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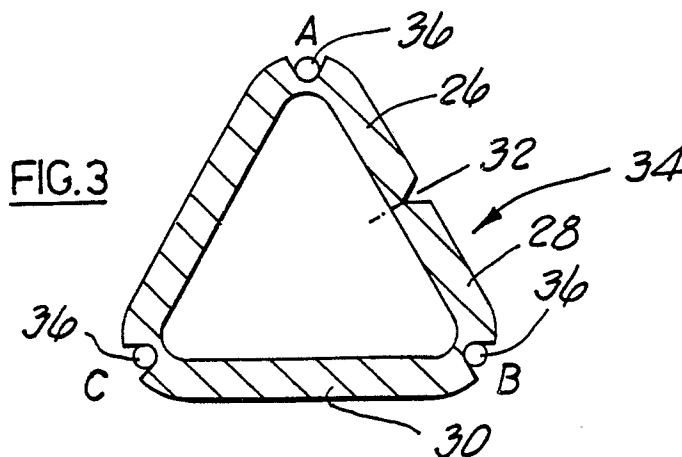
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(54) **Security members and structures.**

(57) A method of making a hollow section security member incorporating lengthwise extending runs of cutting resistant material comprises forming flat sheet material (10) with lengthwise extending grooves (12, 14, 16) and subsequently forming the grooved sheet into said hollow section and securing the cutting resistant material (36) in the grooves (12, 14, 16). The security members are preferably arranged with adjacent faces non-parallel. A preferred cross-sectional shape for the security members is triangular.



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SECURITY MEMBERS AND STRUCTURES

This invention relates to security members and security structures, and to methods of making same. An example of a security member to which the invention relates is a bar for a security barrier or grille.

In the case of security members in the form of bars for use in barriers and grilles, there are several technical requirements. These requirements include cutting resistance, ease of manufacture, strength and resistance to bending in use, ease of incorporation of cutting resistant material, and related factors.

Previous proposals have included round and square section security members into which grooves have been milled to accommodate cutting resistant material. However, these proposals fall short in several respects. These shortcomings include difficulties in manufacture, especially with regard to the provision of the slots for incorporating the cutting resistant material. Other shortcomings include the ease with which the security structure formed from the bars can be bent, for example by means of an improvised screw jack, and in other respects.

Accordingly, we have identified a requirement for an improved security member and a security structure incorporating same, offering improvements in relation to one or more of the matters discussed above, or generally.

According to the invention there is provided a security member, a security structure incorporating same, and a method of making a security member, as defined in the accompanying claims. The invention also provides a security member, a security structure, and a method of making same, not limited by all features of any one particular claim hereof but comprising any feature disclosed herein providing a technical feature or advantage disclosed herein or which can be inferred from the disclosure herein.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

Fig 1 shows a section through a sheet of mild steel or the like incorporating rolled lengthwise-extending grooves;

Fig 2 shows the sheet of Fig 1 formed with lengthwise-extending upturned side edges; and

Fig 3 shows the article of Fig 2 further formed by bending to bring the upturned edges into engagement; and

Fig 4 shows a second embodiment, similar to that of Fig 3, but being a quadrilateral.

In the embodiment of Figs 1 to 3, Fig 1 shows a sheet 10 of mild steel or the like into which has

been rolled three lengthwise-extending grooves 12, 14 and 16. The section taken in Fig 1 is at right angles to the lengthwise direction of sheet 10. Grooves 12, 14 and 16 extend parallel to each other and to the side edges 18, 20 of sheet 10. These edges are formed with chamfers 22, 24, which also extend lengthwise of the sheet.

In Fig 1, the reference letters A, B, C identify, for convenient future reference, locations on the sheet (extending lengthwise) which correspond to the portions thereof which form the three corners of the triangle ABC, seen in Fig 3. As is apparent in Fig 1, the grooves 12, 14 and 16 are rolled in the flat sheet material 10 prior to the forming step illustrated in Fig 2.

