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(54) **Artificial tree to camouflage antennas**

(57) Artificial tree to camouflage antennas comprising a trunk (12) suitable to cover a pole (15) supporting the antenna (11) and branches (13) suitable to hide the antenna (11), each branch (13) comprising two or more tubular elements (27) axially coupled together, a first tubular element (27a) being suitable to be coupled with a corresponding appendix (17) solid with the pole (15), the tubular elements (27) being covered with a casing (32) suitable to achieve a monolithic structure and the first tubular element (27a) being equipped with constraining means suitable to couple the branch (13) to the pole (15) in a removable fashion.

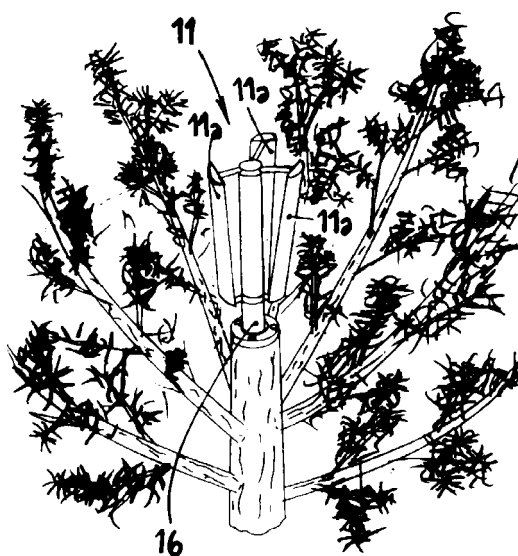


fig.6

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Description

FIELD OF THE INVENTION

[0001] This invention concerns an artificial tree to camouflage antennas and the antenna supporting structures as set forth in the main claim.

[0002] The invention is used to camouflage any type of antenna and the relative supporting structure in order to reduce the aesthetic conflict with the surrounding environment.

[0003] In the following description, the term "antenna" should be taken to mean any device suitable to emit or receive electromagnetic waves, whether it be of the monopole type, panel type, dish type or otherwise.

BACKGROUND OF THE INVENTION

[0004] The problems caused by the installation of antennas, for example for cellular telephone systems, radio bridges and so on, in areas of great historic or environmental value, whether in the town or in the country, are well-known.

[0005] The antennas have to be located at a considerable height from the ground and, while this is not a great problem in industrialised areas, in other areas the presence of poles, towers and pylons has an extremely negative impact on the environment.

[0006] This problem is at present a very topical one, also because there is an ever growing diffusion of public networks or particular technological sectors such as for example telecommunications and cellular telephone systems which require an ever greater number of antennas distributed over a large part of the territory.

[0007] To limit this environmental impact, there have been proposals for poles for antennas shaped like a tree wherein the antennas are located at the top and hidden by foliage made of synthetic materials.

[0008] The European Patent EP-0 791 976, for example, provides to use a pole which has an upper part, where the antenna is installed, on which attachment means for artificial foliage are provided.

[0009] The attachment means consist of an annular clamp suitable to be locked onto the pole, equipped on the outer perimeter with a plurality of radial plates each of which is suitable to support, at a defined angle of inclination with respect to the pole, the lower end of a rod.

[0010] Artificial foliage made of plastic material, suitable to reproduce the branches of a palm-tree, is tied to every rod, which is made of thermoplastic material and has a substantially square transverse section.

[0011] The annular clamp and the lower end of the rods are covered with partly overlapping shells and the rest of the pole with coaxial sleeves; the shells and sleeves are made of fiber glass and are conformed to simulate the trunk of a palm-tree.

[0012] One disadvantage of EP-0 791 976 is that it allows to achieve only artificial trees conformed as palm-trees or similar since the attachment means proposed are not suitable to support substantially horizontal branches or at least to allow very thick and compact foliage to be achieved, such as for example like a conifer.

[0013] The solution proposed therefore can only be used in areas with a hot climate where palm-trees are very common.

[0014] The US patent US-5,611,176 is also known to the state of the art; on the one hand it solves the problem of reproducing other trees apart from palm-trees, but on the other hand it has other disadvantages.

[0015] This patent teaches to cover the surface of a pole, suitable to support an antenna at the top, with a mesh made of plastic material which is then covered with a layer of epoxy resin.

[0016] The layer of epoxy resin is subjected to a surface treatment, for example molding, which allows to make it similar to the bark of the tree which is to be imitated.

[0017] When the resin is polymerized, it is painted with an epoxy paint of a color similar to the surface of the bark which is to be imitated.

[0018] At certain points on the surface of the pole a plurality of tubes are welded, each of which is suitable to support a respective branch.

[0019] The branches are made with segments of tube made of polyvinyl chloride (PVC), fitted and glued together one after the other slightly off-axis so as to obtain segmented branches.

[0020] The branch thus obtained is then covered with a layer of epoxy resin which, after polymerization, is painted.

[0021] The first segment of tube of the branch has a larger diameter than the others and is fitted onto the respective tube which is solid with the pole.

[0022] The branches not only do not greatly resemble real branches, but also have a structure which is not very resistant to mechanical stresses, atmospheric agents and ageing.

[0023] To be more exact, the segments of tube thus assembled have a very low resistance to bending and cutting and are therefore not very suitable to support the stresses caused by strong wind, a load of snow or ice on the foliage.

[0024] The vibrations to which the branch is subjected because of the wind, moreover, can lead to the branch coming off the respective segment of tube, which can compromise the overall appearance of the artificial tree but above all constitute a danger for people.

[0025] Moreover, US-5,611,176 allows to provide finished artificial trees with characteristics and dimensions which can be varied exclusively during the planning or production stage.

[0026] Another disadvantage encountered in arti-

cial trees made according to both US-5,611,176 and EP-0,791,976 is that the layer of paint applied on the epoxy resin to give it the desired color has a limited duration and resistance to external agents.

[0027] To be more exact, if subjected to scratches or abrasions, the layer of paint shows the natural color of the underlying epoxy resin, which compromises the aesthetic appearance of the artificial tree.

