



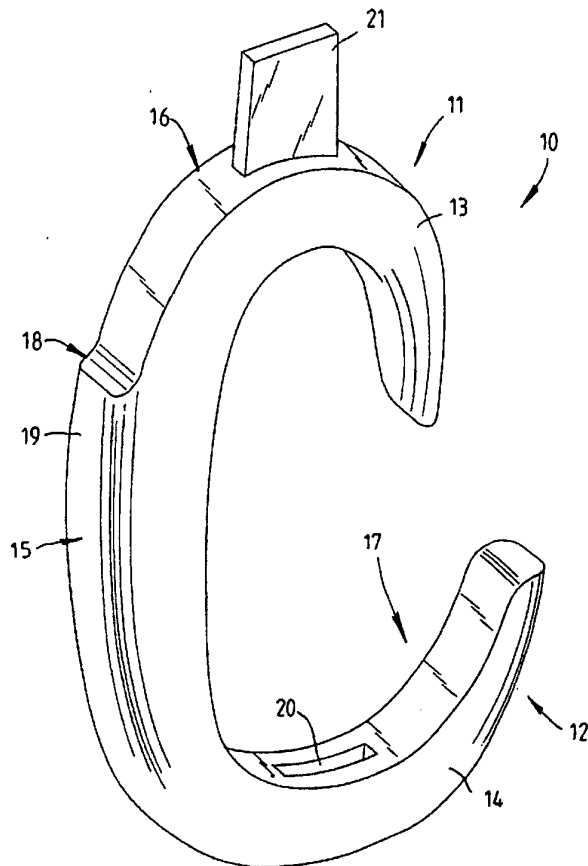
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<p>(21) International Application Number: PCT/AU94/00135 (22) International Filing Date: 18 March 1994 (18.03.94) (30) Priority Data: PL 7900 19 March 1993 (19.03.93) AU (71)(72) Applicants and Inventors: HAYWARD, Leslie, James [AU/AU]; P.O. Box 732, Yeppoon, QLD 4703 (AU). HAYWARD, Vida, May [AU/AU]; P.O. Box 732, Yeppoon, QLD 4703 (AU). (74) Agent: GARDNER, John, R., G.; P.O. Box 443, Mudgeeraba, QLD 4213 (AU).</p>		<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>

(54) Title: CHAIN LINK MEMBER

(57) Abstract

A chain link member (10) for forming a composite chain link, the link member (10) being of C-shaped form and including a side body portion (15) and a pair of opposite arcuate tongues (13) and (14). The tongue (13) has an outer surface (16) complementary to the inner surface (17) of the tongue (14). The chain link member (10) may be arranged in opposing relationship with a further identical chain link member (10) with the inner surfaces (17) of the tongues (14) mating with the outer surfaces (16) of the tongues (13) to form the composite link.



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CHAIN LINK MEMBERTechnical Field

This invention relates to a chain link member and in particular to chain link members of the type which
5 may be interconnected to form a composite link which can replace, or be used as, a normal chain link in many different applications. The present invention also relates to a chain link formed from a pair of chain link members of the above described type.

10 Background Art

In many situations it is desirable to have a means whereby links of a chain may be joined, for example for adding to or extending the length of a chain. This of course can be achieved permanently, by for example welding
15 lengths of chain together, however, this obviously is not suited to all situations, particularly if one is in a remote location. Other means for joining chains have involved the use of separate connecting elements such as shackles, however, such elements generally limit the
20 application of the chain. In particular if the chain is being used in a block and pulley application, the connecting elements are generally of such a size that they prevent the chain from passing through or over the pulley.

U.S. Patent No. 2385232 discloses a chain link
25 formed of separable chain link parts, however, the assembled chain link parts, when forming a chain link do not adopt a configuration of a normal chain link and thus such links are limited in their application. U.S. Patent Nos. 2621470 and 3403506 also disclose chain links formed
30 of separable parts, however, the chain link parts when assembled have a substantially greater width than a normal chain link and also are limited in their application. A further disadvantage of the chain links described in the above U.S. patents is that their design places a potential
35 excess loading on their joining elements.

