge, but still
retains the pin.

Attempts to prevent inadvertently removal of a
pin are shown in U.S. Patent 1,979,894 to Hart.
20 However, the hinge does not hold the pin in position
once it is removed from the retaining position. In
addition, the hinge requires additional elements other
than the hinge body for retaining the pin. U.S. Patent
2,817,871 to Ferry also shows a hinge with pin retaining
25 properties, but does not provide for retaining the pin a
position to release one of the leaves. The hinge does
not provide for reversing the pin and still have a
retaining feature function in a proper manner.

It can be seen then that an improved hinge is
30 needed which provides for retaining the pin when it is
fully assembled or when the two leaves are separated.
Such a hinge should also provide for providing flexible
assembly so that the pin may be reversed while properly
retaining the pin. The present invention addresses
35 these and other problems associated with hinges.

SUMMARY OF THE INVENTION

The present invention is directed to a hinge
which provides for removing a pin from a retaining

position for separation while retaining the pin. A hinge includes a main body portion and a leaf portion which are connected with a removable pin. The pin is retained by knuckles on the main body portion and the leaf portion. The hinge main body portion includes a pair of knuckles which have retaining members formed therein. The retaining members are biased toward the pin and engage annular grooves formed in the pin. The pin has a first groove which has tapering sides and a second groove which has one straight side and one tapered side. With this configuration, the pin may be inserted in a first direction and slid with the retaining portion sliding over the tapered sides. However, when the retaining member engages the straight side of the second groove, the straight side abuts the member and cannot be slid further.

When the pin is pulled out from the engaged position, the leaf member may be separated from the main body portion of the hinge. However, the retaining member of the second knuckle biases against the groove and retains the pin within one of the knuckles. Therefore, the pin is not misplaced or lost. When the leaf and main body portion are realigned, the pin may be easily slid back into place with the two portions pivoting about one another.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein like reference letters and numerals indicate corresponding elements throughout the several views:

5 Figure 1 shows a perspective view of a hinge according to the principles of the present invention;

 Figure 2 shows an exploded perspective view of the hinge shown in Figure 1;

10 Figure 3 shows a top plan view of the hinge body and pin shown in Figure 1;

 Figure 4 shows a side elevational view of the hinge pin;

 Figure 5 shows a sectional view of the hinge taken along line 5-5 of Figure 3; and

15 Figure 6 shows an end view of the hinge mounting a cover to a surface.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

20 Referring now to the drawings, wherein like reference numerals designate corresponding structure throughout the views, and referring in particular to Figure 1, there is shown a hinge, generally designated 10. The hinge 10 includes a main hinge body 12 pivoting with a leaf 16 about a pin 14. The components of the
25 hinge 10 may be made of brass or other suitable materials. The hinge body 12 includes a base 18 having mounting holes 50 formed therein for mounting the hinge body 12 to a surface. A support portion 24 extends upward from the base 18 and includes annular knuckles 20
30 configured to receive and surround the pin 14, as explained hereinafter. The knuckles 20 each include a portion which is cut out from the annular portion of the knuckle 20 and extending into the support portion 24. A
35 retainer member 22 is formed in the cut out portion and extends from the support portion 24 partially into the space which is enclosed by each knuckle 20, as also shown in Figure 4. The retainer member 22 may extend on

either side of the opening for the pins.

As shown most clearly in Figure 2, the leaf member 16 also includes a knuckle 28 and may be molded into a cover or other pivoting portion. It can be appreciated that many configurations and mounting methods for the leaf 16 may be utilized.

Referring now to Figure 4, the pin 14 is shown. The pin 14 includes a first end 30 with a tapered nose portion 32. At a second end 34, an enlarged pin removal portion 36 is configured to be gripped or pried to aid removal of the pin 14. Proximate the first end 30 are a first annular groove 38 and a second annular groove 40. The first annular groove includes a pair of tapering sides 42. The second annular groove 40 includes a straight side 44 nearer the first end 30 and extending radially outward. A second side 46 tapers radially outward nearer the second end 34.

The hinge pin 14 inserts through the knuckles 20 and 28 to pivotally connect the hinge body portion 12 to the leaf portion 16. When the pin 14 is inserted into a first knuckle 20, the first end 30 engages the retainer member 22. The tapered portion 32 forces the retainer portion 22 outward and allows the pin to slide by. In a similar manner, the retainer member 22 slides over the first annular groove 38 and its tapered side 42. The retainer 22 then slides over the second annular groove 40, as the retainer 22 slides over the straight side 44.