[0028] Furthermore, the systems to attach the antennas used in such patents are substantially of a conventional type and made with metallic elements which do not easily lend themselves to being camouflaged as artificial trees reproducing different species from those proposed.

[0029] US-5,611,176 moreover, proposes a system to anchor the pole to the ground which, although it ensures a good hold, is not suitable to perfectly resemble an artificial tree.

[0030] This patent teaches to achieve tufts of needle-shaped leaves using the same technology used in the bottle brushes employed to clean the insides of bottles or the barrels of fire arms.

[0031] Instead of using two metal wires twisted together, however, two wires of plastic material are used and instead of the bristles filaments of green plastic material are used.

[0032] The filaments of green plastic material are held to the two twisted wires by means of gluing with a polymerizable resin.

[0033] In this embodiment there are problems in the application and adhesion of the resin to the two twisted wires.

[0034] The present Applicant has devised and embodied this invention to overcome the shortcomings of the state of the art and to obtain further advantages.

SUMMARY OF THE INVENTION

[0035] The invention is set forth and characterised in the main claim, while the dependent claims describe other innovative characteristics of the invention.

[0036] The purpose of the invention is to provide an artificial tree which is quick and easy to achieve and install and suitable to camouflage any type of antenna.

[0037] A second purpose of the invention is to achieve an artificial tree which perfectly resembles natural trees and which offers maximum versatility of use, which can be assembled on site and structurally adapted to contingent situations or specific uses of the antenna, suitable to be perfectly integrated into most environments.

[0038] A further purpose of the invention is to provide embodiments suitable to ensure an optimum mechanical resistance, to atmospheric agents and to ageing.

[0039] The artificial tree according to the invention has a modular structure defined by a plurality of components which can be assembled and are suitable to be

associated with a pole used to support an antenna of any type.

[0040] To be more exact, the modular components are suitable to define a bark used to cover the supporting pole and a foliage suitable to hide the antennas.

[0041] The bark comprises a plurality of autonomous elements suitable to couple together and to cover the supporting pole.

[0042] In a first embodiment according to the invention, the elements are substantially cylindrical in conformation, or shaped slightly like a truncated cone; they are made of a material which is at least partly deformable elastically and equipped with at least a longitudinal aperture or cut.

[0043] Thanks to this characteristic of elastic deformability, it is possible to widen each cylindrical element when it is associated with the pole to allow it to be inserted thereon.

[0044] In another embodiment according to the invention, every element defining the bark consists of two or more semi-shells suitable to be coupled together to define a substantially cylindrical, or slightly truncated cone shape.

[0045] According to a variant, which can be applied to both embodiments, these elements can be made with one or two layers or meshes of high resistant fibers which are impregnated and covered with a polymerizable resin.

[0046] In the preferential embodiment of the invention, the elements are made by molding using molds suitable to reproduce the roughness of natural bark.

[0047] According to a variant, the same polymerizable resin is also used to close the longitudinal aperture of the first type of element, to weld the semi-shells of the second type of elements together and to couple the elements overlapping along the pole to each other.

[0048] According to one characteristic of the invention, the polymerizable resin is neutral in color and pigments are added thereto in order to give it the desired coloring.

[0049] The bark achieved with this method, therefore, has no problem of discoloration, abrasion or scratches and hence does not need maintenance and has a practically unlimited working life.

[0050] Moreover, by applying several layers of different colored polymerizable resins to the modular elements, it is possible to obtain variations in color typical of the bark of the chosen species of tree.

[0051] With this embodiment, it is possible to achieve trees of any height, according to the height of the supporting tree, simply by adding or subtracting a defined number of modular elements.

[0052] The branches according to the invention are defined by several segments of tube, of a gradually decreasing diameter towards the outer end of the branch, axially coupled together.

[0053] The first part of the branch, that is to say, the part facing the trunk, is suitable to be attached to a mat-

ing appendix solid with the pole.

[0054] This first part, which is normally the part most subject to stresses, is made of a segment of tube with high resistance to mechanical stresses.

[0055] According to one embodiment of the invention, the first part is reinforced with high resistance fibers such as for example fiber glass impregnated with polyester resin.

[0056] According to a variant, the segment of tube is made by a process of coiling continuous fiber glass using a polymerizable resin as a binding element (filament-winding).

[0057] The other parts of the branch are achieved with segments of tube made of plastic material such as for example polyvinyl chloride (PVC).

[0058] There is no problem, with these segments of tube, that they might accidentally come loose, since they are axially coupled together.

[0059] With this invention, moreover, this problem is avoided since, once they are coupled, the segments of tube are completely covered with casings made of high resistance fiber glass impregnated with pigmented polymerizable resin.

[0060] Once the resin has polymerized, the casings make the structure of the branch substantially monolithic.

[0061] Should it be desired to give the branches a substantially curved development, the invention provides to bend the segments of tube made of thermoplastic material when hot, before they are covered by the sheathes made of resin-impregnated fibers.

[0062] According to the invention, the first part of the branch and the corresponding appendix on which the first part is fitted are equipped with coupling means suitable to retain the branch in the correct position and prevent the latter from accidentally coming loose.

[0063] Although extremely stable, the coupling achieved by these attachment means is not however of the permanent type and it is possible to rapidly remove the branch from the artificial tree at any moment, for example to facilitate the maintenance of the antenna.

[0064] Then the desired type of foliage is associated with the branches thus obtained.

[0065] According to a preferential embodiment of the invention, the artificial tree is suitable to reproduce a conifer and the foliage is therefore of the needle-shaped type.

[0066] In this embodiment, the tufts of needle-shaped leaves are made with filaments or similar made of plastic material which are arranged transversely between two or more rows of high resistance continuous fibers or roving, for example fiber glass, the fibers being parallel and impregnated with polymerizable resin.

[0067] The rovings are then twisted together so as to retain the filaments and, subsequently, the resin is polymerized using, advantageously but not exclusively, a source of ultra-violet light to accelerate the process.