Disclosure of the Invention

The present invention aims to provide a chain link member which may be combined with a further similar

chain link member to form a composite chain link of similar form to a standard chain link and which therefore may be used in many different applications, including load or non-load bearing applications. The present invention also aims
5 to provide a chain link member which may be simply and readily joined to a further substantially identical chain like member to form a composite chain link. The present invention further aims in a preferred aspect to provide a chain link formed of a pair of chain link members which has
10 a high strength so as to enable it to be used in situations where a high load is encountered. Other objects and advantages of the invention will become apparent from the following description.

The present invention thus provides in a first
15 aspect a chain link member adapted to co-operate with a further said chain link member to form a composite chain link said chain link member being of generally C-shaped form and having a pair of opposite end portions, one said end portion of said chain link member having an outer
20 surface substantially complementary to the inner surface of the opposite said end portion of said chain link member whereby said chain link member may be located in an opposing relationship relative to a further said chain link member with said outer surface of said one end portion of
25 one said chain link member mating with the said inner surface of said further link member so that said chain link members form a said chain link.

Preferably the end portions are formed as arcuate tongues and at least the tongue at the one end portion
30 tapers in thickness towards the free end thereof so as to allow, when said chain link members are interengaged, for a relatively smooth transition from one chain link member to the other chain link member. Preferably also the tongue of the other end portion also tapers in thickness.

35 The tongues suitably are integrally formed with or joined to a side body member such that the link member has a C-shaped configuration. The outer surface of the side body portion is preferably stepped downwardly to

define a shoulder adjacent the one end portion so as to form a recess for receipt of the opposite tongue of a further chain link member. This also provides for a smooth transition between the outer surface of the tongue and the
5 outer surface of the body portion.

Preferably also the one end portion of the chain link member is provided with an outwardly extending lug or projection and the other end portion is provided with a slot or aperture adapted to receive the lug or projection
10 so as to guide a pair of chain link members into their co-operating mating attitude and hold the members in alignment. The slot or aperture may be a through slot or aperture or a blind slot or aperture. The lug may be constructed so that it may be permanently deformed to
15 retain the chain link members in their co-operating attitude. Alternatively, the lug may be adhered or otherwise secured in the aperture. Preferably the lug is formed as a relatively thin planar element and the aperture has a corresponding cross-section to neatly receive the
20 lug. All of the elements of the chain link member are within the confines of a pair of parallel planes adjacent opposite sides of the link body portion so that the link member has no sideways projecting parts.

The present invention also provides in a further
25 aspect a composite chain link comprising a pair of chain link members of the type described above co-operating so that one end portion of each chain link member is arranged within and mates with the opposite end portion of the other chain link member.

30 In yet a further aspect, the present invention provides a composite chain link comprising first and second interengaging separable chain link members, each said chain link member being of substantially C-shaped form and having a side body portion and a first and second arcuate tongues
35 at opposite ends thereof, said first arcuate tongue having an outer surface complementary to the inner surface of said second arcuate tongue, said first and second chain link members being arranged in an opposing relationship with the

said outer surfaces of the first tongues of said chain link members mating with the said inner surfaces of the second tongues of the opposite chain link members.

The link members in one configuration form a
5 composite chain link of elongated oval form similar to a standard chain link configuration. The link members, however, may be designed for co-operation to form a composite link of any geometrical configuration. The chain link members are in one application constructed of metal.
10 The chain link members however, may be constructed of plastics or a combination of materials.

