

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 084 771 A1

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(43) Date of publication:

21.03.2001 Bulletin 2001/12

(51) Int. Cl.⁷: **B08B 1/04**, A47L 11/38

(21) Application number: **98913760.9**

(86) International application number:

PCT/ES98/00097

(22) Date of filing: **16.04.1998**

(87) International publication number:

WO 99/54063 (28.10.1999 Gazette 1999/43)

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

Designated Extension States:

AL LT LV MK RO SI

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(54) **MACHINE FOR TREATING FACADES**

(57) Machine intended to dose and apply chemical products to vertical walls, such chemical products being for example water, soap, detergent, pickling agents, enamels, paints, primers, waterproofers, polishers, bactericides, combinations of the same and other chemical, biological products having functions such as cleaning, protection, preparation and/or decoration of façades, said products being then processed by means of a roller in order to clean, wash, brush, sand, polish, enamel, etc. and finally dry the treated surface. The machine applies the above mentioned products and other products having similar characteristics, process them by means of various accessories and finally dries them; all these operations are automated.

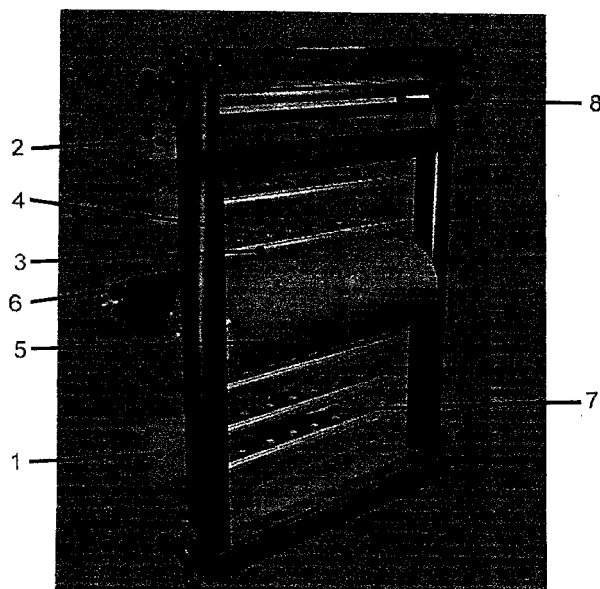


FIGURE 4

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Description

[0001] The object of the construction of this machine is to give an automatic and suitable treatment to the building fronts or façades. The treatment will be made by the application and processing of chemical or biological products, for cleaning, protection, preparation and/or decoration of the building outer faces.

[0002] As the main use of the machine to be described it is considered the automatized cleaning of the building fronts where the outer material is glass or the like. Besides the above, other equally important uses are: cleaning of building fronts made of another material, as well as application of water, soap, detergent, bactericides, pickling agents, paints, primers, waterproofing agents, enamels, polishers, decontaminating agents and other chemical or biological products with similar purposes to said vertical facings.

[0003] For carrying out the described function, the machine can make use of the cranes installed on the roofs of the buildings, or one crane can be installed for such purpose.

[0004] Due to the multiple applications of the treating machine, it is convenient to point out that, apart from the mentioned functions and using as a basis the described machine, it is possible to make specific models for carrying out special treatments in each individual case.

STATE OF THE ART

[0005] Currently, the cleaning and maintenance of the building fronts is made by providing the same with a crane that holds a bucket or gondola, thereby carrying the workers who do the job manually.

[0006] This system currently in use has the inconvenience of the risk derived from having the workers located in the hanging gondolas for carrying out the relevant work.

[0007] In this moment there is no system in the market able to carry out the described functions automatically. This is the reason why the owners of the invention, Mr. Javier Sánchez García and Mr. Antonio Ballano García, have created a machine able to do the task automatically, and which also totally avoids the risk of the workers to be suspended inside a gondola, mostly at a long distance up from the ground.

EXPLANATION OF THE INVENTION

[0008] The present machine has one or several structures -according to the model- where the various functional elements are located. The main structure moves by means of a crane placed on the building roof, which is adapted to move the machine along the whole façade. In this way it is run over the zone to be treated.

