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(54) Assemblable elements for realising metal fences

(57) The invention concerns assemblable elements for realising metal fences. These elements are used to realise metal fences of the type comprising panels (1), substantially flat and made with electrically-welded horizontal (1a) and vertical (1b) metal wires, which are fixed to posts (2) which in their turn are fixed to the ground; the horizontal wires have ends (1c, 1c') which are bent and are inserted into through apertures (2a, 2a'), formed in the external surface of the post, each of which apertures has a section slightly greater than that of the bent ends (1c, 1c') of the horizontal wires so as to permit the introduction of these bent ends into the apertures.

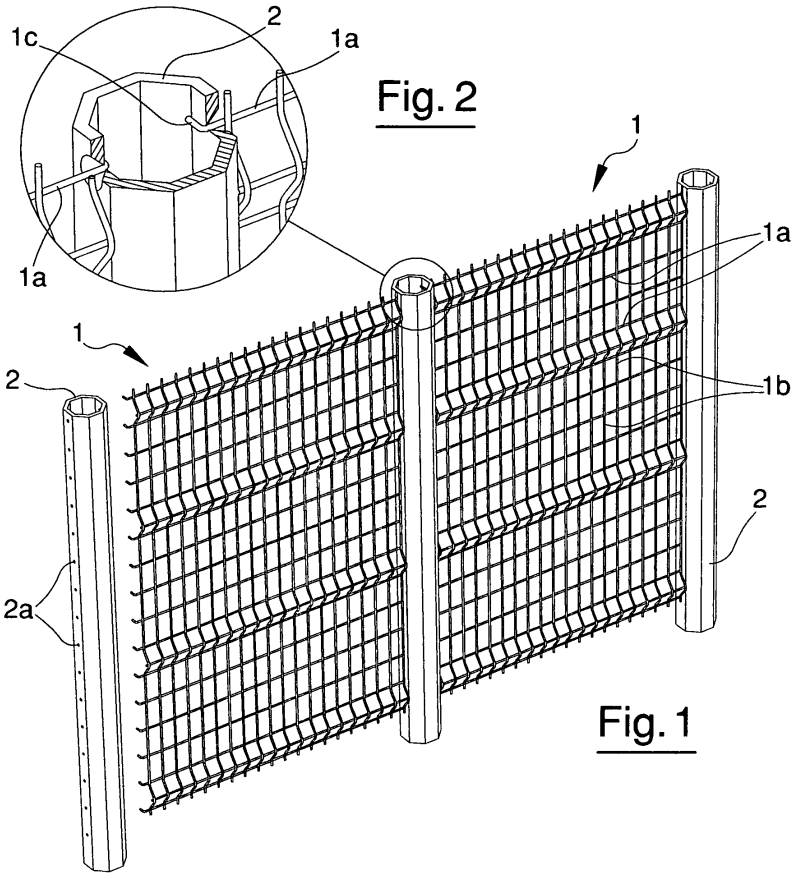

Fig. 2

Fig. 1

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Description

[0001] The present invention concerns assemblable elements for realising metal fences.

[0002] Panels have been in use for some time for realising metal fences, made of electrically-welded metal wires, which in the process of erecting the fence are fixed to posts, which also are made of metal, in various ways; both the panels and the posts are normally, but not always, coated with plastic.

[0003] The panels are elements with generally flat extension and are made by means of intersections of horizontal and vertical wires which are electrically welded in the process of making the panel itself; very often, in order to obtain greater rigidity for the panel, its flat structure is modified by inserting ribs of various shapes and dimensions; these ribs are obtained by bending the vertical wires, and are arranged over rows normally parallel to and spaced apart from each other, forming structures (usually of triangular section), protruding from the plane of the panel, to whose vertex a corresponding horizontal wire is welded. One example of the type of ribs used, which are however known and widely used for these panels, is visible in the drawings.

[0004] Compared with traditional fences formed of panels of framework consisting of metal bars welded to each other, the type of fence described above is very much less expensive and more easily usable; in fact panels made of electrically-welded wires, which normally have a diameter of a few millimetres, can be achieved, starting from coils of galvanised wire, with normal machines for the construction of continuous electrically-welded mesh, and can be easily coated in plastic with known equipment. These panels are in fact normally made by companies which produce electrically-welded meshes, and are supplied to the user finished and ready to be used. Even compared with fences made from meshes in continuous rolls, these types of fence are not only more aesthetically agreeable but also more robust and easier to make. In the course of the description, when speaking of metal fences, we will be referring to fences of post type, which are supplied as free-standing elements, to which are secured, in the process of erecting the fence, panels made with electrically-welded meshes described above.