BRIEF DESCRIPTION OF THE DRAWINGS

[0068] These and other characteristics of the invention will be evident from the following description of some preferred forms of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

Fig. 1	shows an artificial tree according to the invention to camouflage antennas;
Fig. 2	shows the artificial tree as in Fig. 1 before the branches are associated;
Fig. 3	shows a detail of a possible attachment system used to constrain the tree as shown in Fig. 1 to the ground;
Fig. 4	shows a modular element used to achieve the bark of the trunk of the artificial tree shown in Fig. 1;
Fig. 5	shows a variant of Fig. 4;
Figs. 6 and 7	show two possible embodiments of antennas which can be camouflaged with the artificial tree according to the invention;
Fig. 8	shows the modular elements as in Fig. 4 associated with the pole supporting the antennas;
Fig. 9	shows the enlarged section from A to A of Fig. 8;
Fig. 10a	shows a branch of the tree as in Fig. 1 in a first production step;
Fig. 10b	shows the branch as in Fig. 10a in a subsequent step;
Fig. 11	shows the enlarged section from B to B of Fig. 10b;
Fig. 12	is a part view of the branch as in Fig. 10b during its association with the tree as in Fig. 2;
Fig. 13	shows the foliage used in the artificial tree as in Fig. 1;
Fig. 14	shows the enlarged section from C to C of Fig. 13;
Fig. 15	shows an enlarged detail of Fig. 13.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0069] With reference to Fig. 1, an artificial tree according to the invention is used to camouflage a system of antennas 11 of the type normally used in cellular telecommunications systems, of which two possible embodiments are shown in Figs. 6 and 7.

[0070] To be more exact, the system of antennas 11 comprises three directional antennas 11a provided in close proximity in Fig. 6 and distanced in Fig. 7.

[0071] The system of antennas 11, however, may be replaced by a system comprising antennas of another type, such as for example a monopole, a panel or a dish.

[0072] In this case, the artificial tree 10 is able to simulate a conifer of the *Pinus nigra* species, commonly known as the black pine or Austrian pine.

[0073] The *Pinus nigra* can easily be imitated since it has a straight trunk with substantially horizontal branches, very regular and defining a conical-pyramidal foliage, very thick and compact and hence very suitable to camouflage antennas.

[0074] These plants, moreover, can reach heights of up to 20-30 metres, and therefore are optimal models to achieve artificial trees 10 suitable to camouflage antennas which need to be installed at a great height.

[0075] According to a variant, not shown in the drawings, the artificial tree 10 is able to simulate a conifer of the *Pinus pinea* species, commonly known as cluster pine.

[0076] The artificial tree 10 according to the invention has a modular structure comprising, in its essential parts, a trunk 12 and branches 13.

[0077] The trunk 12, in turn, has a modular structure defined by a plurality of elements 14 suitable to be superimposed and associated with each other so as to simulate bark which surrounds and hides a metal pole 15 equipped at the upper end with supporting elements 16, of which some possible forms of embodiment are shown in Figs. 6 and 7, for the system of antennas 11.

[0078] The metal pole 15, as shown in Fig. 2, is shaped substantially like a truncated cone and is equipped, on the upper part, with a plurality of radial appendices 17, each of which is suitable to constrain a respective branch 13, as will be explained in more detail later.

[0079] According to a variant, not shown in the drawings, the pole 15 has a truncated pyramidal shape having at least fifteen sides.

[0080] On the lower end of the pole 15 there are constraining means 22 which allow to make the pole 15 solid with the ground 23.

[0081] In this case, the constraining means 22 comprise a flange 24 which is attached in a conventional manner to tie bars 25 constrained to a concrete cast 26.

[0082] As can be seen in Fig. 3, the concrete 26 is made in the ground 23 at a desired depth so as to give the trunk 12 a realistic appearance.

[0083] In this case, the appendices 17 consist of segments of metal tube 18 welded to the pole 15 orthogonally, or with a defined angle of inclination.

[0084] According to one characteristic of the invention, the modular elements 14 are suitable to be coupled to the pole 15 by intervening laterally thereto.

[0085] According to a first solution shown in Fig. 4, each modular element 14 comprises two semi-shells, respectively 14a and 14b, which can be coupled together so as to define a shell shaped substantially like a truncated cone, and suitable to surround the pole 15.

[0086] According to a variant which is not shown here, each modular element 14 is made with three or more semi-shells.

[0087] In the embodiment shown in Fig. 5, the elements 14 are defined by a single shell, shaped substantially like a truncated cone, elastically deformable and equipped with a longitudinal aperture or cut 19.

[0088] The characteristic of elastic deformability allows to widen each shell 14 until it is possible to insert it onto the pole 15 by acting laterally thereto.

[0089] According to the invention, the modular elements 14 are made by contact molding, using polymerizable resins reinforced with high resistance fibers, such as for example glass or carbon disposed like a reed-matting.

[0090] According to one characteristic of the invention, the polymerizable resins are neutral in color and pigments are added thereto; the pigments are natural or artificial in origin and are suitable to give the resins a desired coloring such as, for example in the case of a *Pinus nigra*, grey-brown-blackish.

[0091] Using pigmented resins allows to achieve elements 14 with a more natural color than by using a surface painting process, and prevents scratches or abrasions from compromising the aesthetic appearance of the trunk 12.

[0092] According to the invention, the molds used to produce the elements 14 are made of silicon rubber or similar and are suitable to reproduce the roughness and longitudinal ribbed structure typical of natural bark.

[0093] With this invention it is possible to achieve artificial trees 10 of any height simply by varying the number of modular elements 14 to be associated with the pole 15.

[0094] The individual modular elements 14, moreover, can easily be shortened in order to allow, for example, to adapt them to specific installation requirements.

[0095] It is very easy to couple the individual modular elements 14 to the pole 15, as shown in Fig. 8, and provides that the corresponding edges 114 of each individual modular element 14 are made to coincide. The modular elements 14 are fixed to the pole 15 by means of gluing performed along a single directrix.

[0096] Subsequently the edges 114 are covered with a layer 21 of polymerizable resin (Fig. 9) of the same type used to achieve the modular elements 14.