Brief Description of Drawings

In order that the invention may be more readily understood and put into practical effect, reference will
15 now be made to the accompanying drawings which illustrate a preferred embodiment of the invention and wherein:-

Fig. 1 is a perspective view of a chain link member according to the present invention;

20 Figs. 2, 3 and 4 are side, end elevational views and underside view of the chain link member of Fig. 1;

Fig. 5 is a sectional view of the chain link member along line I-I of Fig. 3;

25 Fig. 6 illustrates the manner in which a pair of chain link members may be oriented to form a composite chain link;

Fig. 7 illustrates respective chain link members mating with each other to form a chain link; and

Fig. 8 illustrates in perspective view the pair of assembled chain link members of Fig. 7.

30 Detailed Description of the Drawings

Referring to the drawings and firstly to Figs. 1 to 4, there is illustrated a chain link member 10 according to the present invention which is of generally C-shaped form having in this embodiment one arcuate end 11 and an
35 opposite arcuate end 12. Each end 11 and 12 is essentially formed as an arcuate tongue 13 and 14 respectively the tongues 13 and 14 being joined or integrally formed with a side body portion 15. In this embodiment the tongues 13

and 14 are tapering in cross-section towards their free ends. As shown, the tongue 13 follows a substantially smaller average radius than the tongue 14 so that the width of the chain link member 10 at the end 11 is somewhat smaller than the width at the end 12.

The tongue 13 has an outer arcuate surface 16 shaped to fit within and mate with a complementary concave arcuate inner surface 17 of the tongue 14 of a further chain link member 10. The outer arcuate surface 16 in this embodiment is also substantially flat in transverse section from one side of the link member 10 to the other side. The inner surface 17 of the tongue 14 is of correspondingly flat configuration. The outer surface 10 of the tongue 14 is additionally stepped downwardly at a shoulder 18 from the outer surface 19 of the body portion 13 so as to, in effect define a recess for receiving the tongue 14.

The end 12 is additionally provided with a through slot or aperture 20 through the tongue 14 and the end 12 is provided with a lug 21 extending outwardly from the tongue 14 and aligned longitudinally with a slot or aperture 20. The lug 21 is adapted to be received within the slot 20 of a further link member 10 as described further below. The lug 21 is in this embodiment of planar tab like form and the aperture or slot 20 is of corresponding cross-section. The lug 21, however, may be of a different configuration, for example of a cylindrical peg form and the aperture formed as a cylindrical hole. Many other alternative complementary projection/aperture arrangements may be provided.

It will be apparent in Figs. 3 and 4 that all of the elements of the chain link member are within the confines of a pair of parallel planes (shown in dotted outline) disposed at the opposite sides of the main body 15 of the link member 10. Such an arrangement ensures that when the link members are interconnected no parts of the link members project outside these planes. This permits a composite chain link formed from the link members of the invention to be used in any situation where a standard

chain link is employed without fouling surrounding equipment or apparatus.

In use and to form a composite chain link 22 of the type shown in Figs. 7 to 8, a pair of identical link members 10 and 10' are provided and arranged in opposing relationship as shown in Fig. 5 so that one end portion 11 of one link member 10 is located adjacent the other end portion 12' of the other link member 10' and vice versa. Additionally, the lugs 21 and 21' of each link member 10 and 10' are substantially longitudinally aligned with the apertures 20 and 20' of the other link member 10 and 10'. From the position shown in Fig. 6 the link members 10 and 10' are moved relatively towards each other so that the respective lugs 21 and 21' move into the apertures 20' and 20 respectively, this movement continuing until the outer surface 16 of the tongue 13 mates with the inner surface 17' of the tongue 14' as shown in Fig. 6 and similarly at the opposite ends of the link members 10 and 10'. This forms the link members 10 and 10' into the link assembly 22 of similar form to a standard chain link as shown in Figs. 6 and 7. The tapering nature of the tongues 13, 13', 14 and 14' as well as the downwardly stepped nature of the surfaces 16 and 16' so as to ensure full complementary mating and a relatively smooth transition from the tongue 13 of one link member 10 to the inner surface of body portion 15 of the other link member 10. Similarly on the surface of the outside of the links 10 and 10', the tongues 12 and 12' have a relatively smooth transition to the respective surfaces 19 and 19'.