Referring now to Fig 2, in the next step of the process of making the security member seen in Fig 3, the side edge portions 26, 28 of sheet 10, which extend lengthwise of the sheet, are each bent upwardly, as seen in Fig 1, to the position shown in Fig 2. In this position, the portions 26, 28 extend at approximately 60 degrees with respect to the base portion 30. As can also be seen, the bending of the material takes place on the axes of grooves 12, 16, which are thus enlarged significantly. These bending operations are performed on a press brake.

The next manufacturing step is illustrated in Fig 3. This step involves bending the section of Fig 2 through an angle of approximately 60 degrees at the location on base 30 identified by groove 14. This bending step brings edges 18, 20 into contact, thereby completing the triangular section seen in Fig 3. The chamfers 22, 24 define a groove 32 which enables a lengthwise seam weld to be conveniently formed, to unify the structure.

The final steps in the process of making the hollow section security member 34 seen in Fig 3 comprise welding in position in the grooves 12, 14 and 16, rods of tungsten carbide 36 which resist cutting of the security member by rod saws and the like. This welding operation is performed in a manner similar to that employed in prior art procedures.

A series of security bars 34, as shown in Fig 3, can be incorporated into a security structure, such as a grille. In such an assembly, the security members are usually arranged to extend lengthwise and parallel to each other at a spacing sufficiently close, for example, to prevent escape.

In such a security structure, the preferred arrangement of the security bars or members 34 is such that, for example, the base walls CB of each security bar lie in a common plane, and the walls AC of successive bars lie in planes parallel to each

other, and so too do the walls AB of successive bars. As a result, the facing surfaces AB and AC of successive bars in the grille, are non-parallel. Consequently, it is extremely difficult for an improvised screw jack to be effectively caused to act between successive bars, due to the slope of the facing surfaces. Of course, it would be possible, using a specially fabricated, or very carefully positioned screw jack end piece, to apply a bending force between the bars at the adjacent corners B-C. Despite this, the possibilities of using a simply-fabricated screw jack for bending the bars are greatly reduced.

Fig 4 shows a further embodiment representing a modification of that of Fig 3. The generally triangular configuration of Fig 3 has been modified to a generally quadrilateral form designated by the reference letters WXYZ, in which the sides XY and YZ correspond to the sides AB and BC of the preceding embodiment. The sides XW and WZ and ZY are arranged generally at right angles to each other, with side XY inclined as in the Fig 3 embodiment. A side XZ has been indicated in dotted lines, corresponding to the side AC in Fig 3, for comparison purposes, but is of course not present in practice.

The security member 40 of Fig 4 is constructed in an exactly analogous manner to that of Figs 1 to 3 but with slightly modified bending procedures followed by welding the groove 42 and welding the tungsten carbide rods 44. This security bar is principally intended for use as the end one of a series of security bars forming a grille or barrier, the generally right-angled portion of the cross-section is beneficial for purposes of incorporation into a frame or support of concrete or other material. In such an arrangement, the side ZY of bar 40 would be arranged in a common plane with the sides CB of the triangular section of the security members. As a result, the disposition of side XY of security bar 40 relative to side AC of the adjacent security bar 34 would be such as to prevent, or inhibit, screw-jacking in the manner already described above.

Among the advantages provided by the above embodiments are the following. Firstly, the security members are easy to manufacture. The basic sheet material 10 can be readily rolled with the grooves, in an inexpensive manner. The subsequent bending steps are readily carried out to produce polygonal sections which are strong and, by virtue of their relative dispositions, are extremely difficult to bend. Moreover, it is a simple matter to incorporate the cutting resistant material. As a result, a grille or barrier constructed from the security bars has a very high structural integrity while retaining the desired relatively low manufacturing cost.

Interestingly, the above described method of

making hollow section security members constitutes one of two main aspects of the inventive material disclosed herein. The cutting resistant material is located in lengthwise grooves. These grooves are formed in the material prior to forming the hollow sections. The preferred embodiment is to roll the grooves into flat sheets and then to form these into a triangular or quadrilateral section. The technique could be applied to round and other sections.