[0097] The same method is used to associate the superimposed modular elements 14 (Fig. 8).

[0098] According to a variant, the modular elements 14 can be finished with surface applications of pigmented resin of a different color from the basic color used, so as to make the trunk 12 even more realistic.

[0099] As shown in Fig. 10a, each branch 13 comprises a plurality of tubular elements 27 of a gradually decreasing diameter, in this case five, respectively 27a, 27b, 27c, 27d and 27e, axially fitted and glued together.

[0100] In this case, the tubular elements 27, except for the first 27a, are bent under heat in such a manner as to achieve curved branches 13.

[0101] According to the invention, the first tubular element 27a is suitable to couple with the respective

tubular metal segment 18 and for this purpose is equipped with a through hole 28 suitable to align with a corresponding through hole 29 made in the same tubular metal segment 18.

[0102] A pin 30 is suitable to be inserted into the aligned holes 28 and 29 and is held in position by a split pin 31 (Fig. 12).

[0103] The pin 30 prevents the branch 13 from accidentally coming loose from the tubular metal segment 18 but it allows to detach the branch 13 at any moment to facilitate, for example, the replacement or maintenance of the system of antennas 11.

[0104] The first tubular element 27a is the one which is most subject to mechanical stresses and therefore is made with a polymerizable resin reinforced with high resistance fibers, such as for example fiber glass.

[0105] The remaining tubular elements 27b-27e may be made with less resistant materials such as for example polyvinyl chloride (PVC).

[0106] According to one characteristic of the invention, once the tubular elements 27 have been fitted and glued together as shown in Fig. 10a, they are entirely covered (Figs. 10b and 11) with a casing 32 made of a web of high resistance fibers, for example glass, impregnated with pigmented polymerizable resins.

[0107] In this case too, the polymerizable resin may be surface treated, for example with molds or matrixes in silicon rubber, in order to make grained and ribbed structures similar to those of real branches.

[0108] The branches 13 thus achieved not only are very similar in appearance to real branches, but also they are very resistant to mechanical stresses since they have a monolithic structure.

[0109] When the resin has polymerized, a plurality of little tubes 33 are coupled onto the branch 13, welded to the respective tubular elements 27a-27e with resin and fiber glass; they are suitable to accommodate and retain secondary branches or foliage 34 of the type shown in Fig. 13, or of any other type.

[0110] The foliage 34 is made with filaments made of plastic material, for example polyvinyl chloride (PVC), which are arranged transversely between three rows of fiber glass or carbon (roving) 36, temporarily held parallel, impregnated with polymerizable resin.

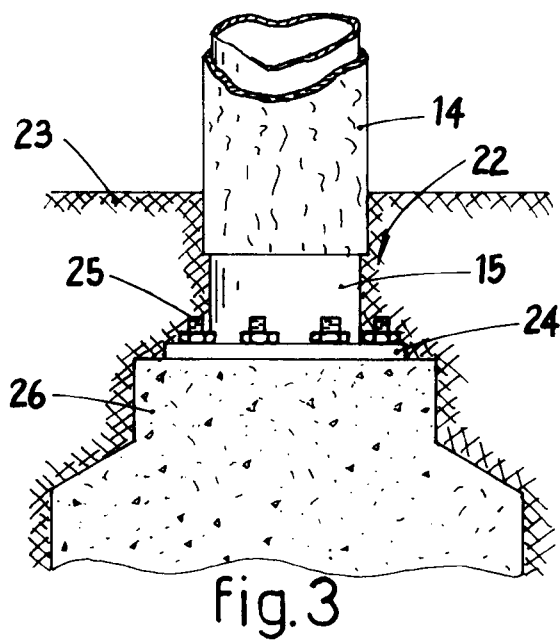
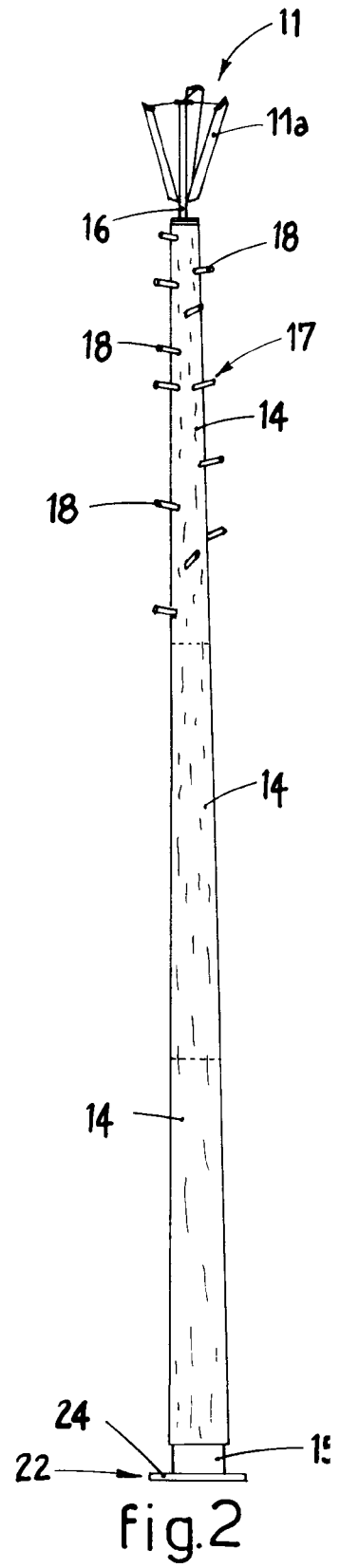
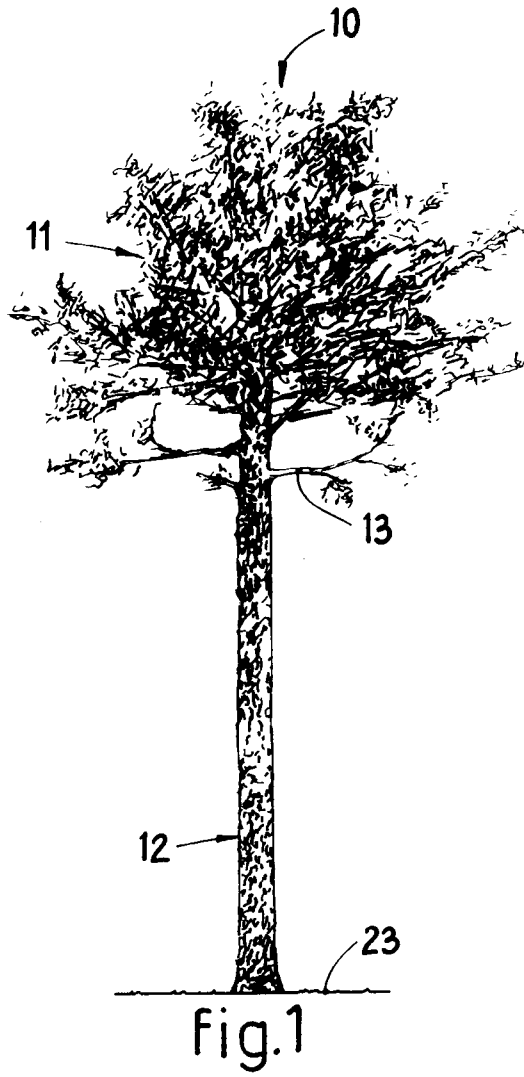
[0111] The threads 36 are then twisted together (Fig. 15) so as to retain the filaments 35 and, subsequently, the resin is made to polymerize using, for example, a source of ultra-violet light in order to accelerate the polymerization process. The filaments 35 form a winding angle comprised between 0° and 80° with respect to the longitudinal axis of the tubular elements 27a-27e, according to the filament winding technique.