It will be seen in Figs. 7 and 8 that at each end of the composite link 22 the tongues 13 and 14' and 13' and 14 are nested together and overlap. This ensures that the composite link 22 has high strength in the longitudinal direction, such as to resist loads as would be encountered with conventional endless chain links of similar form. Loads in this direction also tend to urge the mating tongues together so as to prevent detachment of the link members 10 and 10'.

The link members 10 and 10' may be permanently joined by forging or otherwise deforming the lugs 21 and 21' after assembly. This may be achieved by enlarging the end portions of the lugs 21 and 21' which project through the slots 20. Alternatively, in plastic applications the link members 10 may be joined by adhesives. Such adhesives, for example, may be used on the lugs 21 and 21' to secure them within the slots 20 and 20' and/or between mating surfaces 16 and 17.

The link assembly 22 has many applications. For example it may be used to replace or join links of a chain and being of similar configuration to a standard chain link may pass through a pulley in block and pulley applications for lifting purposes. The link assembly 22 may be used in many other applications, such as for joining scrub pulling chains or used as towing chains or in other vehicle or marine applications.

In the above applications the link members 10 may be constructed of metal, however, in other applications the link members 10 may be constructed of plastics. Other applications for the link members 10 may include use as chain links in jewellery or for hanging curtains.

The chain link member is described above to have generally arcuate end portions and arcuate tongues which form those end portions. The end portions however may be of differing configurations without departing from the inventive concept. For example, the end portions may be of part rectangular form or the tongues may be substantially linear and extend normal to the side body portion of the link member.

Whilst the above has been given by way of illustrative embodiment of the invention, all such modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as defined in the appended claims.

CLAIMS

1. A chain link member adapted to co-operate with a further said chain link member to form a composite chain link, said chain link member being of generally C-shaped
5 form and having a pair of opposite end portions, one said end portion of said chain link member having an outer surface substantially complementary to the inner surface of the opposite said end portion of said chain link member whereby said chain link member may be located in an
10 opposing relationship relative to a further said chain link member with said outer surface of said one end portion of one said chain link member mating with the said inner surface of said further link member so that said chain link members form a said chain link.
- 15
2. A chain link member according to Claim 1 wherein said opposite end portions are formed as arcuate tongues.
3. A chain link member according to Claim 2 wherein
20 said arcuate tongue at said one end portion of said link member has a smaller average radius than said tongue at the opposite end portion of said link member such that the width of said link member at said one end portion is less than the width of said link member at said other end
25 portion.
4. A chain link member according to Claim 3 wherein said tongues are connected through a side body portion to define said link member of said C-shape form.
- 30
5. A chain link member according to Claim 4 wherein said body portion is provided with a downwardly stepped shoulder adjacent said one end portion to define a recess for receiving the tongue at the opposite end portion of a
35 further link member.
6. A chain link member according to Claim 1 wherein said one end portion includes an outwardly extending lug

and the opposite end portion includes a complementary aperture for accepting a said lug of a further chain link member.

5 7. A composite chain link comprising a pair of chain linked members of the type defined in Claim 1, said chain link members being arranged in an opposing relationship such that said one end portion of one said chain link member mates with the opposite end portion of the other
10 said chain link member.

8. A composite chain link comprising first and second interengaging separable chain link members, each said chain link member being of substantially C-shaped form
15 and having a side body portion and a first and second arcuate tongues at opposite ends thereof, said first arcuate tongue having an outer surface complementary to the inner surface of said second arcuate tongue, said first and second chain link members being arranged in an opposing
20 relationship with the said outer surfaces of the first tongues of said chain link members mating with the said inner surfaces of the second tongues of the opposite chain link members.

25 9. A composite chain link according to claim 1 wherein said chain link members include co-operable means for aligning said chain link members in said opposing relationship.

30 10. A composite chain link according to claim 9 wherein said co-operable means comprise co-operable projections and slots.