As the pin 14 slides through the leaf knuckle 28, the pin 14 engages the second knuckle 20. As with the first knuckle engaged, the retainer member 22 slides over the annular groove 38. At this point, the pin 14 is fully engaged, as shown in Figure 1. The retainer member 22 at the first end of the pin 30 rests in the annular groove 38. The pin 14 is prevented from being further inserted through the hinge body 12 as the

removal portion 36 abuts the knuckle 20.

To remove the pin 14, it is retracted from the hinge body toward the second end 34. The retainer 22 is easily pushed radially outward and slides over the
5 tapered side 42 of the annular groove 38. The pin 14 is slid further until the retainer member 22 on the knuckle
20 nearer the second end 34 of the pin is biased into the second annular groove 40. At this point the knuckle
28 is disengaged and the leaf member 16 may be separated
10 from the hinge body member 12.

The pin 14 may not be retracted further at this point as the retainer member 22 is resting in the second annular groove 40. Further pressure forces the side of the retainer member 22 against the straight side
15 44 of the second annular groove 40. This prevents further retracting movement of the pin 14 relative to the retainer 14. However, as the retainer member 22 is resting in the annular groove 40, the biasing force of the member is sufficient to retain the pin 14 from
20 sliding in either direction.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and
25 function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the
30 terms in which the appended claims are expressed.

WHAT IS CLAIMED IS:

1. A hinge, comprising:
 - (a) a hinge body, including a base and a riser portion, the riser portion extending upward from the base portion and supporting a plurality of knuckles forming an aligned tubular opening, wherein each knuckle includes a biasing portion extending partially into the tubular opening; and,
 - (b) a pin configured to fit through the tubular openings including a first tapered end and a first annular groove formed in the pin proximate the tapered end, the groove including a first straight side proximate the tapered end and a tapering side on the opposite side, and a second groove having tapered sides, wherein the biasing portions insert into the grooves.
2. A hinge according to claim 1, further comprising mounting means for mounting the hinge body to a surface.
3. A hinge according to claim 1, wherein the pin further comprises pin removal means for removing the pin from the hinge.
4. A hinge according to claim 1, wherein the biasing portions slide over the tapered groove sides and abut the straight side of the groove.
5. A hinge according to claim 4, further comprising pin removal means at a second end of the pin, wherein the removal means are larger than the tubular openings.

6. A hinge according to claim 1, further comprising a leaf portion including a knuckle intermediate two knuckles on the hinge body configured to receive the pin.

7. A hinge according to claim 1, wherein the biasing portions are integral with the hinge body.

8. A hinge, comprising:

(a) a hinge body, including a base and a riser portion, the riser portion extending upward from the base portion and supporting a plurality of knuckles forming a aligned tubular opening, wherein each knuckle includes a biasing portion extending partially into the tubular opening; and,

(b) a pin configured to fit through the tubular openings including a first tapered end and a first annular groove formed in the pin proximate the tapered end, the groove including a first straight side proximate the tapered end and a tapering side on the opposite side, and a second groove having tapered sides, wherein the biasing portions slide over the tapered groove sides and abut the straight side of the groove.

9. A hinge according to claim 8, wherein the pin includes an enlarged portion at a second end.

10. A hinge according to claim 8, further comprising a leaf portion including a knuckle intermediate two knuckles on the hinge body configured to receive the pin.

11. A hinge according to claim 8, wherein the biasing portions are integral with the hinge body.

12. A hinge body comprising a base and a riser portion, the riser portion extending upward from the base portion and supporting a plurality of knuckles, each of said knuckles forming a aligned tubular opening, and wherein each of said knuckles includes a biasing portion extending partially into the tubular opening.

13. A hinge according to claim 12, wherein the biasing portions are integral with the hinge body.

14. A hinge body according to claim 12, further comprising a leaf member including a leaf knuckle intermediate two knuckles on the hinge body configured to receive the pin.