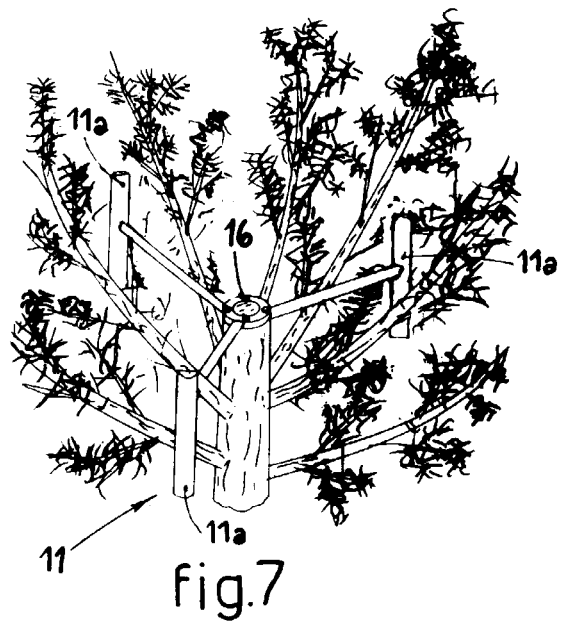
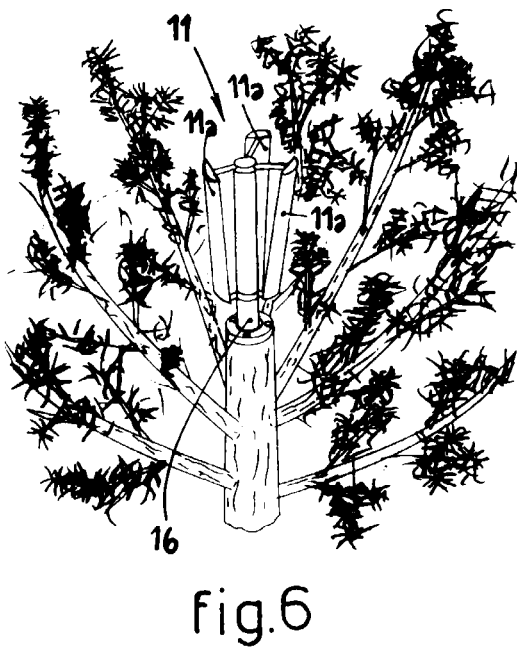
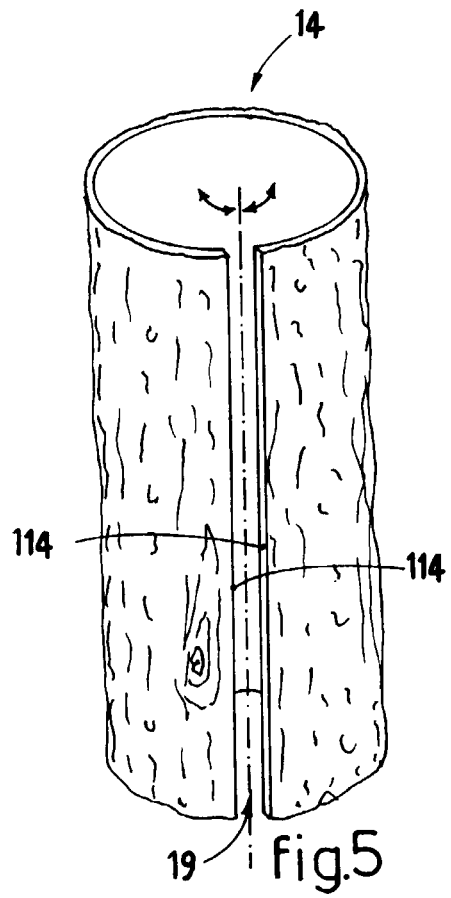
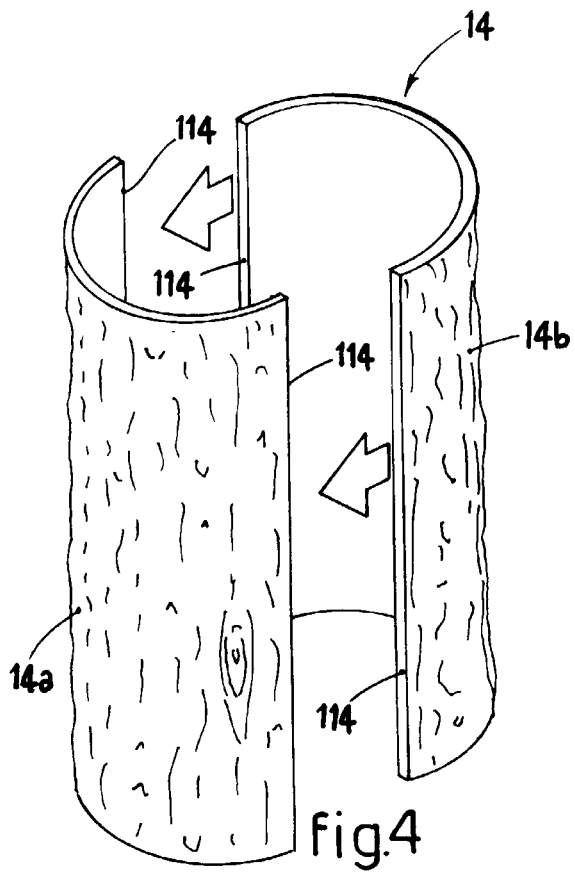
[0112] It is obvious that modifications and additions may be made to this invention, but these shall remain within the field and scope thereof.