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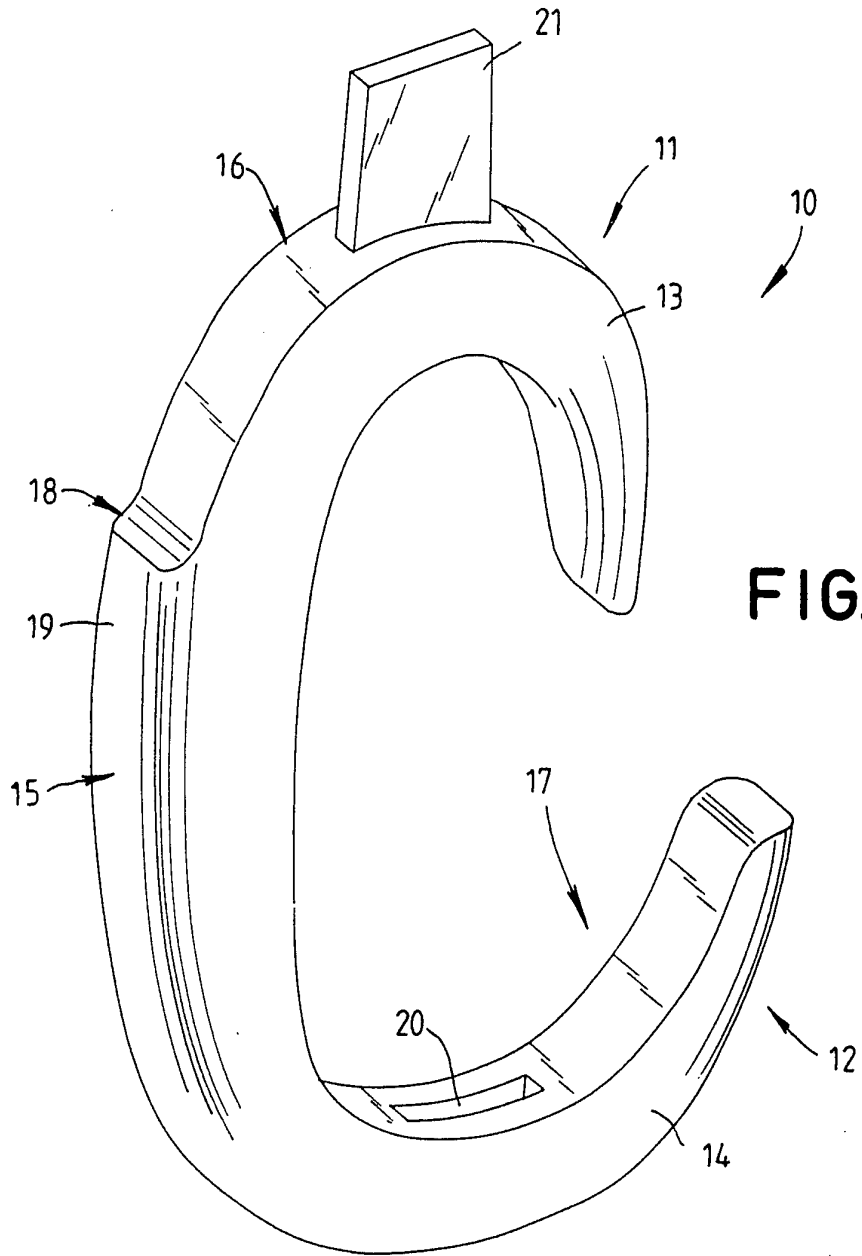