[0009] The machine has several tanks where the products to be applied are stored. The products are car-

ried by dosing pumps to nozzles, and from there to the building front. If it is necessary, injection methods can also be used for this function. These products can be water, soap, detergent, bactericides, pickling agents, paints, primers, waterproofing agents, enamels, polishers, decontaminating agents and other chemical or biological products which carry out façade cleaning and/or treatment functions.

[0010] Subsequently, the applied product is spreaded and processed by a rotating roller, driven by an engine. Depending on the kind of use of the machine, the roller can be provided with bristles made of metal or plastic, sandpaper, chamois skin, foam, etc.

[0011] Once the treatment of the surface is made, it is dried by a ventilation system, although, in optional embodiments, systems of aspiration, compressed air, infrared radiation, racket, cloth, or a combination of same can be incorporated.

[0012] The machine has a tank for collecting the remaining used materials. When the applied products are recyclable materials, such as water or cleaning products, they are collected inside the tank by rubber flaps or a liquid suction apparatus, and by making use of suitable filters they can be reutilised.

[0013] The machine rests on the building front by a wheel system, which can be simple or multiple, so that the machine moves against the front once the crane eases the rope. In the case of building fronts that are not totally flat, the machine has a system with multiple wheels which are used to overcome the obstacles.

[0014] In the case of buildings having cranes of low power, the machine is divided in two parts: a fixed one and a movable one. The fixed part has the pumps and the tanks for the liquids, and it is placed on the building roof. The movable part has the remaining elements of the machinery. In this way, the weight of the movable part of the machine is reduced, and it is the fixed part which doses the products.

[0015] All the models are provided with the necessary devices for complying with the safety requirements established by the current legal provisions.

[0016] The system is managed by a custom-made microcontroller, and optionally can include standard industrial systems, such as industrial computers, robots, remote controls or the like. Thus, the machine can be given several governing controls such as the dosage of the used different products, autodiagnosis, remote control, crane, sensor control, signalling and security systems.

[0017] The machine is the result of the above circuit combination, the circuits being multiple, which means that every circuit can be multiplied so many times as desired. Also, several sets can be mixed in the same machine, made of the different combinations of the described circuits, which originates different models of the machine.

[0018] In case of necessity, the electric systems can be replaced with pneumatic systems that make the

mentioned tasks.

[0019] All the components forming part of the circuits of the machine are standard elements of the general industry, so that they can be of national or foreign manufacture.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] As an example of a practical embodiment, attached are drawings showing the main parts of the machine.

Figure 1 shows the sub-assembly which transports the liquids that are projected to the building front, meaning:

1. Liquid tank
2. Liquid dosing pump
3. Nozzle support tube
4. Nozzles

Figure 2 shows the sub-assembly which carries out the liquid treatment to the front, meaning:

5. Roller
6. Roller core
7. Roller axle
8. Cotter
9. Pulleys
10. Driving belt
11. Bearings
12. Roller driving engine

Figure 3 shows the circuit which dries the treated surface by blowing, meaning:

13. Motor fan
14. Air inlets
15. Air mixer

Figure 4 shows the main assembly where the most representative elements of a typical machine can be found, meaning:

1. Liquid tank
2. Liquid dosing pump
3. Nozzle support tube
4. Nozzles
5. Roller
6. Roller driving engine
7. Air driving fan
8. Air mixer

DESCRIPTION OF AN EMBODIMENT FORM

[0021] The function of this concrete model is basically in accordance with the following process:

1.- It pours water to get the surface ready.

2.- It applies a chemical-biological combination, with cleaning and decontaminating agents.

3.- It passes a rotating brush made with nylon bristles which rubs the surface with the applied product.

4.- It sprinkles a chemical solution to protect the treated surface.

5.- It dries the surface by blowing air that comes from a fan.

