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(71) Applicant: **COMERCIAL SALTER S.A**
Lluis Millet, 52, 3a planta
Esplungues de Llobregat (ES)

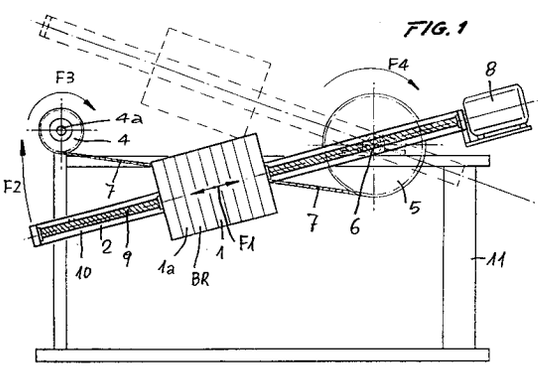
(72) Inventor: **PEYDRO ESTEBAN, Salvador**
Lluis Millet, 52, 3 planta
E-8950 Esplugues de Llobregat(Barcelona) (ES)

(74) Representative: **Aragones Forner, Rafael Angel et al**
Pastells & Aragones, S.L.
Pau Claris, 138
E-08009 Barcelona (ES)

(54) AUTOMATIC WEIGHT ADJUSTING SYSTEM FOR EXERCISING APPARATUS.

(57) The system comprises a weight (1) which is gradually displaceable along a rocking guide (10) which oscillates when the user performs an exercise by pulling the same weight (1) during the exercise for each determined position of the weight (1) along the rocking guide (10). The displacement of the weight (1) along the rocking guide (10) increases or reduces gradually the weight for the exercise of the user, through a combination of a resistance arm consisting of the weight (1) displaceable along the rocking guide (10) and of two power (4) and resistance (5) wheels associated to each other through a transmission means (7), the power wheel (4) being connected to the user-actuated means (13, 14) and the resistance wheel (5) being connected to the shaft (3) of the rocking guide (10).

FIG. 1



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This invention refers to an automatic weight adjustment system for gymnasium exercise apparatus.

At present, for body-building, gymnasium, etc, machines, the market offers electronic machines which work using compressed air via cylinders and iron plates which make up a block comprised of plates of 5 or 10 kg. and with a weight per block which varies between 25 and 200 kg., depending on the machine and the exercise being performed.

Both the electronic and compressed-air machines have the drawback of exercising an uneven force, thus presenting difficulties when exercising, especially for professionals and physical instructors. At present, in gymnasia and professional centres, machines with iron plates making a block are used mainly, this system being the most commonly used due to the fact that the force exercised is the most true and balanced, although it poses a major problem when weight needs to be increased or decreased, as the exercises have to be interrupted at this point to place the weight selector on the spot on the block required and the exercises resumed with more or less weight, which interferes with the exercises enormously, both because of the stoppage and because of the abrupt weight change.

The system of this invention eliminates these problems, as the weight comes in progressively and automatically, without the need to stop exercising. With the invention's system, the instructor or the person in charge of the physical instruction can program in advance the weight and the repetitions he feels are the most appropriate for the person who will be performing the exercises, achieving a perfect training session.

Amongst the advantages offered by this system, we can highlight:

a) Automatic entry and exit of weight, without the need to stop exercising;

b) The weight can be programmed, as can the number of repetitions;

c) Balanced effort from start to finish of the exercise;

d) Entry to and exit from the machine with reset to 0 kg., greatly assisting the position and start-up of the person exercising;

e) The machine has standard or standardized programs, which can be selected according to professional criteria or medical recommendations;

f) Control of the training system of improvements achieved physically, from a workcard recorded beforehand via a data-processing system; and

g) Weight adjustment in fractions of grams.

In accordance with the above, the automatic weight adjustment system in gymnasium exercise apparatus as per this invention is characterized essentially by the fact that it comprises a weight which is displaced gradually along a tilting guide, which is tipped by the user's action when he performs the exercise, which consists of making the tilting guide tip with the weight in a determined position along the tilting guide, the user pulling the same weight during the exercise for each determined position along the tilting guide, in which weight displacement along the tilting guide, the weight gradually increases or decreases for the user's exercise, which is achieved by way of a combination of a resistance arm consisting of the weight which can be displaced by the tilting guide and the power and resistance wheels interconnected to each other by the transmission system, the power wheel being connected to the means activated by the user, and the resistance wheel, to the axis of the tilting guide.

