(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 062 419**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **82301283.6**

(22) Date of filing: **12.03.82**

(51) Int. Cl.³: **E 04 H 17/18**, E 04 H 17/04

(30) Priority: **13.03.81 IE 546/81**
08.04.81 IE 793/81

(43) Date of publication of application: **13.10.82**
Bulletin 82/41

(84) Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

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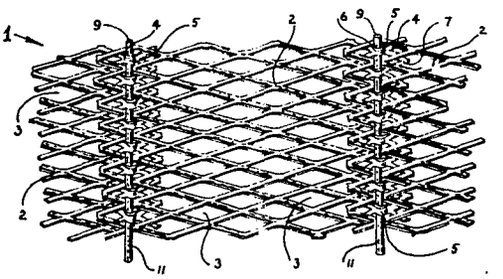
(54) A fence assembly.

(57) The fence assembly (1) comprises a plurality of panels (2) of semi-rigid net-like material having a plurality of closed meshes (3). Ridges (5), provided by channels (6) are formed adjacent an edge (7) of each panel. The panels (2) are joined by portions (4) of the mesh (3) of the ridge (5) of one panel projecting through meshes (3) of the other panel (2). A retaining bar in the form of a fence post (9) is passed through the channel (6) between the engaging meshes (3) to prevent withdrawal of the meshes.



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The present invention relates to a fence assembly of the type comprising a plurality of panels of semi-rigid net-like material, each panel having a plurality of closed meshes and being joined to another panel by a retaining means.

Fence assemblies of this type are well known and are used extensively for partitioning storage areas, warehouses, factories and additionally for perimeter fencing around building sites, security compounds, and the like. These fences may be either permanently mounted or demountable.

One example of such a fence assembly is described in U.S. Patent Specification No. 3423072. This Specification discloses a fence assembly comprising a plurality of panels of net-like material. Each panel is provided with sidewardly projecting unclosed hooks on each vertical side of the panel. A vertical retaining bar or fence post engages the hooks of adjacent panels to secure the panels together.

Another example of fence assembly is described in U.S. Patent Specification No. 932355 which discloses a fence assembly also comprising a plurality of panels of net-like material. In this case, the panels are mounted in a rectangular wire frame and loops are formed on the vertical sides of the wire frame. A retaining bar or fence post engages the loops on adjacent panels to secure the panels together.

It is also known to mount panels of net-like material in angle-iron frames. In these cases the angle-iron frames are bolted together and may be bolted to intermediate upright fence posts.

All these known fence assemblies suffer from a major problem in that they may be opened at the joints between panels, thereby providing ready access to intruders. Additionally, in general these fence assemblies tend to be relatively expensive.

More specifically in the case of the fence assembly of U.S. Patent Specification No. 3423072, the joints between the panels may be easily opened by pushing against a panel. If sufficient pressure is applied to any one of the panels, the unclosed hooks engaging the fence post will straighten, thereby permitting the panel to be disengaged from the post. This can be a particular problem when a crowd of people push against a panel. Even if the hooks are sufficiently strong to overcome

pressure on the panel, the shanks of the hooks can in general be relatively easily cut. Indeed by merely cutting a few hooks the panel can be pulled away from the bar to form a gap for the would-be intruder.

Again in the fence assembly of U.S. Patent Specification No. 932355 by cutting the loops on the wire frame, a panel can easily be disengaged from the fence post. In the particular embodiment described in the U.S. Specification the mere cutting of three loops is sufficient to disengage a panel. This particular fence assembly suffers from a further disadvantage in that the net panel is mounted within the wire frame, and accordingly, can be dislodged from the frame by cutting one or two strands of the panel. Indeed it will be appreciated that even if the net panel was spot welded to the frame, the welds could easily be broken.

Similar problems occur where the panels of the fence assembly comprise net material mounted in a framework of, for example, angle iron. Once nuts and bolts are used either in joining the panels directly together or to a fence post it will be readily appreciated that the joint is easily broken.

All these fence assemblies are also relatively expensive. In the case of the fence assemblies of the two U.S. Specifications, standard "off the shelf" panels cannot be used. Thus

additional expense is incurred in the provision of special panels. Indeed, in the case of U.S. Specification No. 3423072 even if standard panels are used, the vertical edges of the panels have to be trimmed in such a way as to leave a sufficient amount of material to form the hooks. Subsequently, the hooks have to be formed.