[0022] The construction of this machine is the result of the combination of several important parts, as described below:

LIQUID TRANSFER CIRCUIT

[0023] The liquids that will be applied over the surface to be treated are contained in corresponding tanks (figure 1, position 1). From these tanks and by means of dosing pumps (figure 1, position 2) the liquids are sucked and conveyed by pipes to tubes (figure 1, position 3) where the nozzles (figure 1, position 4) are located. It is in this point where the relevant liquid comes out, propelled against the surface to be treated.

[0024] The circuits can be independent, so that they do not mix the liquids, or a whole that mixes the liquids at the time of the application of same.

TREATMENT CIRCUIT

[0025] Once the surface to be treated is cleaned and the desired product applied, the treatment of said surface starts.

[0026] It is carried out by means of a rotating brush (figure 2, position 5) arranged on a core (figure 2, position 6), which is in turn attached to an axle (figure 2, position 6). This axle is connected by a transmission (composed by the cotter (figure 2, position 8), pulleys (figure 2, position 8) and the driving belt or chain (figure 2, position 10)) to an engine (figure 2, position 12).

[0027] This engine on starting moves the brush and turns the same so that when the brush gets in contact with the building front, it treats this surface with the product applied in the prior stage.

[0028] To avoid frictions, the axle is mounted on suitable bearings (figure 2, position 11).

DRYING CIRCUIT

[0029] After the application of the products and the treatment of the façade with the roller, the surface drying process starts.

[0030] In the first machinery model, a fan will be arranged on the machine (figure 3, position 13) which will carry out this function. The air driven by this fan flows through pipes, and is carried to air entries (figure 3, position 14). These entries are connected to a mixer which has a diffusing groove (figure 3, position 15),

which will blow the air to the surface to be dried.

RECYCLING OF PRODUCTS

[0031] The whole area of the surface to be treated is protected by rubber flaps with two aims: to protect the surfaces close to the treatment area from possible splashes and to collect the remaining product. 5

[0032] These flaps or lips guide the remaining liquid to a recycling tank, and using the system described in paragraph "LIQUID TRANSFER CIRCUIT", and including a proper filter, that product is thrown against the surface again, with the consequent saving in the used raw material. 10

Claims

1. Machine for building front treatment of the type that applies products like water, soap, detergent, bactericides, pickling agents, paints, enamels, primers, waterproofing agents, polishers, decontaminating agents and other chemical or biological products that are able to carry out automatic cleaning and/or treating tasks of the building fronts and result in washing, scouring, hygienising, brushing, sandpapering, waterproofing, decontaminating, etc. as a consequence of the application, dosage and treatment of the above mentioned products or the like. 20
2. Machine for building front treatment according to claim 1, characterised by a combination of the above mentioned systems. 30
3. Machine for building front treatment according to claim 1, for fronts or façades made of crystal, glass, granite, stone, artificial stone, brick, ceramics, stoneware, metal and other construction products or elements. 35
4. Machine for building front treatment according to claim 1, and in view of the size, situation, work way (it is moving at a considerable height from the ground) and novelty of the product, it is considered as included in the invention the advertising space that could be used on the machine and its accessories. 40 45

Amended claims under Art. 19.1 PCT

[received by the International Bureau on September 21, 1998 (21.09.98); amended claims 1 to 4; new claim No. 5 to be added (2 pages)] 50

1. Machine for building front treatment of the kind used for cleaning fronts or façades, with all the necessary elements inside the same, with remote control so it can be handled from the ground, using a crane placed on the building roof for its movement, 55

and cleaning all kind of fronts, either smooth or with small projections, without a special fastening rail, characterised by a frame with a wheel system which allows it to overcome the small projections, in addition to provide the machine with a support on the surface to be treated; which carries a series of horizontal and parallel tubes (3) where a series of nozzles (4) are installed for spraying liquids which come from tanks through pipes, driven by pumps (2); which carries a horizontal roller for brushing the fronts (5) driven by an engine (6); which is provided with a series of tanks (1) with different liquids for application to the surface to be treated; which carries a plenum (8) of air driven by a motor fan (7) to dry the front; which carries a tank for collecting the remaining liquids on its lower part, so that they can be reused by means of the pumps (2), tubes (3) and nozzles (4); and which carries an electric system with a microcontroller and sensors that control the whole machine.