As per the invention, the user gradually displaces the weight along the tilting guide, increasing or decreasing this weight, whilst he is exercising, without the need to stop the exercise, or this can either be programmed, and can even be repetitive.

This weight is displaced along the tilting guide by a motorized system activated by the user and can be programmed.

Preferably, this weight is displaced by a spindle driven by a motor guided in lengthways bars.

Meanwhile, the power wheel is excentric to its swivel axis, and can be to the profile where the transmission is taken up in relation to the resistance wheel during the tipping movement of the tilting guide, in such a way that when the user performs the exercise for each position of the weight in the tilting guide, he has the same weight pull.

As per the invention, the whole unit of the tilting guide with the weight which can be displaced along it by motorized means and the corresponding guides, is mounted on a framework, and the power and resistance wheels with the framework are mounted on a bedplate which rests on the floor.

We should highlight the fact that the weight displacement and the weight increase or decrease for the user's exercise are infinitely adjustable or not, as required.

To assist a more detailed explanation and understanding, two sheets with sketches are included, showing a practical case of application of the automatic weight adjustment system for gymnasium exercising apparatus of the aforesaid characteristics, which shows, for illustration purposes only and not limitatively, the scope of this invention.

In said sketches:

Figure 1 is a side elevational view which shows, in diagram form, this invention's system.

Figure 2 is a perspective view which shows, in diagram form, an example of application of the invention's system to one of the body-building machines.

In accordance with the sketches, the automatic weight adjustment system in gymnasium exercise machines, with which this invention is concerned, consists of a weight -1- in the form of a block, which comprises several weights -1a- back-to back, weight -1- of which can be displaced gradually, as per the arrow -F1- along a tilting guide -2- on an axis -3-, guide -2- of which is tipped by the user's action whilst he is performing the exercise on the corresponding apparatus, tilting guide -2- of which consists of two parallel bars, upper -2a- and lower -2b-, This exercise consisting of making the tilting guide -2- tip with weight -1- situated in a determined position along the tilting guide - as per arrow -F2- (see Figure 1), with which the user pulls the same weight during the exercise - for each weight position on the tilting guide.

In the said displacement -F1-, towards one end or the other of the tilting guide -2- of the weight -1- along the said tilting guide, the weight for the user to perform the exercise increases or decreases gradually, which is effected by way of a combination of a resistance arm -BR-, comprising the weight -1- which can be displaced along the tilting guide -2-, and a power wheel -4-, connected to the means activated by the user, and a resistance wheel -5-, arranged in the axis -6- of the tilting guide -2-, the power wheel -4- and resistance wheel -5- of which are interconnected to each other by a transmission system consisting of a chain -7-.

We should highlight that the power wheel -4- is excentric to the swivel axis and, if applicable, depending on the path - longer or shorter - along which the weight has to travel, it can be excentric to the profile (excentric, oval or mixed profile), over which profile the transmission is taken up (chain -7-) in relation to the resistance wheel -5- during the tipping movement of the tilting guide -2- in such a way that when the user performs the corresponding exercise for each position of the weight -1- on the tilting guide -2-, he has the same weight pull.

As per this invention's system, the user can effect this gradual displacement of the weight -1- along the tilting guide -2-, increasing or decreasing this weight, whilst he is exercising, without the need to stop the exercise. As per the invention, this gradual weight displacement can be programmed and, if applicable, repetitively, according to the user's physical characteristics.

As per the invention, the weight -1- moves along the guide -2- by way of a motor -8- activated by the user by pressing a button or by programming, as indicated in the above paragraph. As is illustrated in the figures, this weight is displaced by the motor -8- by way of a spindle -9-.

The unit of the tilting guide -2-, comprising the bars -2a-, -2b-, with the weight -1- which can be displaced along them by way of a spindle -9- driven by the motor -8-, is mounted on a framework -10- which, with the power wheel -4- and the resistance wheel -5-, is mounted on a bedplate -11-, which rests on the floor.

As per this invention's system, the displacement of the weight -1- and the increase or decrease of the weight for the user's exercises are infinitely adjustable, although in practice the increase or decrease will be in grams or kilograms.

In the example used, as illustrated in Figure 2, the automatic weight adjustment system is shown applied to a specific exercise machine, although it can be applied to any kind of gymnasium exercise apparatus. In this example, the user sits on a chair -12- (illustrated in dotted lines in said Figure 2) and places his feet underneath a push-up support -13- (illustrated in dotted lines), in combination with a counterweight -14-, so that the push-up support -13- can go back to its initial position, all as per the conventional arrangement of these machines.