[0005] Fences of this type are generally erected by fixing a post, connecting one side of a panel to the post, connecting a second post to the other side of the panel, fixing the second post, connecting one side of another panel to the second post, and so on. The posts can be sunk into the ground or can be fixed to supports anchored to fixed structures, such as for example low concrete walls.

[0006] Posts and panels of known type entail a number of disadvantages in the construction of fences of this type.

[0007] In the first place, many fences use posts with special profiled sections, which must therefore be achieved by non-standardised tools, and they often need different posts for erecting horizontal parts of the fence and parts at an angle; some of these posts also require removal from the panel of the parts of the ribs next to the post. Furthermore, erection of many fences with known elements requires special tools, to be used during assembly, or special fixing elements for securing the panels to the posts. An object of the present invention is to eliminate the disadvantages indicated above by providing assemblable elements for realising a fence, having posts, with standard sections, which do not require the removal of any part of the panels nor the use of special tools or special fixing elements to secure the panels to the posts.

[0008] A considerable advantage of the invention is that, once one end of a panel has been fixed to a post, and while waiting for the other end to be fixed to the next post, a "self-supporting" intermediate structure is formed, which therefore allows the complete fence to be assembled by just one person.

[0009] A further advantage of the invention is to be assemblable by connecting the posts to fragments of posts of pre-existing fences.

[0010] These objects and advantages are all achieved by the invention in question as it is characterised in the claims set out below.

[0011] Further characteristics and advantages of the present invention will appear more clearly from the detailed description which follows of embodiments of the invention in question, illustrated by way of nonlimiting example in the attached figures, in which:

- figure 1 shows a perspective view of part of a first embodiment of a fence with some panels connected to posts and with one post to which the panel has not yet been fixed;
- figure 2 shows a partially sectioned view of a detail from figure 1;
- figure 3 shows a view in section of a post of the first embodiment of fence, to which are connected two panels arranged at an angle;
- figure 4 shows a view in section of a post of the first embodiment of fence, to which are connected two panels arranged in a straight line;
- figure 5 shows a perspective view of part of a second embodiment of a fence with some panels connected to posts and with one post to which the panel has not yet been fixed;
- figure 6 shows a partially sectioned view of a detail from figure 5;
- figure 7 shows a view in section of a post of the second embodiment of fence, to which are connected two panels arranged at an angle;
- figure 8 shows a view in section of a post of the second embodiment of fence, to which are connected two panels arranged in a straight line.

[0012] Figures 1 and 5 illustrate part of metal fences which are erected using elements constituted by panels 1 and posts 2. The panels 1 are substantially flat and are

made with horizontal 1a and vertical 1b metal wires, electrically welded; the horizontal and vertical wires of the panels, normally of circular section and of a few millimetres in diameter, are electrically welded in the process of manufacture of the panel itself using normal machines for the manufacture of electrically-welded meshes. In order to obtain greater rigidity for the panel, it is possible to modify the flat structure of the panel by inserting ribs, which can be of various shapes and dimensions, obtained by bending the vertical wires; the ribs are arranged over rows normally parallel to and spaced apart from each other, forming structures protruding from the plane of the panel, to whose vertex a corresponding horizontal wire is welded. An example of these ribs is illustrated in the panels in figures 1 and 5. The posts 2 are generally tubular elements with longitudinal extension and are variously shaped so as to be able to connect the panels to them in order to obtain the fence; these posts are fixed to the ground and are normally sunk into the ground or fixed to supports anchored to fixed structures, such as for example low concrete walls. Both the panels and the posts are normally, but not always, coated with plastic. What is said above forms part of the known art, widely used for these kinds of fence.

[0013] In the elements in question, for forming the fences, at least some of the horizontal wires 1a have both ends 1c, 1c', projecting from the panel, these ends being bent in the same direction with respect to the panel. In the first embodiment illustrated in figures 1 to 4, the ends 1c of the panel are arranged, all on the same side of the panel, on planes inclined with respect to the plane occupied by the panel; in particular the bent ends 1c of the horizontal wires of the panels are arranged at 90° with respect to the plane occupied by the panel. In general the ends of all the horizontal wires are bent, with the exception of any present on the parts of the ribs protruding from the plane occupied by the panel.