2. Machine for building front treatment according to claim 1, characterised in that the machine uses the following "sequential" combination of functions: firstly, it projects liquid over the front by means of a pump (2) which carries it from a liquid tank (1) housed therein to tubes (3) which have nozzles (4), and in this way, a "pre-washing" is effected; then it projects cleaning product by means of a system like the former one, and so a "soaping" of the front is carried out; subsequently, it scours the soap and water applied to the front under the action of a rotating brush (5) driven by an engine (6), carrying out a "brushing"; afterwards, a further pump sprays water which is carried to the tubes having the nozzles, and a "rinse" of the building front is effected; finally, it blows on the surface of the building front by means of a motor fan (7), which brings air from outside to a plenum (8), where it is mixed and projected against the building front, causing a "drying" thereof and taking the remaining liquid to a reutilisation tank, which is used to carry out a pre-washing.

3. Machine for building front treatment according to claim 2, wherein the cleaning product of the "soap phase" is replaced with chemical and biological products to "decontaminate" the building front.

4. Machine for building front treatment according to claim 2, wherein the cleaning product of the "soap phase" is replaced with chemical and biological products to give a "surface treatment" such as polishing or waterproofing of the building front.

5. Machine for building front treatment according to claim 2, and in view of the size, situation, work way (it is moving at a considerable height from the ground) and novelty of the product, it is considered

as included in the invention the advertising space that could be used on the machine and its accessories.

Statement under Art. 19.1 PCT

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In a statement according to the Patent Cooperation Treaty (PCT) and the PCT Regulations, only the claims of the patent are amended by virtue of same and in view of the International Search Report.

10

These amendments serve to provide a more detailed explanation about the structure and function of the invention and have no effect on the description or drawings as previously filed. Neither do they go beyond the disclosure of the invention contained in the international application as filed.

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The claims are related to figure 4 of the previously filed application.

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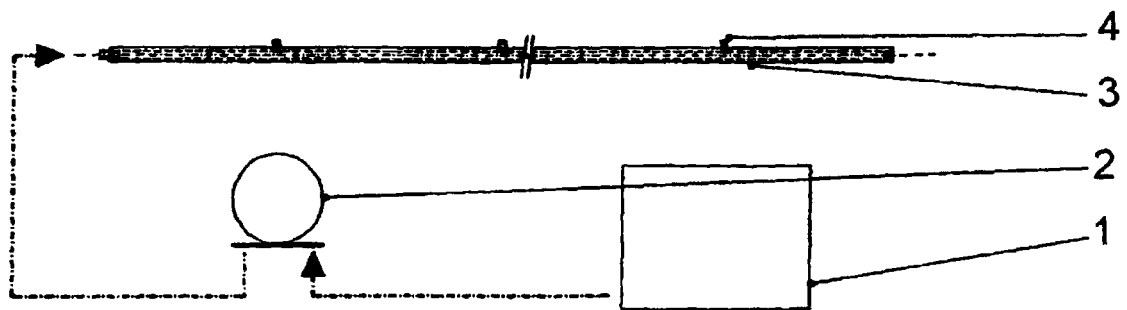