Interestingly also, the other aspect of the invention described above relates to the relative dispositions of the security members when incorporated into a security barrier such as a grille. By adopting a polygonal cross-section in which the facing surfaces of adjacent bars are non-parallel, the simple use of a screw jack for bending the bars is avoided.

Many modifications can be made by those skilled in the art in the above embodiments while remaining within the scope of the invention. Thus, for example, the slots in the sheet material may be formed by any suitable mechanical means, including broaching, planing, milling as well as by rolling, though the latter is preferred. These operations can be performed on the material in hot or cold form. The polygonal shapes disclosed may be modified. The triangular section seen in Fig 3 need not be equilateral, it could be isosceles or less regular.

Claims

1 A method of making a hollow section security member comprising the steps of forming said security member with at least one lengthwise-extending groove, and securing cutting resistant material in said groove, characterised in that said groove is formed in the material of said member by a lengthwise grooving operation prior to forming said hollow section, and said grooving operation is followed by the step of forming said grooved material into said hollow section and securing said cutting resistant material in the groove.

2 A method according to claim 1 characterised in that said groove is formed in flat sheet material prior to forming same into said hollow section.

3 A method according to claim 2 characterised in that said groove is rolled in said flat sheet, the latter being hot or cold.

4 A method according to claim 2 characterised in that said groove is broached or planed or milled in said flat sheet.

5 A method according to any one of claims 1 to 4 characterised in that said hollow section is formed by stepwise bending operations.

6 A method according to claim 5 characterised in that said hollow section security member has a polygonal-shaped cross-section and said grooves are positioned so that they are located at the corners of said polygon.

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7 A security structure such as a grille comprising at least two hollow section security members extending lengthwise alongside each other, said security members each having at least one lengthwise extending run of cutting resistant material incorporated in the material defining said hollow section, characterised in that said security members are polygonal in cross-section and are arranged relative to each other with facing surfaces non-parallel.

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8 A security structure comprising polygonal section security members arranged with their adjacent or facing surfaces non-parallel.

9 A security structure according to claim 7 characterised in that said hollow section security members are triangular in section.

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10 A security structure according to any one of claims 7 to 9 characterised by a peripheral security member having a quadrilateral section of which the outer two faces are arranged in planes at right angles to each other and an inner face faces an adjacent security member and is non-parallel thereto.

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11 A security structure according to any one of claims 7 to 10 characterised in that said security members are of generally triangular cross-sectional shape and arranged with their non-facing sides generally parallel to each other.

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12 A security member suitable for use in a security structure according to any one of claims 7 to 11 characterised in that said security member has a generally triangular cross-sectional shape.

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13 A security member suitable for use in a security structure according to any one of claims 7 to 11 characterised in that said security member has a generally quadrilateral cross-sectional shape of which three sides are generally at right angles and the fourth side is arranged at between 55 and 65 degrees to one of the sides it joins.

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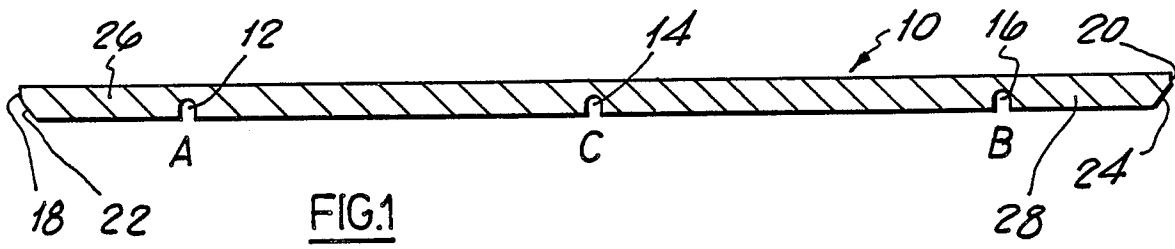
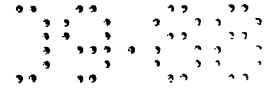