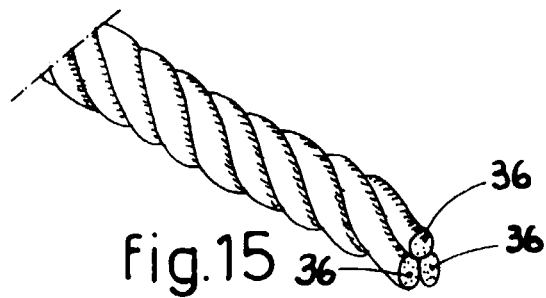
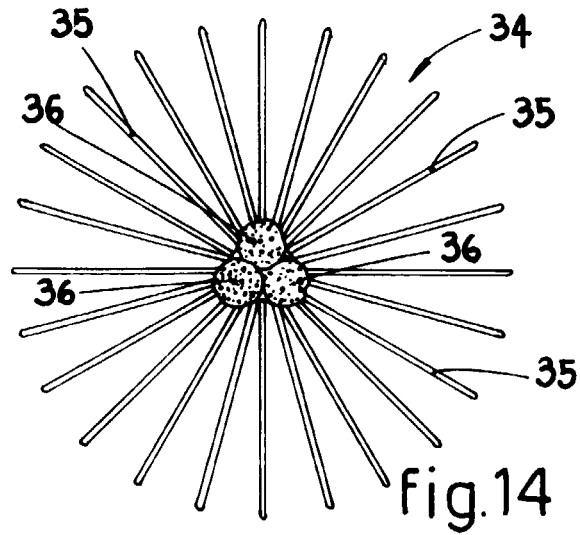
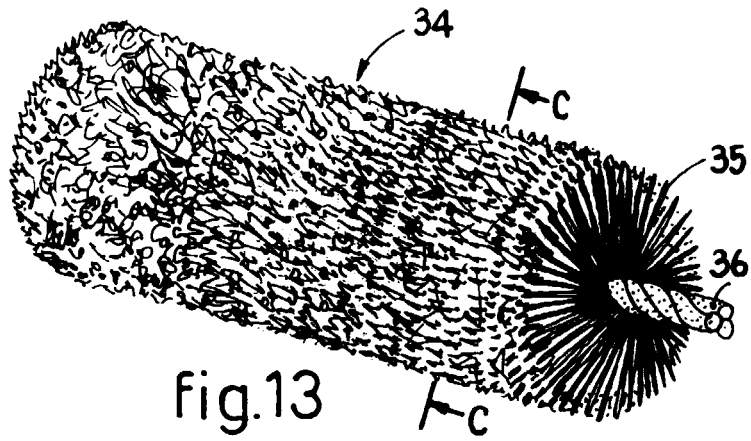
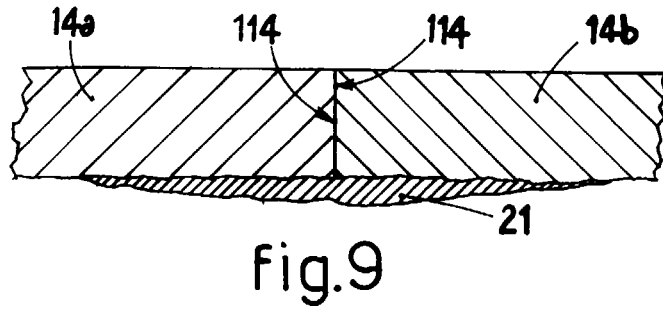
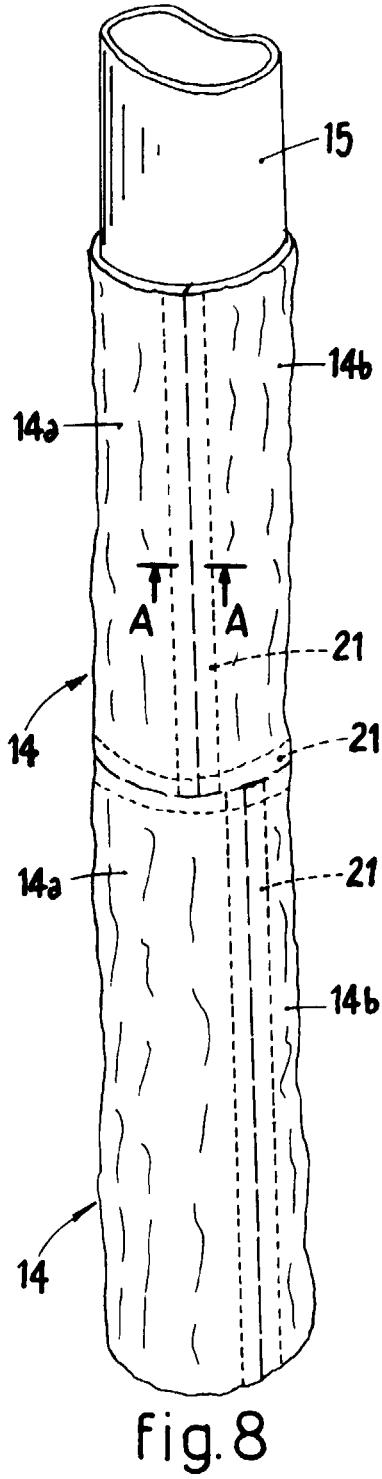
Claims