The present invention is intended to provide a solution to the problems of the prior art fence assemblies. It provides a solution in that the panels are joined by a mesh of one panel projecting through a mesh of another panel, and the retaining means is located between the said meshes to prevent withdrawal.

The advantage of the invention is that a very secure, and relatively inexpensive fence assembly is provided. Because the actual meshes of adjoining panels interengage, it is virtually impossible for an intruder to separate the panels at their joints. Additionally, because the meshes of the panels are used for joining, standard panels of net material may be used. Another advantage of the invention is that the fence assembly may be either a permanent structure or demountable for erection elsewhere.

Preferably, the projecting mesh is bent to form a ridge, the retaining means engaging within the ridge.

The advantage of this feature of the invention is that it further enhances the strength of the joints.

Advantageously, a plurality of projecting meshes form an elongated ridge.

The advantage of this feature of the invention is that it provides a particularly secure joint, while also providing a relatively inexpensive panel for the fence assembly.

In one embodiment of the invention the ridge extends the length of a vertical side of the panel adjacent thereto.

The advantages of this feature of the invention is that it facilitates manufacture of the panel and construction of the fence assembly. This is because the ridge can be formed by one pressing operation.

In another embodiment of the invention, the ridge is provided by an elongated channel formed in the panel, the channel overlapping the adjacent panel. Preferably, the channel is of semi-circular cross-section.

The advantage of this feature of the invention is that it leads to a relatively simple construction of fence assembly and panel, and the formation of the channel in each panel

adds to the rigidity of the panels and in turn the strength of the fence assembly. Further, it is particularly useful for engaging any form of fence post.

Alternatively, the ridge is formed by bending portion of the panel adjacent a vertical side edge at an angle of substantially 45^{o} to the panel.

The advantage of this feature of the invention is that it provides a particularly rigid panel, and in turn a robust fence assembly, and the panel is also easily formed.

Preferably, the retaining means is provided by a retaining bar.

The advantage of this feature of the invention is that it provides a particularly strong robust construction of fence assembly.

Advantageously, the retaining means is a fence post.

The advantage of this feature of the invention is that it further facilitates the installation of a robust secure fence assembly.

Additionally, the invention provides a panel for use in the fence assembly. Preferably, each panel is of expanded metal mesh material.

The advantage of this feature of the invention is that it leads to a particularly strong construction of fence assembly.

Alternatively, each panel is of weld-mesh material.

The advantage of this feature of the invention is that it provides a relatively strong robust construction of fence assembly, while also being relatively easily assembled.

The invention will be more clearly understood from the following description of some preferred embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a fence assembly according to the invention,

Fig. 2 is a plan view of the fence assembly of Fig. 1,

Fig. 3 is an exploded view of portion of the fence assembly of Fig. 1,

Fig. 4 is a diagrammatic plan view of the fence assembly of Fig. 1,

Fig. 5 is a plan view of a fence assembly according to another embodiment of the invention,

Fig. 6 is an exploded view of the fence assembly of Fig. 5,

Fig. 7 is a diagrammatic plan view of the fence assembly of Fig. 5,

Fig. 8 is a diagrammatic exploded view of the fence assembly of Fig. 5,

Fig. 9 is a perspective view of a fence assembly according to a further embodiment of the invention,

Fig. 10 is a plan view of the fence assembly of Fig. 9,

Fig. 11 is a perspective view of a detail of the fence assembly of Fig. 9,

Fig. 12 is a perspective view of the fence assembly according to a still further embodiment of the invention, and

Fig. 13 is a plan view of the fence assembly of Fig. 12.

Referring to the drawings, and initially to Figs. 1 to 4 thereof there is provided a fence assembly according to the invention,

indicated generally by the reference numeral 1. The fence assembly 1 comprises a plurality of panels 2 of semi-rigid net-like material having a plurality of closed meshes 3; in this case the panels are of expanded metal mesh material. Each panel 2 is joined to another panel by portions 4 of the meshes 3 of one panel projecting through the meshes 3 of another panel 2. To facilitate this the projecting meshes are bent to form a ridge 5, in this case the ridge is provided by a channel 6 formed along a vertical side edge 7 of each panel 2. The channel 6 is of substantially semi-circular cross-section. This can clearly be seen in Fig. 3. A retaining means provided by a retaining bar formed by a fence post 9 is inserted in the channel 6 between the engaging meshes 3 to prevent withdrawal of the said meshes. Lower portions 11 of the fence post 9 project below the panels 2 for securing in the ground.