FIG.1

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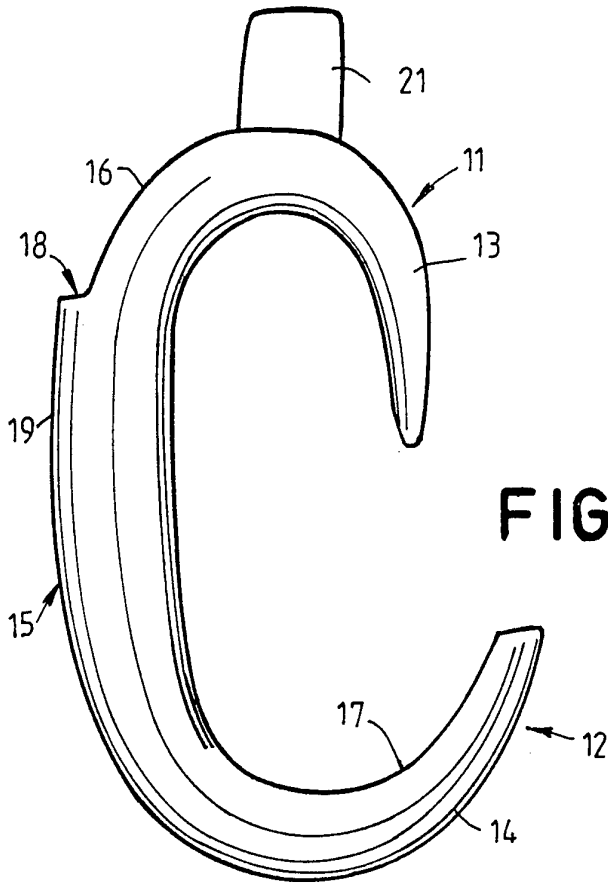