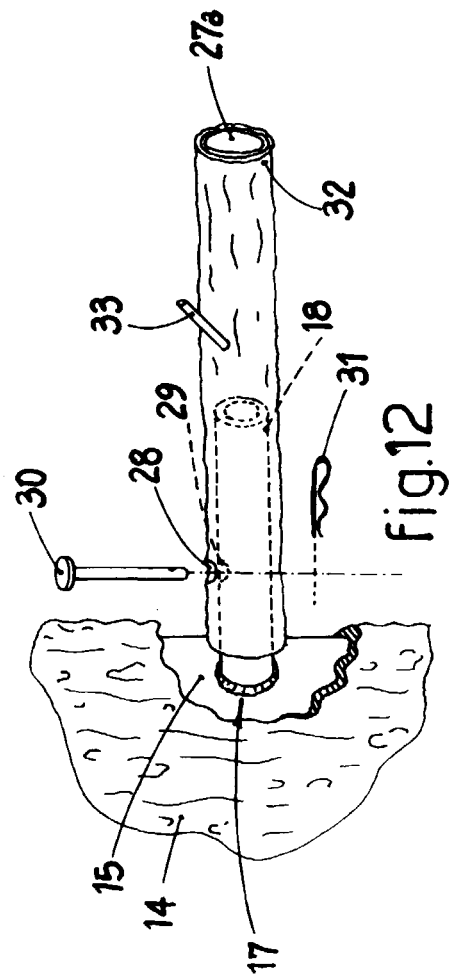
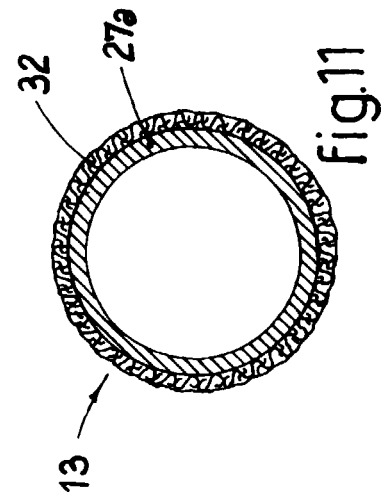
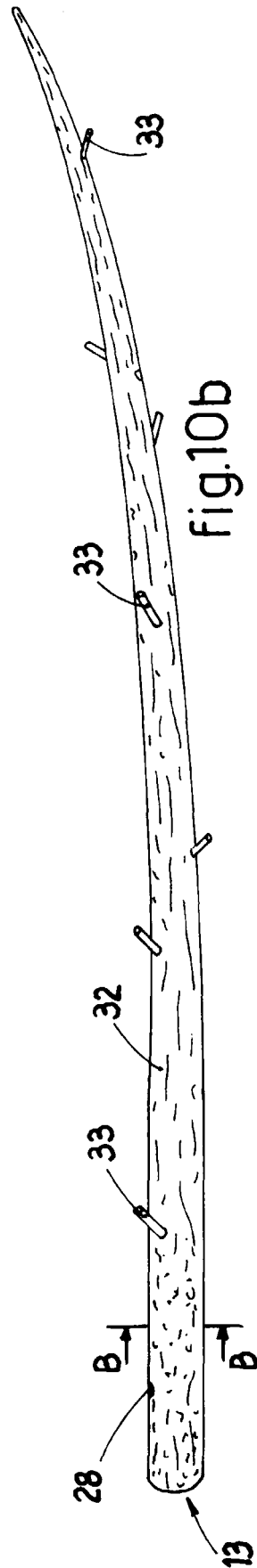
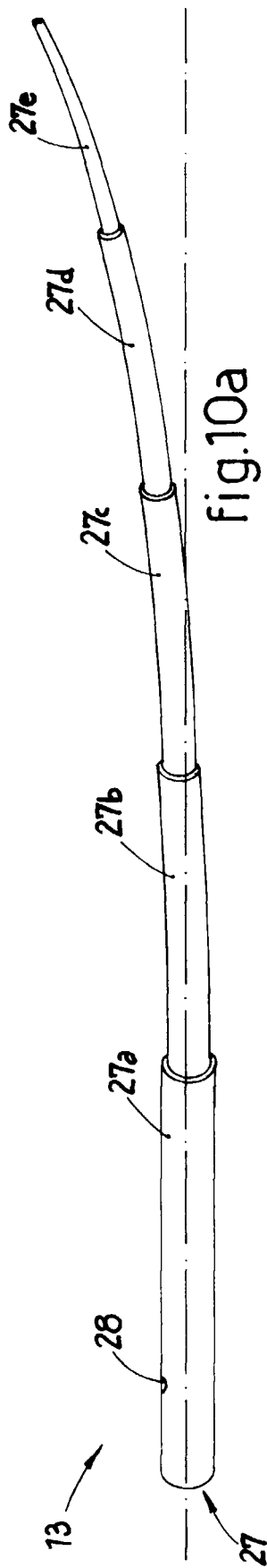
1. Artificial tree to camouflage antennas comprising a trunk (12) suitable to cover a pole (15) supporting the antenna (11) and branches (13) suitable to hide the antenna (11), wherein each branch (13) comprises two or more tubular elements (27) axially coupled together, wherein said tubular elements (27) are covered with a casing (32) suitable to achieve a monolithic structure, wherein a first tubular element (27a) is able to be coupled with a corresponding appendix (17) solid with said pole (15) and is equipped with constraining means able to removably couple the branch (13) to the pole (15), characterised in that said trunk (12) has a modular structure defined by two or more modular elements (14) constituted by truncated cone-shaped shells able to be coupled one on top of the other and able to be inserted onto the pole (15) by acting laterally thereto.
2. Artificial tree as in Claim 1, characterised in that said constraining means comprise a pin (30) suitable to be removably inserted into through holes (28,29) provided in corresponding positions on the appendix (17) and on the end of the first tubular element (27a) where it is associated.
3. Artificial tree as in Claim 1, characterised in that at least said first tubular element (27a) is made with artificial fibers wound between continuous rows of fiber glass or carbon, with a winding angle comprised between 0° and 80° with respect to the longitudinal axis of said first tubular element (27a), according to the filament winding technique.
4. Artificial tree as in Claim 1, characterised in that the casing (32) is made with webs of high resistance fibers impregnated with polymerizable resin.
5. Artificial tree as in Claim 1, characterised in that the tubular elements (27b-27e) coupled with the first tubular element (27a) are made of plastic material suitable to be bent under heat.
6. Artificial tree as in Claim 1, characterised in that said pole (15) has a truncated pyramidal shape having at least fifteen sides.
7. Artificial tree as in Claim 6, characterised in that every truncated cone-shaped shell (14) comprises at least two semi-shells (14a-14b) suitable to be coupled together.
8. Artificial tree as in Claim 7, characterised in that the corresponding coupling edges (114) of the semi-shells (14a-14b) are suitable to be welded together by polymerizable resin (21).