In use, two panels 2 are offered up to each other as illustrated in Fig. 3. The meshes of the ridge 5 of one panel 2 are passed through the meshes 3 of the other panel see Figs. 1 and 2. The fence post 9 is then passed through the channel 6 between the engaging meshes and hammered into the ground so that the portion 11 is embedded in the earth. The remaining panels 2 and fence posts 9 are assembled in similar fashion.

Needless to say, it will be appreciated that the fence posts 9 instead of terminating in the lower portion 11, could terminate

in a plate member adapted for securing to the ground, for example, by masonry bolts or the like.

Referring now to Figs. 5 to 8, there is provided a fence assembly 21 according to another embodiment of the invention. This fence assembly is substantially similar to that just described and like components are identified by the same reference numeral. In this case, the engaging meshes 3 of each panel are bent to form a ridge 5. A pair of channels 6 are provided along each vertical side 7 of each panel 12. The meshes 3 of each ridge 5 interengage each other. The fence post 9 is then passed through co-operating channels 6.

The advantage of this embodiment of the invention is that because the engaging meshes are both bent to form a ridge, the space between the said engaging meshes is larger in cross-section, and accordingly, can accommodate a larger diameter fence post for additional strength of the fence assembly.

Referring now to Figs. 9 to 11, there is provided a fence assembly 31 according to a further embodiment of the invention. This fence assembly is also made from panels 2 of expanded metal mesh material and is substantially similar to those already described, and again like components are identified by the same reference numerals. In this case, the ridge 5 of the engaging meshes 3 is formed by bending portions 15 of each

panel 2 adjacent their vertical side edges 7. As can be seen in Fig. 10 each portion 15 is bent at an angle of approximately 45° with the panel 2. The fence post 9 is passed between the ridges 5 as illustrated in Fig. 10. Needless to say the portions 15 may be bent at an angle other than 45°.

A particular advantage of this fence assembly is that because the vertical side edges 15 of each panel 2 are bent at 45° to the panel, a particularly rigid panel is provided. This it will be appreciated enhances the strength of the fence assembly.

Referring now to Figs. 12 and 13 a still further embodiment of the invention is illustrated. This fence assembly 41 is substantially similar to that described with reference to Figs. 1 to 4 and like components are identified by the same reference numerals. In this embodiment of the invention the panels 2 are of weld-mesh material. As in the case of the fence assembly of Figs. 1 to 4, the engaging meshes of one panel are bent to form the ridge 5. The ridge 5 is formed by the channel 6 along one vertical side edge 7 of each panel 2. In this case the fence post 9 terminates in a plate 18. The plate 18 is secured to the ground by masonry bolts 19. A particular advantage of using weld-mesh material is that the mesh size is larger than expanded metal mesh. Accordingly, this permits the projecting portions 4 of the mesh 3 to project further through the meshes 3 of an adjacent panel, thereby accommodating a larger diameter of fence post.

It will be appreciated that in addition to panels of expanded metal mesh and weld-mesh panels of any other suitable semi-rigid net-like material may be used.

It will also be appreciated that although the retaining means for retaining the meshes engaged has been described as being a fence post of circular cross-section, other suitable retaining means could be used. For example, it is envisaged that bars or fence posts of angle section, channel section, or any other suitable desired section could be used. Indeed, it will be appreciated that instead of a bar, a semi-rigid wire could be used. Needless to say, although in all the embodiments of the invention described, the retaining bar has also formed the fence post for the fence assembly, this is not necessary. Independent support stanchions if desired could be used.

It will be appreciated also that it is not necessary for the projecting portions of the mesh to be bent into a ridge. Nor is it necessary for the channel forming the ridge to extend along the full length of a vertical side of each panel. In certain cases, it is envisaged that a few adjacent projecting meshes at the top and bottom of each panel may be formed into a ridge. Indeed, it will be appreciated that to form the necessary space for the retaining means, all that is required is for a portion of one of the meshes to project through the mesh of another panel.

It is envisaged that the channel forming the ridge of the projecting meshes may be of any cross-section, for example it may be of triangular, or indeed, square or rectangular cross-section.