FIG. 2

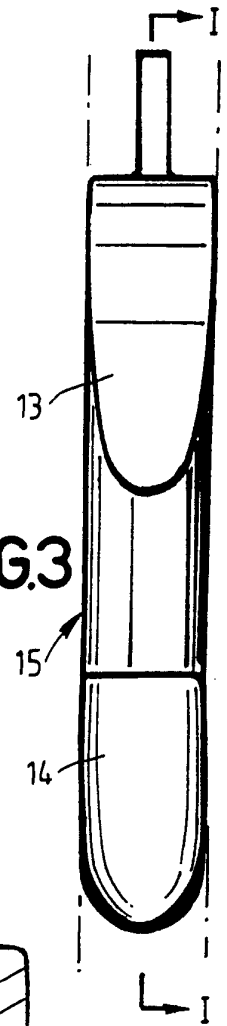


FIG. 3

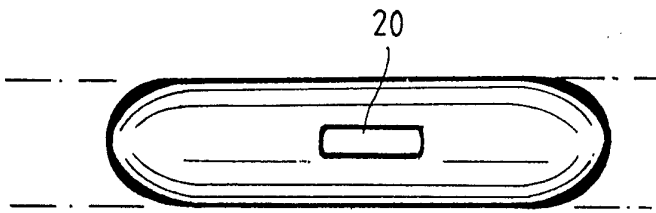


FIG. 4

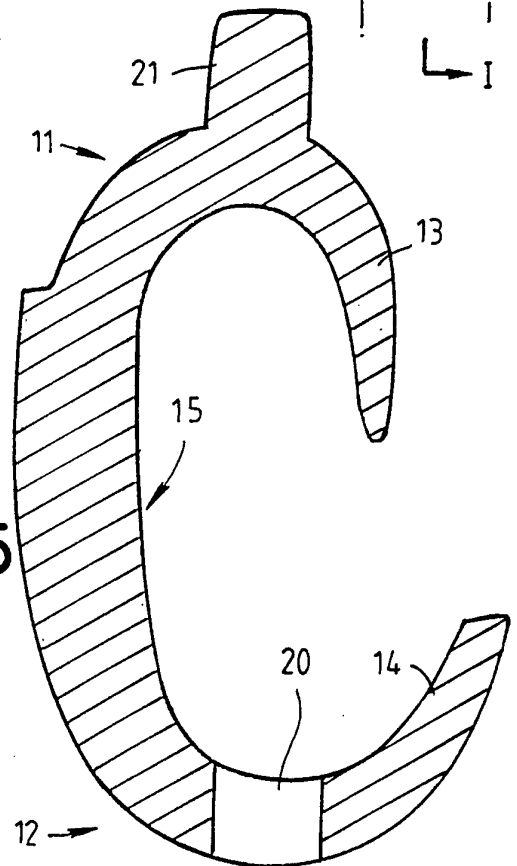


FIG. 5

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FIG.6

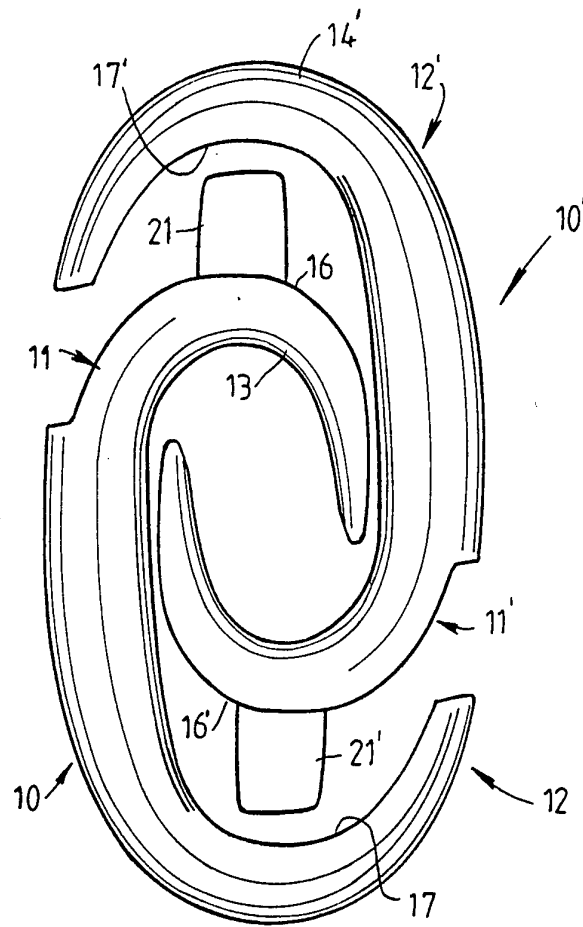
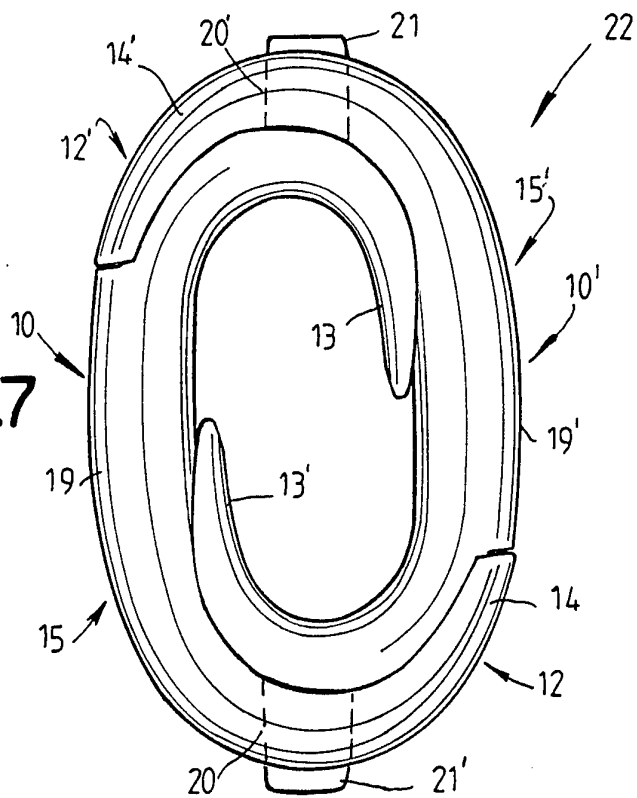