[0014] In the second embodiment illustrated in figures 5 to 8, the bent ends 1c' of the horizontal wires are arranged in the same plane as that occupied by the panel, and are all bent in the same direction (in particular, downwards as illustrated in the drawings) and are hook-shaped; for reasons which will be better described below, the ends 1c have hooks in which the internal space between the two branches which define the hook have a width which is greater than the thickness of the material which makes up the lateral surface of the post.

[0015] The posts 2 are formed using internally hollow tubular elements, which allows their manufacture using normal machines for making tubular elements; the section of the posts can be of any shape although, for reasons which will be better specified below, for the posts in question a regular octagonal section is preferred. On each of the posts 2 there are two rows of through apertures 2a, 2a', which are formed in the outer surface of the post with radial axes, i.e. perpendicular to the longitudinal axis of the post; the two rows of holes are arranged in opposite positions with respect to the longitudinal axis of the post, i.e. in the case of a post of octagonal section, on two opposite lateral faces of the post.

[0016] In the first embodiment the apertures consist of holes 2a, each of which has a section slightly greater than that of the bent ends 1c of the horizontal wires; in particular the said holes are oftrunco-conical form, with conicity of 45° facing towards the inside of the post, and have the smaller base of section slightly greater than the section of the horizontal wires, so as to allow the introduction of the bent ends 1c into the holes. In the second embodiment the apertures are formed using slots 2a' of elongated form, whose lower part has a profile suitable for containing a wire of the panel (i.e. it has dimensions slightly greater than the section of the horizontal wires), and whose length, in the longitudinal direction of the post, is greater than the overall width of the hook-shaped end 1c' of the horizontal wires; in this embodiment also, the slots, like the holes in the first embodiment, can have a shape diverging towards the outside. In proximity to the lower part of each slot is solidly connected a tongue 3, which extends internally to the post in a radial direction, whose thickness is less than the width of the space in the inside of each hook. In particular, each of the said tongues 3 is formed by bending, towards the inside of the post, the part of the lateral surface of the post which is partially cut to form the respective slot 2a' and which remains connected to the lateral surface of the post at the bottom of the slot 2a'. In other words, the outline of slot 2a' is cut through only at the top, and the cut area of the lateral surface of the post, which remains connected to the post at the bottom of the slot, is bent towards the inside of the post to form the tongue 3 of the corresponding slot. Obviously, although with greater constructional difficulty, the tongues could be elements formed separately and subsequently welded to the ends of the slots which, in this case, would have been formed with a through cut over their entire perimeter. For reasons which will be more fully explained below, the length of the tongues, in other words their projection inside the post, is less than the distance between the hook-shaped ends and the vertical wire of the panel closest to these ends; their inner part, furthermore, can conveniently be rounded.

[0017] The apertures in each row are spaced apart, in a longitudinal direction, by the same distance as the distance between horizontal wires of the panel, or by a submultiple of it, in such a way as to permit the simultaneous entry of each bent end of these horizontal wires into one of the apertures. The presence of apertures at distances which are a submultiple of the distance between the horizontal wires of the panel allows precise placement of the panels in the case of fences to be erected on terrain with variable soil levels.

[0018] To avoid the possibility of rainwater running down the inside of the posts, the top of the posts is closed with a cap, not illustrated in the drawings, an item however which is common for posts exposed to atmospheric agents; in order to avoid any water entering through ap-

ertures 2a, 2a' from collecting inside the post, a through aperture, not illustrated in the drawings, can conveniently be provided at the base of the post, to allow the exit of any water inside the post itself.

[0019] The procedure for erecting fences using the elements in question is as follows.

[0020] A post is fixed to the ground, sinking it into the soil or fixing it to supports anchored to fixed structures, such as for example low concrete walls; if there are fragments of posts of pre-existing fences, the hollow structure of the posts in question can often allow the posts themselves to be fitted over the pre-existing fragments and fixed to them, for example by bolts, welding or poured concrete as necessary. One side of a panel is then connected to the post, by inserting the bent ends of one side of the panel into the appropriate apertures 2a, 2a' of a row of apertures in the post. In the first embodiment this operation is carried out very simply by sliding the bent ends 1c into the holes 2a, keeping these ends coaxial with the holes and rotating the panel once these ends have entered the holes themselves. In the second embodiment this operation is again simply carried out by keeping the panel in line with the post and sliding the hooked ends 1c' into the slots 2a' until the hooks have passed inwards by further than the length of the tongues, an operation made possible by the fact that the length of the tongues is less than the distance between the hook-shaped ends and the vertical wire of the panel closest to these ends; the panel is then lowered until each horizontal wire has reached the bottom of the relative slot, and pulled outwards so that the tongues fit into the space in the inside of the relative hook.