To operate the user sets the weight -1- in a specific position along the tilting guide -2- with a button - not illustrated - and, seated on the chair -12- with both his feet under the push-up support -13-, he raises up the tilting guide -2- with the weight -1-, turning the power wheel -4- in the direction of the arrow -F3- which, by way of the chain -7- makes the resistance wheel -5- turn in the direction of the arrow -F4- and, by way of the axis -6-, the framework -10- is raised up (with the weight -1- and the tilting guide -2-), in the direction of the arrow -F2-. When the framework reaches the top point - the ascent of which is shown in dotted lines - corresponding to the top point of the push-up support -13-, it goes through the return path and it is ready to start again.

Of course, the displacement -F1- of the weight -1- along the tilting guide -2-, as per the invention, can be effected via the motor -8- and the spindle -9-, or by any other pneumatic, hydraulic, etc. means. Likewise, the transmission system -7- between the power wheel -4- and the resistance wheel -5- can be any to suit, whether using the chain as illustrated and described, or any belt of any cross-section to suit, or by any other means.

Likewise, as has been indicated corresponding to the swivel the framework -10- has to make, the power wheel -4- can be excentric to its axis -4a-, or excentric to the profile where the transmission -7- is taken up, the profile of which can be of any excentric shape, oval, mixed, complex, to suit, in such a way that, for each position of the weight -1- on the tilting guide -2-, the weight pulled by the user during the exercise is always the same.

Similarly, the make-up of the framework -10- and the bedplate -11- can be as illustrated or any other to suit.

It should be understood that, in the practical construction of the automatic weight adjustment system with which this invention is concerned, as many variations of details can be included as are considered appropriate, always provided that these do not alter the essential characteristics thereof, which are summed up in the following claims.

Claims

1. Automatic weight adjustment system in gymnasium exercise apparatus, characterized by the fact that it comprises a weight which can be displaced gradually along a tilting guide which is tipped by the user's action when he performs an exercise, which consists of making the tilting guide tip with the weight in a determined position along the tilting guide, the user pulling the same weight during the exercise for each determined weight position along the tilting guide, in the weight displacement of which along the tilting guide, the weight gradually increases or decreases for the user's exercise, which is effected by a combination of a resistance arm, consisting of the weight which can be displaced along the tilting guide and the power wheel and resistance wheel interconnected to each other by a transmission system, the power wheel being connected to the means activated by the user and the resistance wheel, to the axis of the tilting guide.

2. System, as per claim 1, characterized by the fact that the user effects the gradual displacement of the weight along the tilting guide, increasing or decreasing this weight, whilst he is exercising, without him having to stop said exercise.

3. System, as per claim 1, characterized by the fact that the gradual displacement of the weight along the tilting guide is programmed and can even be repetitive.

4. System, as per the above claims, characterized by the fact that the said weight is displaced along the tilting guide by motorized means activated by the user and can even be programmed.

5. System, as per claim 4, characterized by the fact that the said weight is displaced by a spindle driven by a motor guided on lengthways bars.

6. System, as per claim 1, characterized by the fact that the power wheel is excentric to its swivel axis, and can be to the profile where the transmission is taken up in relation to the resistance wheel during the tipping movement of the tilting guide so that, when the user performs the exercise for each weight position on the tilting guide, he has the same weight pull.

7. System, as per the above claims, characterized by the fact that the whole unit of the tilting guide, with the weight which can be displaced along it by motorized means and the corresponding guides, is mounted on a framework, and the power wheel and resistance wheel with the framework are mounted on a bedplate which rests on the floor.