FIGURE 1

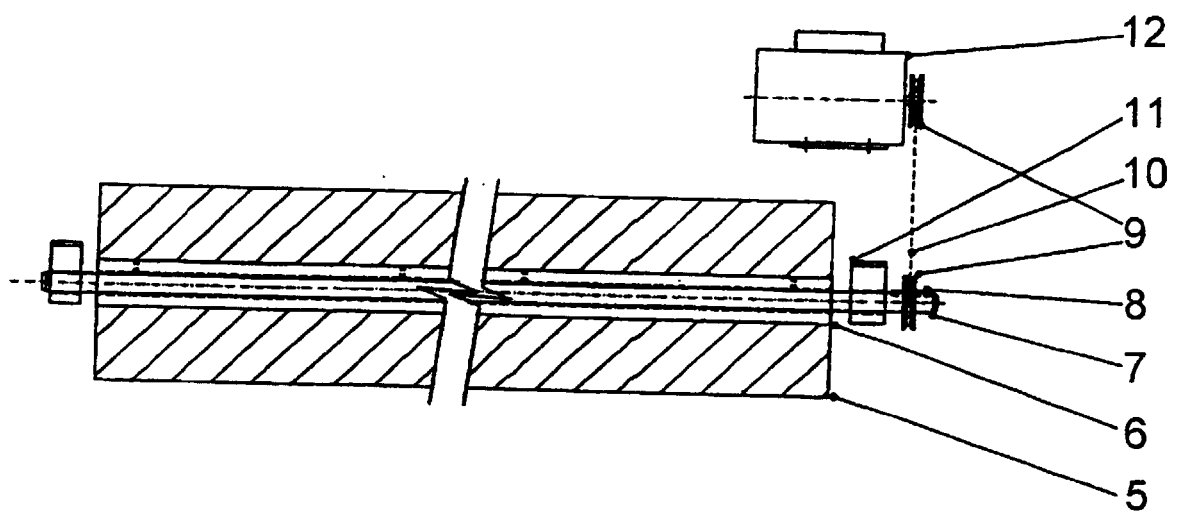


FIGURE 2

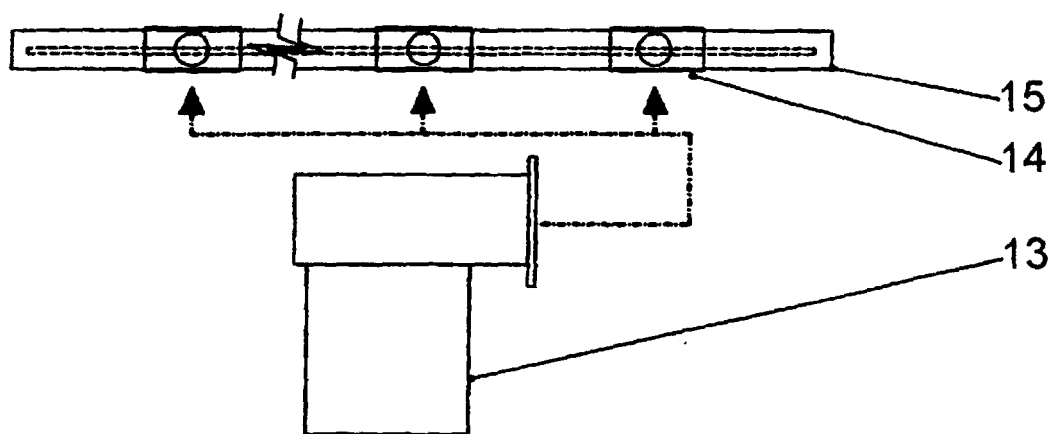


FIGURE 3

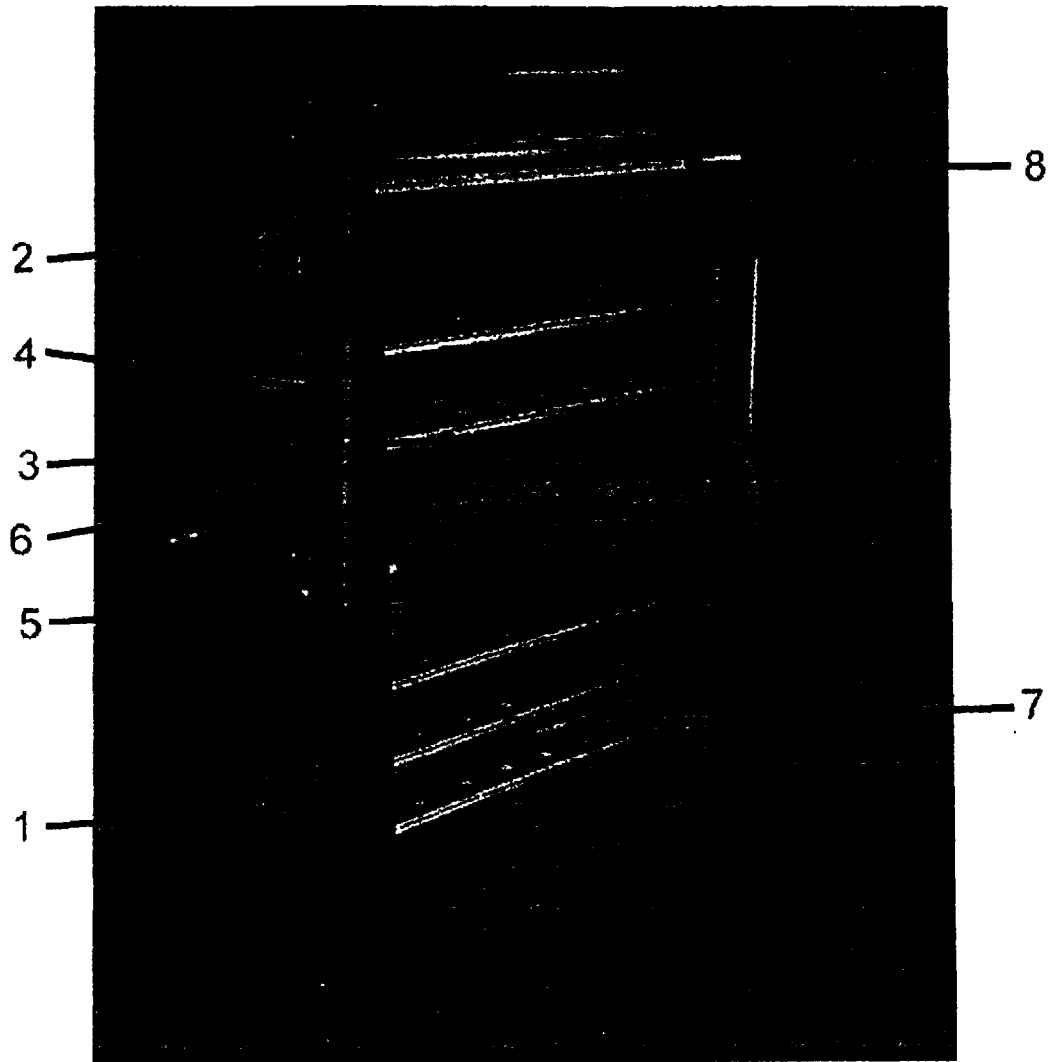


FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 98/00097

A. CLASSIFICATION OF SUBJECT MATTER		
IPC 6 : B08B 1/04, A47L 11/38		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC 6 : B08B 1/00, K47L 201/00, B08B 3/00, A47L 11/38, B05B 13/00, B05C 9/12, B05C 9/14		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
CIBEPAT, EPODOC, WPIL, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US-3298052-A (GOLFE) 17 January 1967 (17.01.67) see the whole document	1-3
X	PATENT ABSTRACTS OF JAPAN, CD-ROM PAJ 1997-12[035] JP 09206259 A (ITO KENZAI KK)	1-3
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X	PATENT ABSTRACTS OF JAPAN, CD-ROM PAJ 1997-11[034] JP-09195520-A (TOHOKU GREEN KOSAN KK)	1-3
A	US-4351132-A (ROLAND MOLIN) 28 October 1982 (28.10.82) see the whole document	1-3
A	PATENT ABSTRACTS OF JAPAN, CD-ROM PAJ 1996-06[017] JP-08052440-A (HECHATRO PLANNING KK)	1-3
A	US-4835811-A (CROWHURST) 6 June 1989 (06.06.89) see the whole document	1-3
☒ Further documents are listed in the continuation of box C. ☒ Patent family members are listed in annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 15 July 1998 (15.07.98)		Date of mailing of the international search report 23 July 1998 (23.07.98)
Name and mailing address of the ISA/ S. P. T. O.		Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 98/00097

C. (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR-2654652-A (NICOLAIEFF) 24 May 1991 (24.05.91) see the whole document	1-3
A	EP-029401-A (POLLET) 27 May 1981 (27.05.81) see the whole document	1-3

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ES 98/00097

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