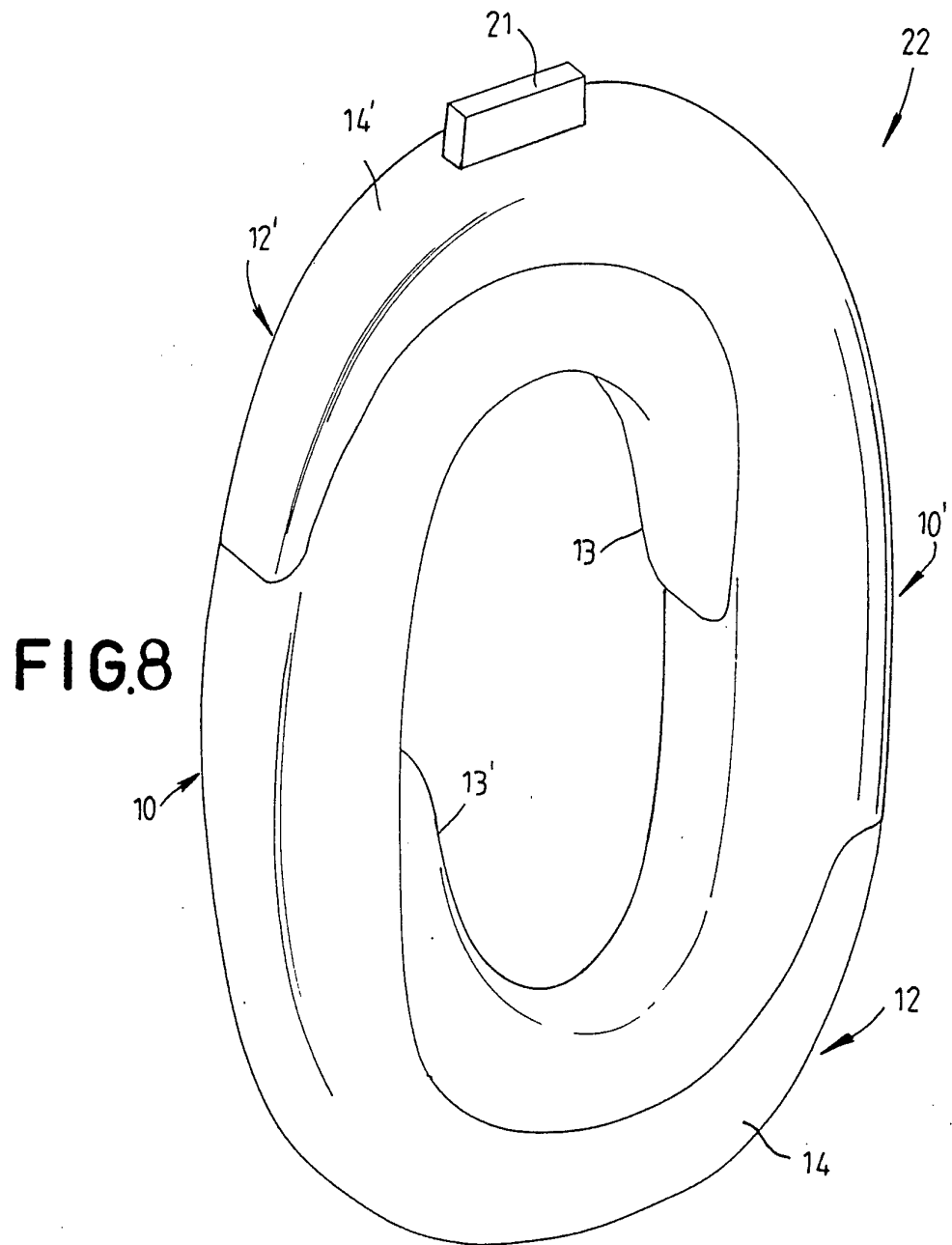


FIG.7



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INTERNATIONAL SEARCH REPORT

Information on patent family memt

International application No.

PCT/AU 94/00135

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member
WO 9110845	EP 511249 GB 9001173
END OF ANNEX	