As well as the fence assemblies just described, where the panels are joined in line and joined adjacent their vertical side edges, the panels could be joined at any angle to each other either at their ends or if desired by one panel engaging another intermediate its ends. In this case a panel similar to those illustrated in Figs. 9 and 10 would be used. The ridge 5 would project through the meshes of the other panel at a position intermediate the ends of the other panel, and the retaining bar would then prevent withdrawal of the engaging meshes.

Indeed, it is also envisaged that where fences higher than a single panel are required, the panels could be joined as described above along their horizontal edges.

It is envisaged that in certain cases ridges may be formed on alternate panels only, each other panel being flat. In these cases ridges would be formed on both vertical sides of the alternate panels while each other panel would be flat.

CLAIMS

1. A fence assembly of the type comprising a plurality of panels (2) of semi-rigid net-like material, each panel (2) having a plurality of closed meshes (3) and being joined to another panel (2) by a retaining means (9), characterised in that the panels (2) are joined by portions (4), of a mesh (3) of one panel (2) projecting through a mesh (3) of another panel (2), and the retaining means (9) is located between the said meshes (3) to prevent withdrawal.

2. A fence assembly as claimed in claim 1 in which the projecting mesh (4) is bent to form a ridge (5), the retaining means (9) engaging within the ridge (5).

3. A fence assembly as claimed in claim 2 in which a plurality of projecting meshes (4) form an elongated ridge (5).

4. A fence assembly as claimed in claim 3 in which the ridge (5) extends the length of a vertical side (7) of the panel (2) adjacent thereto.

5. A fence assembly as claimed in claims 3 or 4 in which the ridge (5) is provided by an elongated channel (6) formed in the panel (2), the channel (6) overlapping the adjacent panel (2).

6. A fence assembly as claimed in claims 3 or 4 in which the ridge (5) is formed by bending portion (15) of the panel adjacent a vertical side edge (7) at an angle of substantially 45^{o} to the panel.