Fig. 1

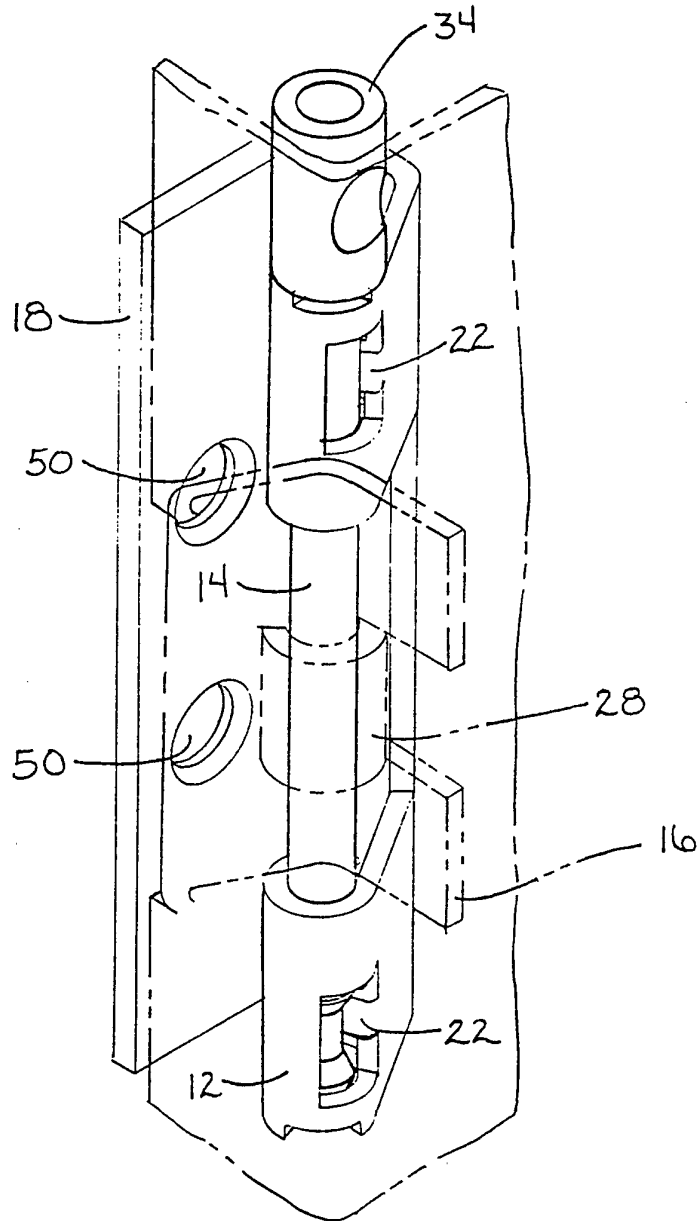
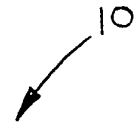