[0021] In the case of rectilinear portions of fence, once the bent ends have been slid into the apertures, in the first embodiment the panel is rotated through 90° so that the horizontal wires are located coaxially with the axis of the holes themselves, whereas in the second embodiment the panel is already in line with the posts; these configurations are illustrated in figures 1, 2, 4 and 5,6,8. In the case of corner portions of fence, on the other hand, once the bent ends have been slid into the apertures, the panel is rotated through 45°. In the first embodiment the horizontal wires are located with their axis at 45° to the axis of the holes themselves, and this operation is considerably facilitated by the 45° chamfering of holes 2a. In the second embodiment, in addition to the divergence of the slots towards the outside, this operation can be facilitated by the fact that the inside of the slots can be rounded; even if the panel is rotated, however, the hook-shaped ends remain each engaged on its respective tongue.

[0022] Even the regular octagonal shape of the posts (which have internal angles of 135°, i.e. a right angle +45°) facilitates this operation in both embodiments and allow corner portions of fence to be achieved with a very precise right angle, using the same posts as are used for the rectilinear portions of fence. These configurations are illustrated in figures 3 and 7.

[0023] It should be noted that the configuration with right angle is the most frequent in corner portions of fencing. The conformation of the elements which make up the fencing however allows corner portions of fencing to be easily achieved with angles between 90° and 180°; a slight degree of forcing however allows corner portions of fencing to be achieved with angles below 90°, although this situation is not very common nor much used.

[0024] Once one side of the panel has been connected to a fixed post, the panel is self-supporting and does not need a person or any equipment to remain in position; this allows the erection of the fence by a single person without any special equipment.

[0025] A second post is then connected to the other side of the panel, which is still free; this operation is performed according to the procedure described above, by fitting the apertures in the post onto the bent ends of the free side of the panel, whose other side has been previously fixed to the previous post. The second post is then rotated through the appropriate angle to obtain a rectilinear or corner stretch of fence, and is then fixed to the ground. In this way the panel is definitively connected to the fenceposts and can no longer be removed, except obviously if it is cut or the post uprooted, since even if considerable pressure is exerted on the panel, the bent ends prevent the panel from being detached from the posts.

[0026] Starting from the second post, the operations described are then repeated, using other panels and other posts, so as to erect the fencing along the desired perimeter.

[0027] Both embodiments achieve the indicated objects; the differences lie solely in the fact that the first embodiment is simpler to realise (both the holes and the 90° bends are easier to form than the slots and the hook-shaped bends), while the second embodiment offers greater security against the fence being broken through (the hooks fitted onto the tongues in the second embodiment are more difficult to disengage than the ends bent through 90° as in the first embodiment).

Claims

1. Assemblable elements for realising metal fences of the type comprising substantially flat panels (1), made with electrically-welded horizontal (1a) and vertical (1b) metal wires, which in the process of erecting the fence are fixed to posts (2) which in their turn are fixed to the ground at one of their ends, **characterised in that**: at least some of the horizontal wires have both ends (1c, 1c') bent in the same direction; each of the posts (2) is internally hollow and has two rows of through apertures (2a, 2a'), formed in the external surface of the post with radial axis and in positions opposite each other with respect to the longitudinal axis of the post, each of which openings has at least one part of section slightly greater

than that of the bent ends (1c, 1c') of the horizontal wires; the openings in each row are spaced apart, in a longitudinal direction, by the same distance as the distance between horizontal wires of the panel, or by a submultiple of it, in such a way as to permit the simultaneous introduction of each bent end of these horizontal wires into one of the apertures.

2. Elements according to claim 1, **characterised in that**: the said bent ends (1c) of the horizontal wires of the panels are arranged on planes inclined at 90° with respect to the plane occupied by the panel itself; the said apertures are formed by means of holes of trunco-conical form, with conicity of 45° facing towards the inside of the post, and have the smaller base of section slightly greater than the section of the horizontal wires.