FIG. 1

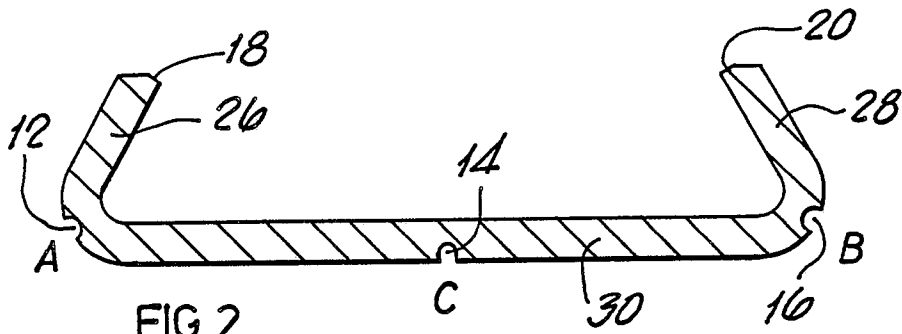


FIG. 2

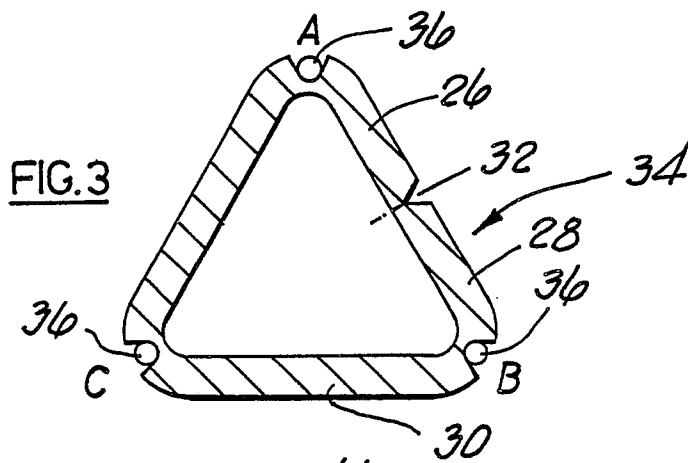


FIG. 3

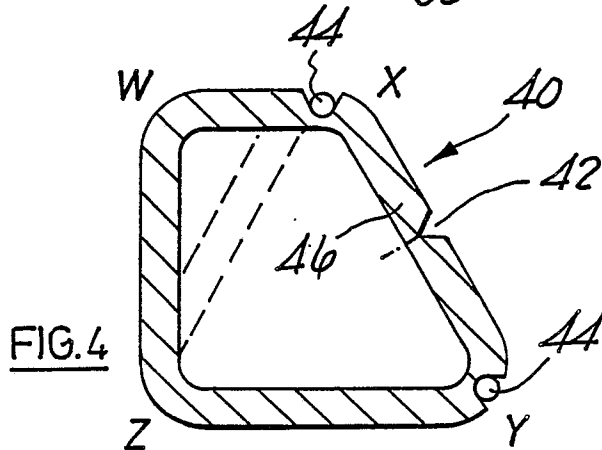


FIG. 4



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	JP-B-73 000 739 (NIPPON KOKAN K.K.) * Abstract; figures 1-8 * ---	1,2,4,5 ,6	E 06 B 9/01 B 21 C 37/08
Y	GB-A-2 176 526 (CHUBB SECURITY INSTALLATIONS LTD) * Page 1, lines 124-130; page 2, lines 1-10; figure 5 * ---	1,2,4,5 ,6	
A	---	3,7,8	
A	EP-A-0 105 514 (BAUM) * Page 11, lines 15-35; page 12, lines 1-21; claims; figures 1-4 * ---	8	
A	US-A-3 552 938 (DRACA) ---		
A	US-A-3 422 525 (JEPPSON) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 06 B B 21 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-11-1988	Examiner VIJVERMAN W.C.
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			