7. A fence assembly as claimed in any preceding claim in which the retaining means is a retaining bar (9).

8. A fence assembly as claimed in any of the preceding claims in which the retaining means is a fence post (9).

9. A panel for the fence assembly as claimed in any of claims 1 to 8.

10. A panel as claimed in claim 9 in which the panel is of expanded metal mesh material.

11. A panel as claimed in claim 8 in which the panel is of weld-mesh material.

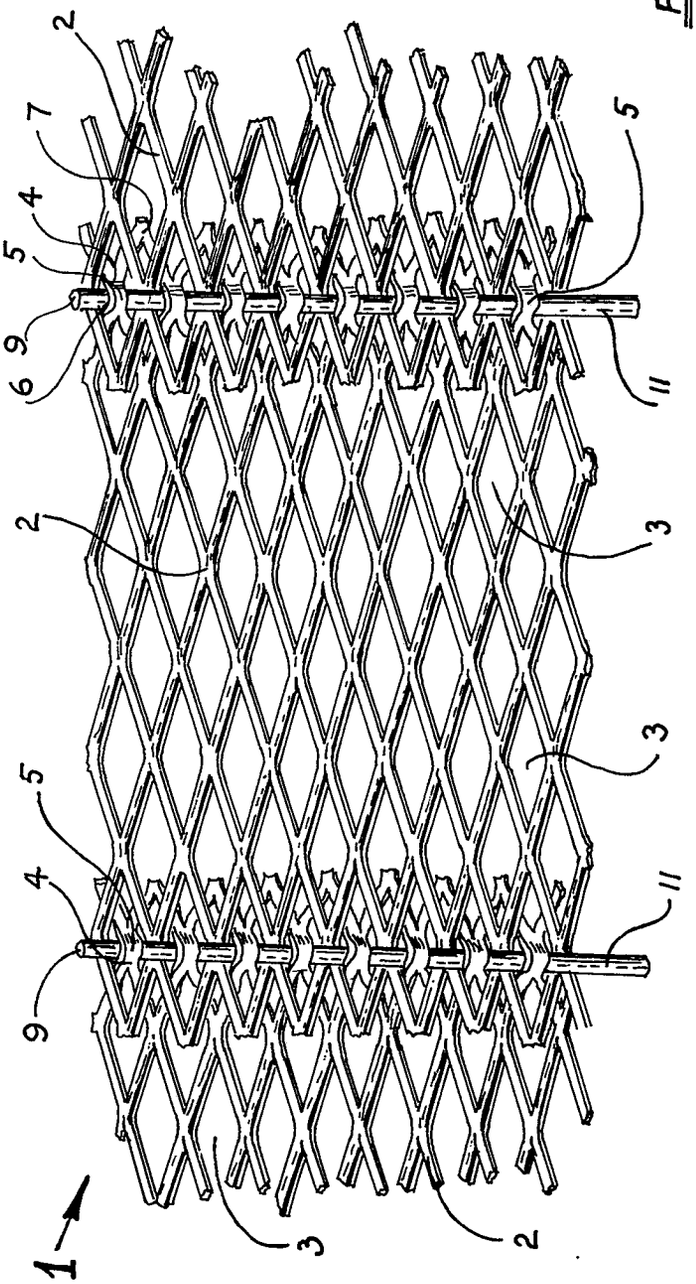

Fig. 1

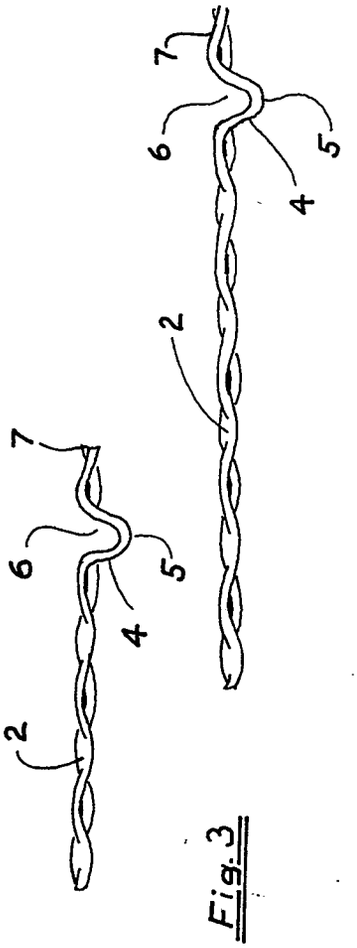

Fig. 3

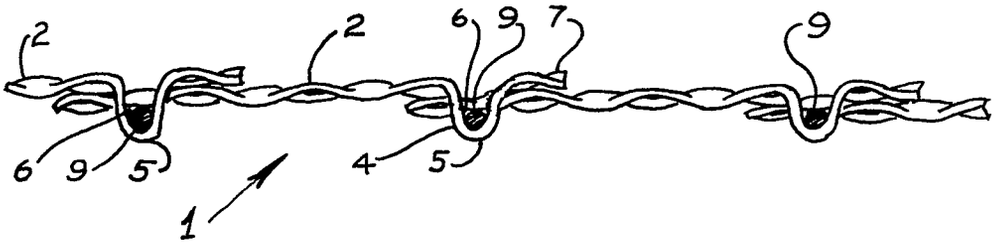

Fig. 2

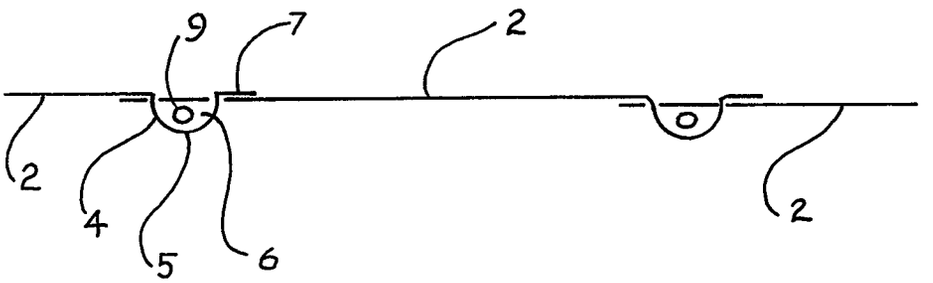

Fig. 4

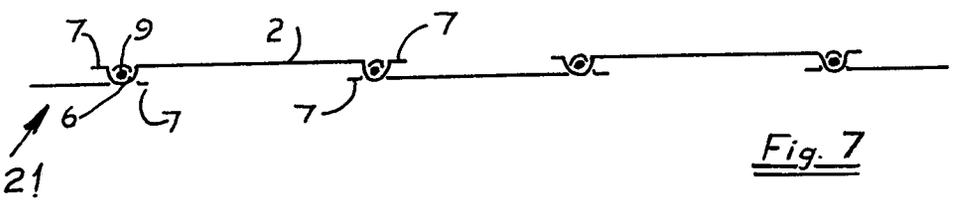

Fig. 7

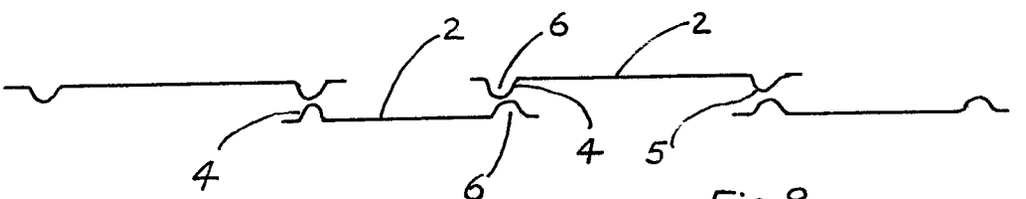

Fig. 8

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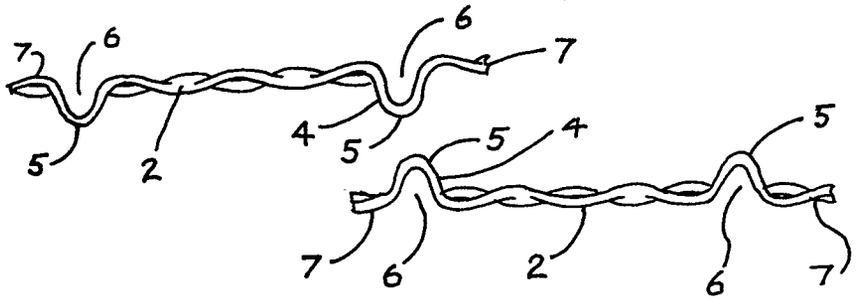