3. Elements according to claim 1, **characterised in that:** the said bent ends (1c') of the horizontal wires of the panels are arranged on the same plane as is occupied by the panel and are conformed to a hook shape; the said apertures are formed using slots (2a') of elongated form, whose lower part has a profile with dimension slightly greater than the section of the horizontal wires, and whose length, in the longitudinal direction of the post, is greater than the width of the end bent into a hook shape of the horizontal wires (2a'); in proximity to the lower part of each slot is solidly connected a tongue (3), which extends internally to the post in a radial direction, whose thickness is less than the width of the space in the inside of each hook.

4. Elements according to claim 3, **characterised in that** each of the said tongues (3) is formed by bending, towards the inside of the post, the part of the lateral surface of the post which is partially cut to form the said aperture (2a') and which remains connected to the lateral surface of the post at the bottom of the aperture (2a').

5. Elements according to claim 1, **characterised in that** the said posts are located with the apertures (2a, 2a') coaxial with the horizontal wires (1a) in the portions of rectilinear fencing, and with the apertures (2a, 2a') with axis at 45° to the axis of the horizontal wires (1a) in the portions of fencing with corner.

6. Elements according to claim 1, **characterised in that** the said posts are tubular with regular octagonal section.

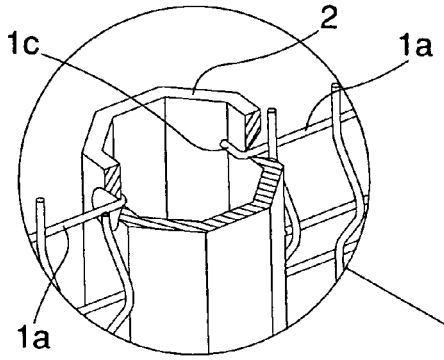


Fig. 2

Fig. 1

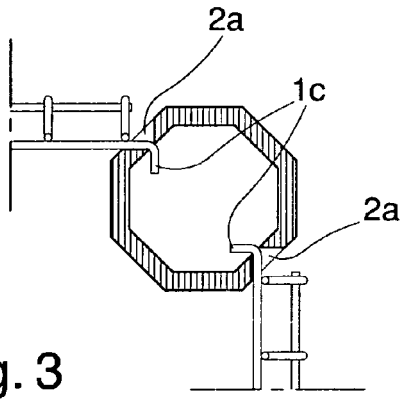


Fig. 3

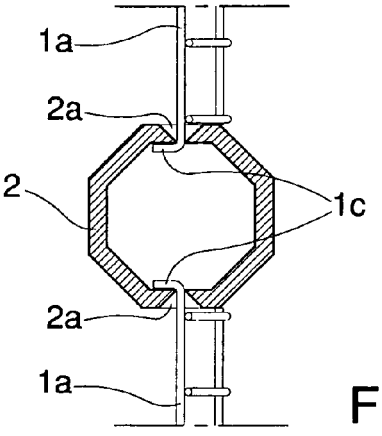


Fig. 4

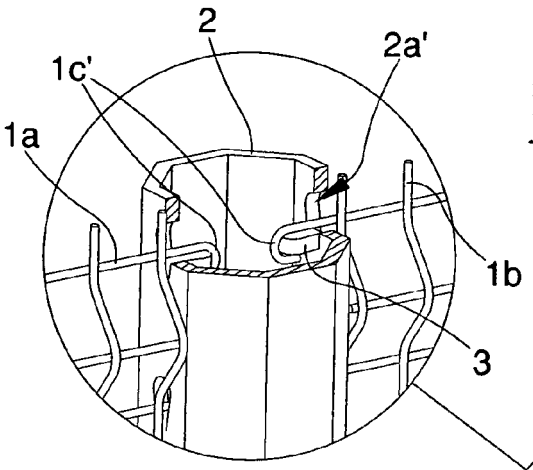
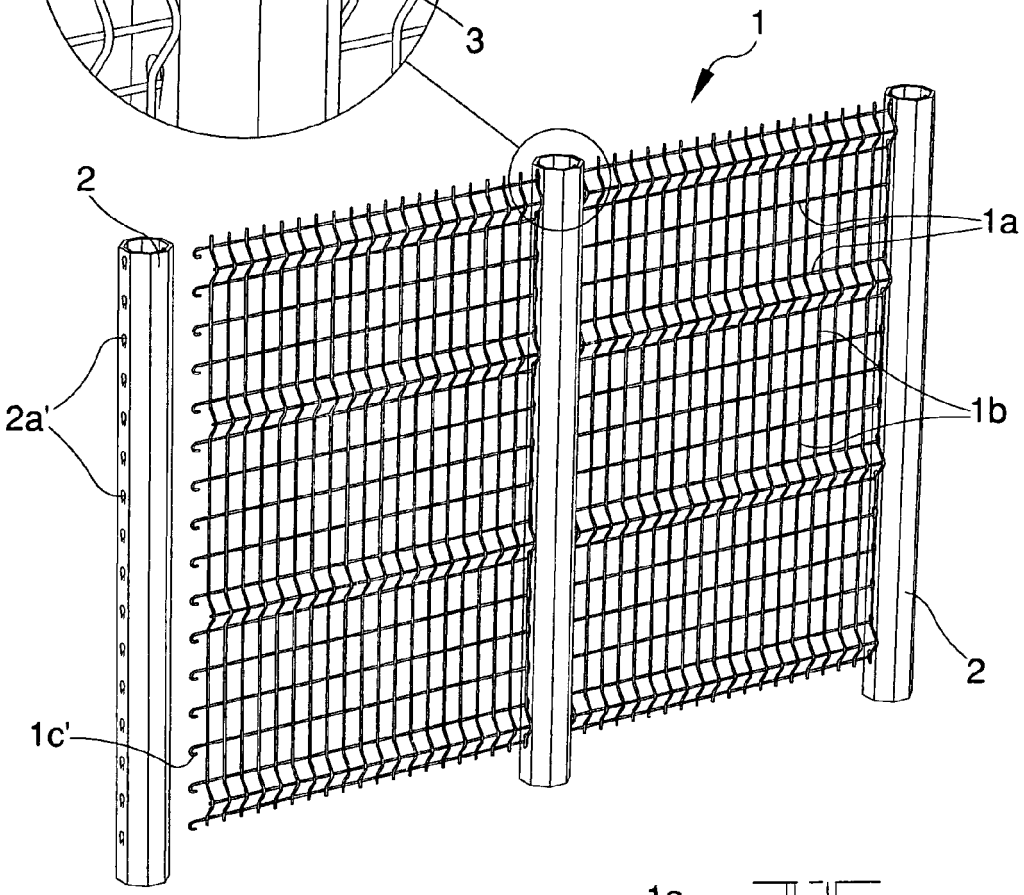


Fig. 6

Fig. 5



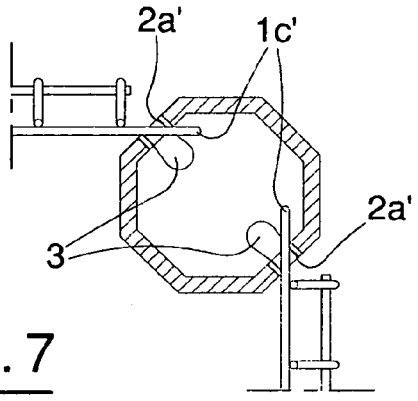


Fig. 7

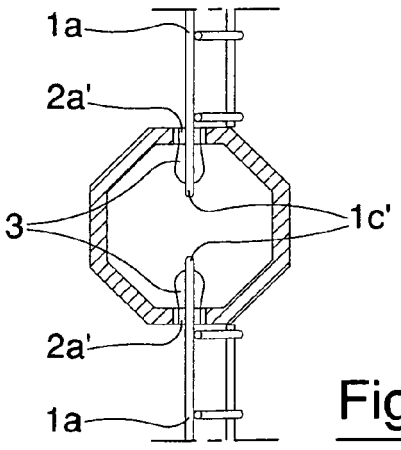


Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5748

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 230 280 A (HARDMAN DAVID GARY [GB]; HARDMAN GAY ANDREA [GB]) 17 October 1990 (1990-10-17)	1	INV. E04H17/16
A	* page 3, line 14 - page 4, line 7 * * page 4, line 28 - page 5, line 31; figures *	2	

A	US 5 746 040 A (YOUNG RONALD A [US] ET AL) 5 May 1998 (1998-05-05) * the whole document *	1,3	

			TECHNICAL FIELDS SEARCHED (IPC)
			E04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 May 2008	Porwoll, Hubert

CATEGORY OF CITED DOCUMENTS

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27-05-2008

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