FIG. 2

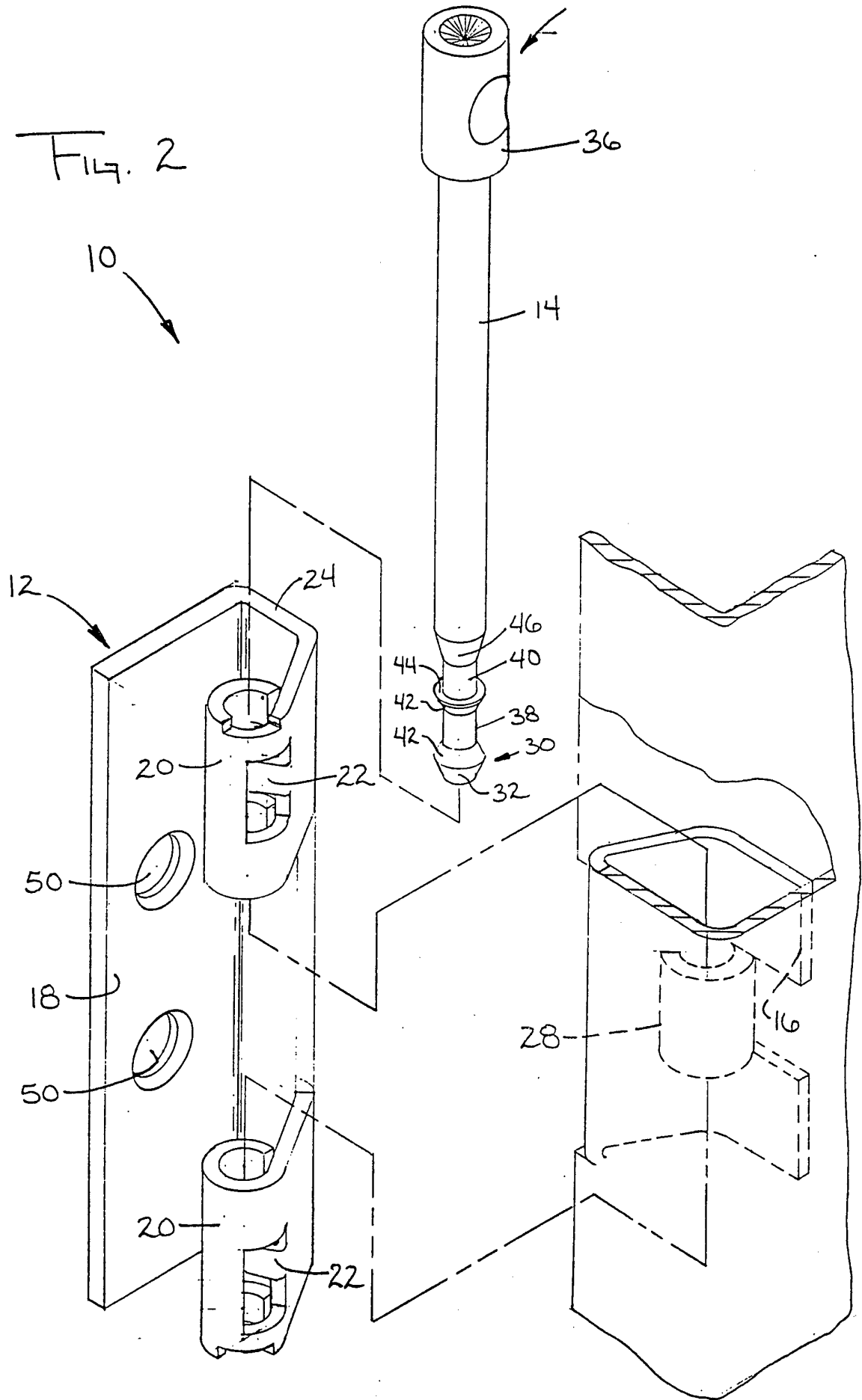


FIG. 4

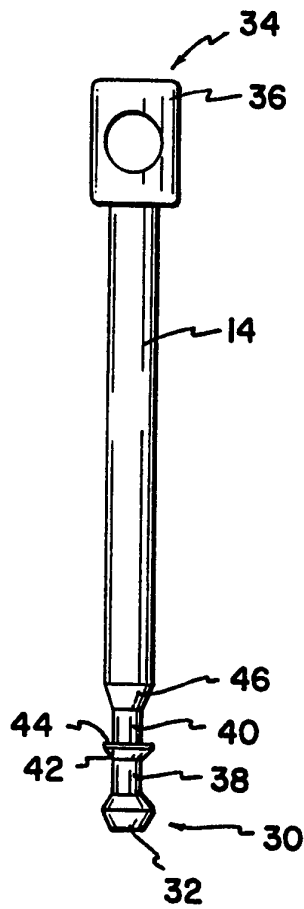


FIG. 3

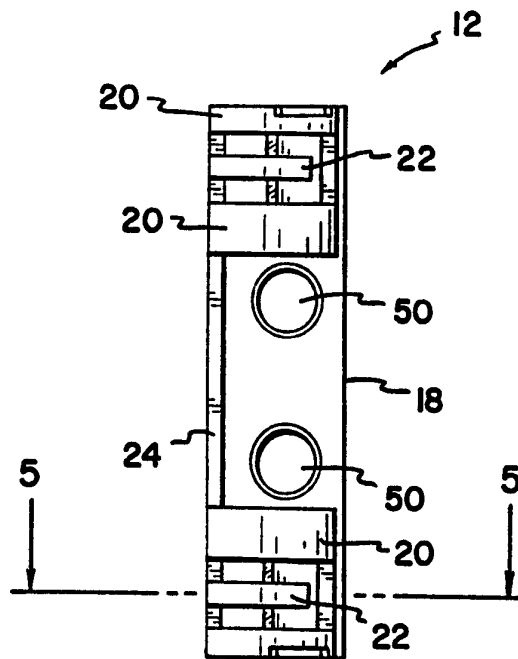


FIG. 6

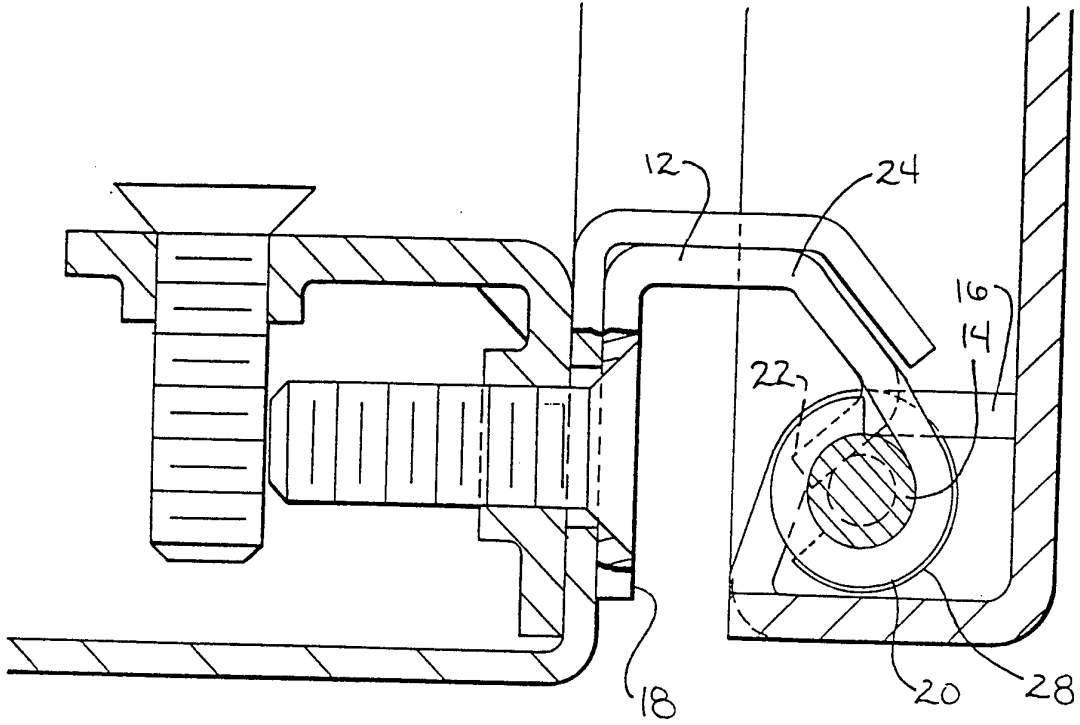
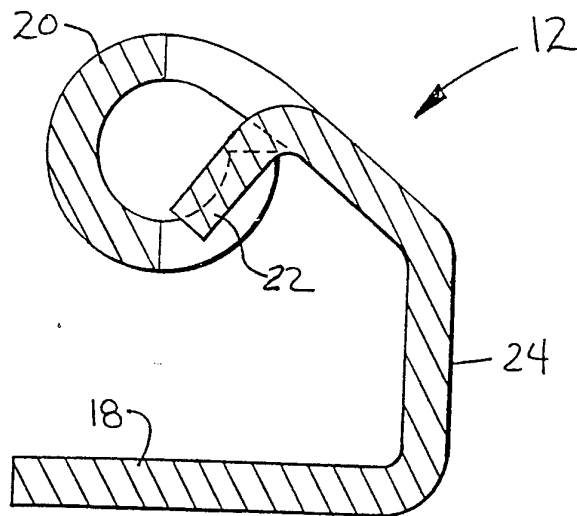


FIG. 5



INTERNATIONAL SEARCH REPORT

International Application No

PC., US 94/13302

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 E05D7/10				
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) IPC 6 E05D				
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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)				
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Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	DE,A,26 23 140 (VEREINIGTE BAUBESCHLAGFABRIKEN GRETSCH & CO) 4 August 1988	1-6, 8-10,12, 14		
Y	see page 12, paragraph 2 ----	7,11,13		
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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-2623140	01-12-77	NONE	
US-A-2997734	29-08-61	NONE	