Fig. 6

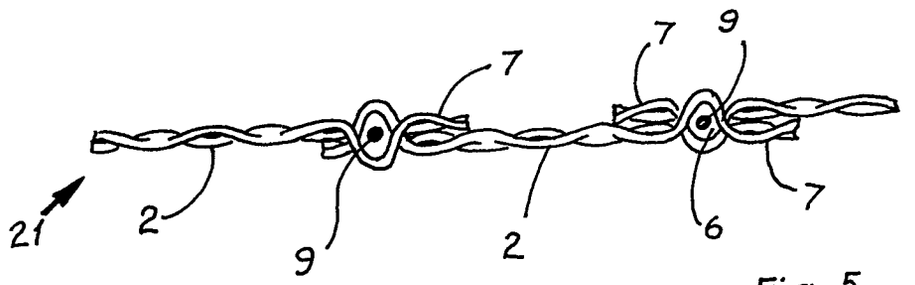

Fig. 5

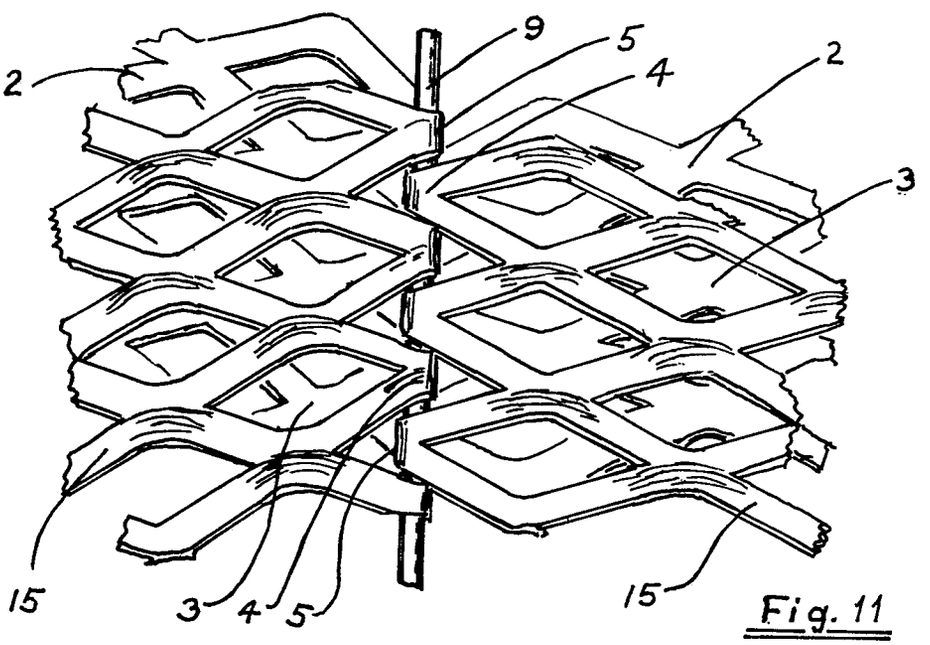

Fig. 11

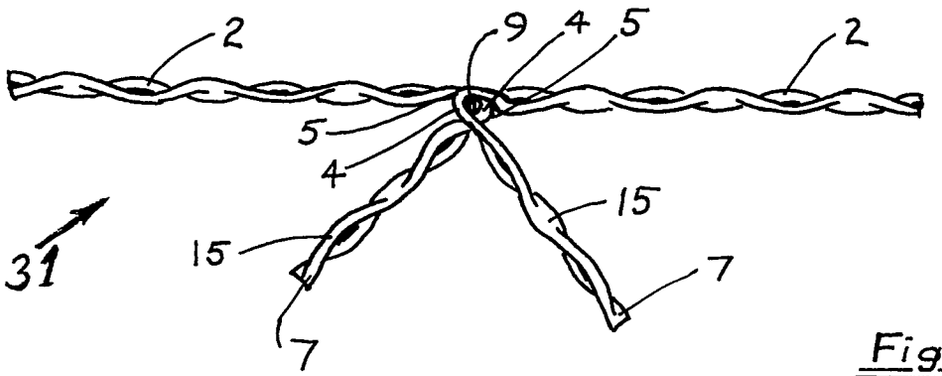

Fig. 10

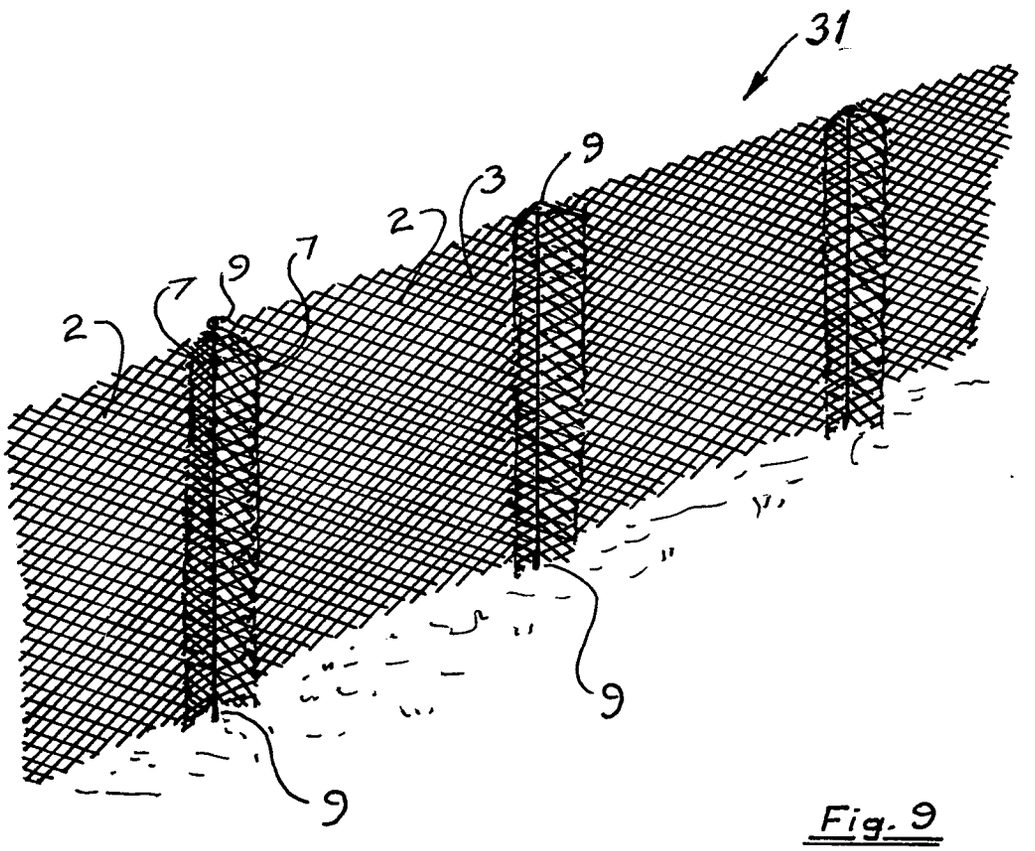

Fig. 9

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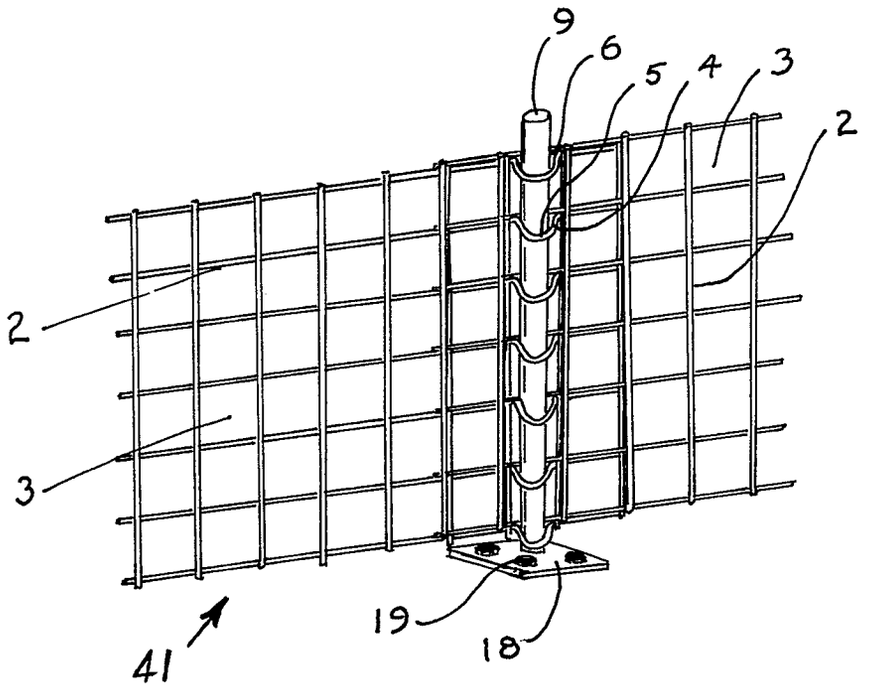

Fig. 12

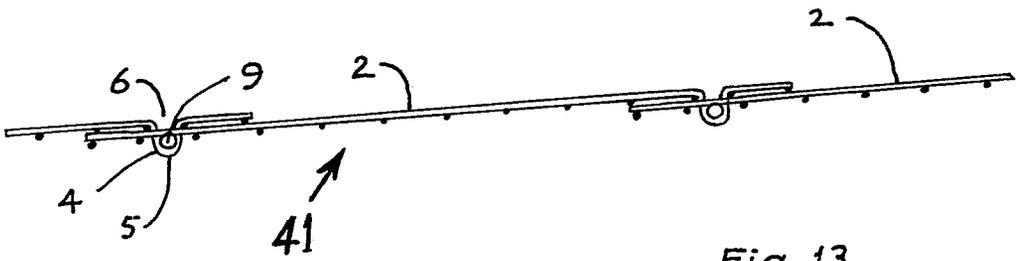

Fig 13

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 82 30 1283.6

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	DE - A - 2 307 164 (SOPHA S.A.) * whole document * --	
A	DE - U - 7 600 989 (R. FENNE GMBH & CO.) * fig. 1 * --	
A	DE - U - 1 782 415 (EISENWERK DRAHT-BREMER GMBH) * fig. 1, 2 * --	
A	FR - E - 80 624 (G.J.M. MERAT) * fig. 3, 4 * ----	

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

E 04 H 17/18
E 04 H 17/04

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

E 04 H 17/00
F 16 B 5/00
E 21 D 11/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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A: technological background
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P: intermediate document
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 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	08-06-1982	v. WITTKEN

EPO Form 1503.1 06.78