9. Artificial tree as in Claim 6, characterised in that every truncated cone-shaped shell (14) has a longitudinal aperture or cut (19) which allows to temporarily widen said shells (14). 5
10. Artificial tree as in Claim 9, characterised in that the edges (114) defining the longitudinal aperture or cut (19) are suitable to be welded together by means of polymerizable resin (21). 10
11. Artificial tree as in Claim 1, characterised in that the branch (13) is suitable to support tufts of needle-shaped foliage (34) made by twisting together at least two rovings of high resistance fibers impregnated with polymerizable resin, filaments made of plastic material suitable to simulate needle-shaped leaves being arranged transversely between said rovings before they are twisted. 15
12. Artificial tree as in any claim hereinbefore, characterised in that coloring pigments are added to the polymerizable resin. 20
13. Artificial tree as in Claim 1, characterised in that the pole (15) is equipped at the lower part with constraining means (22) suitable to be buried. 25
14. Artificial tree as in Claim 1, characterised in that said modular elements (14) are made with elastic polymerizable and reinforced resin with a reed-matting of fiber grass or carbon. 30
15. Artificial tree as in Claim 1, characterised in that it simulates a conifer of the *Pinus nigra* or *Pinus pinea* species. 35
16. Method for manufacturing an artificial tree to camouflage antennas, wherein said artificial tree comprises a trunk (12) suitable to cover a pole (15) supporting the antenna (11) and branches (13) suitable to hide the antenna (11), wherein said trunk (12) has a modular structure defined by two or more modular elements (14) constituted by truncated cone-shaped shells able to be coupled one on top of the other and able to be inserted onto the pole (15) by acting laterally thereto, characterised in that said modular elements (14) are made by contact molding, using polymerizable resins reinforced with high resistance fibers disposed in a reed-matting manner. 40 45 50
17. Method as in Claim 16, characterised in that said polymerizable resins are neutral in color, wherein pigments are added thereto and wherein said pigments are natural or artificial in origin and are able to give said resins a desired coloring. 55
18. Method as in Claim 16, characterised in that the mold used to produce said modular elements (14) is made of silicon rubber or similar material and is able to reproduce the roughness and longitudinal ribbed structure typical of natural bark.
19. Method as in Claim 16, characterised in that each individual modular elements (14) is coupled to said pole (15) in such a manner that the corresponding edges (114) of each individual modular element (14) are made to coincide. 10
20. Method as in Claim 16, characterised in that said modular elements (14) are coupled to said pole (15) by means of gluing performed along a single directrix. 15











European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 10 1043

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.7)
A	US 5 787 649 A (KAO LOUIS KEN-HON ET AL) 4 August 1998 (1998-08-04) * the whole document *	1,16	H01Q1/44 H01Q1/12
A	GB 2 325 569 A (ALAN DICK & COMPANY LIMITED) 25 November 1998 (1998-11-25) * abstract; claim 1; figures 2,3 *	1,16	
A	US 4 774 113 A (SHAFFER EARL R) 27 September 1988 (1988-09-27) * the whole document *	11	
A	US 4 305 980 A (SPIEGEL SI ET AL) 15 December 1981 (1981-12-15) * column 5, line 62 - column 6, line 63; figure 4 *	11	
D,A	US 5 611 176 A (JUENGERT ROBERT P ET AL) 18 March 1997 (1997-03-18) * abstract; figure 1 *	1,16	
D,A	EP 0 791 976 A (BROLAZ PROJECTS PROPRIETARY LI ;SECTIONAL POLES AFRICA PTY (ZA)) 27 August 1997 (1997-08-27) * abstract; figure 1 *	1,16	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H01Q
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 April 2000	Examiner Van Dooren, G
CATEGORY OF CITED DOCUMENTS 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		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	

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 10 1043

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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27-04-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5787649 A	04-08-1998	NONE	
GB 2325569 A	25-11-1998	AU 7068398 A EP 0978154 A WO 9849744 A	24-11-1998 09-02-2000 05-11-1998
US 4774113 A	27-09-1988	NONE	
US 4305980 A	15-12-1981	AU 5938980 A CA 1150507 A CA 1152322 A DE 3024022 A FR 2461466 A GB 2056853 A	15-01-1981 26-07-1983 23-08-1983 12-02-1981 06-02-1981 25-03-1981
US 5611176 A	18-03-1997	NONE	
EP 0791976 A	27-08-1997	AT 187582 T AU 706369 B AU 1487797 A DE 69700889 D	15-12-1999 17-06-1999 28-08-1997 13-01-2000

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82