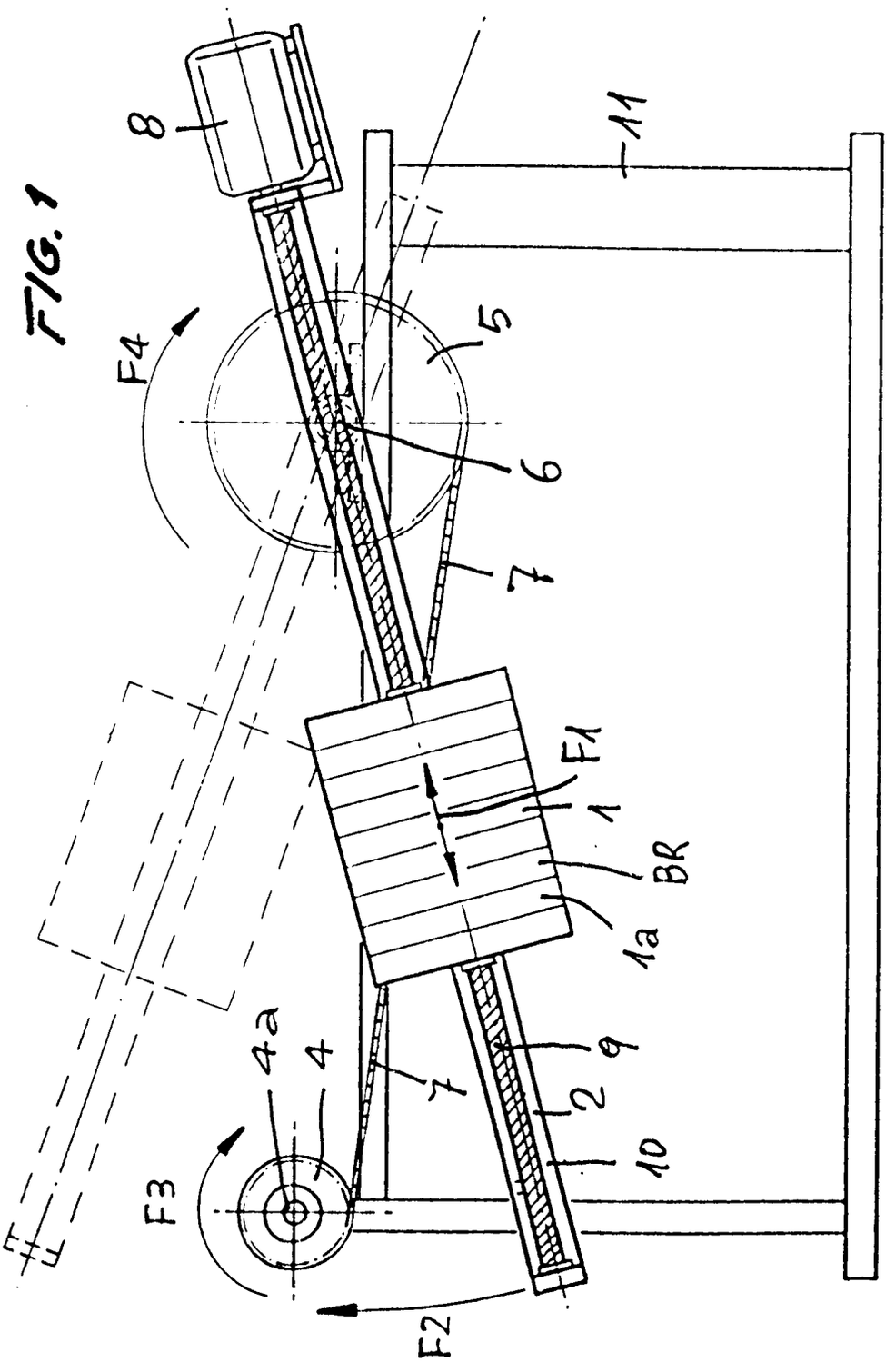
8. System, as per the above claims, characterized by the fact that the weight displacement and the increase or decrease of this weight for the user's exercises are infinitely adjustable.

Amended claims

1. Automatic weight adjustment system for gymnasium exercise apparatus, comprising a tilting guide (10), along which a weight (1) is displaced and positioned, by way of a spindle (9) driven by motorized means (8), the tilting guide (10) of which is tipped by the user's action, characterized by the fact that the tipping movement is effected by way of a resistance arm consisting of the weight (1), which can be displaced along the tilting guide (10), and a power wheel (4) and a resistance wheel (5), connected via a transmission system (7), the power wheel (4) of which is connected to the means activated by the user (13,14) and the resistance wheel (5) to the swivel axis (3,6) of the tilting guide (10).

2. Automatic weight adjustment system for gymnasium exercise apparatus, as per claim 1, in which the power wheel (4) is excentric to its swivel axis (4a), or the profile of this power wheel (4), where the transmission (7) is taken up between the power wheel (4) and the resistance wheel (5) during the tipping movement of the tilting guide (10), is excentric to its swivel axis (4a), so that the transmission (7) is taken up in such a way that, for each position of the weight (1) on the tilting guide (10), the user has the same weight pull.

FIG. 1



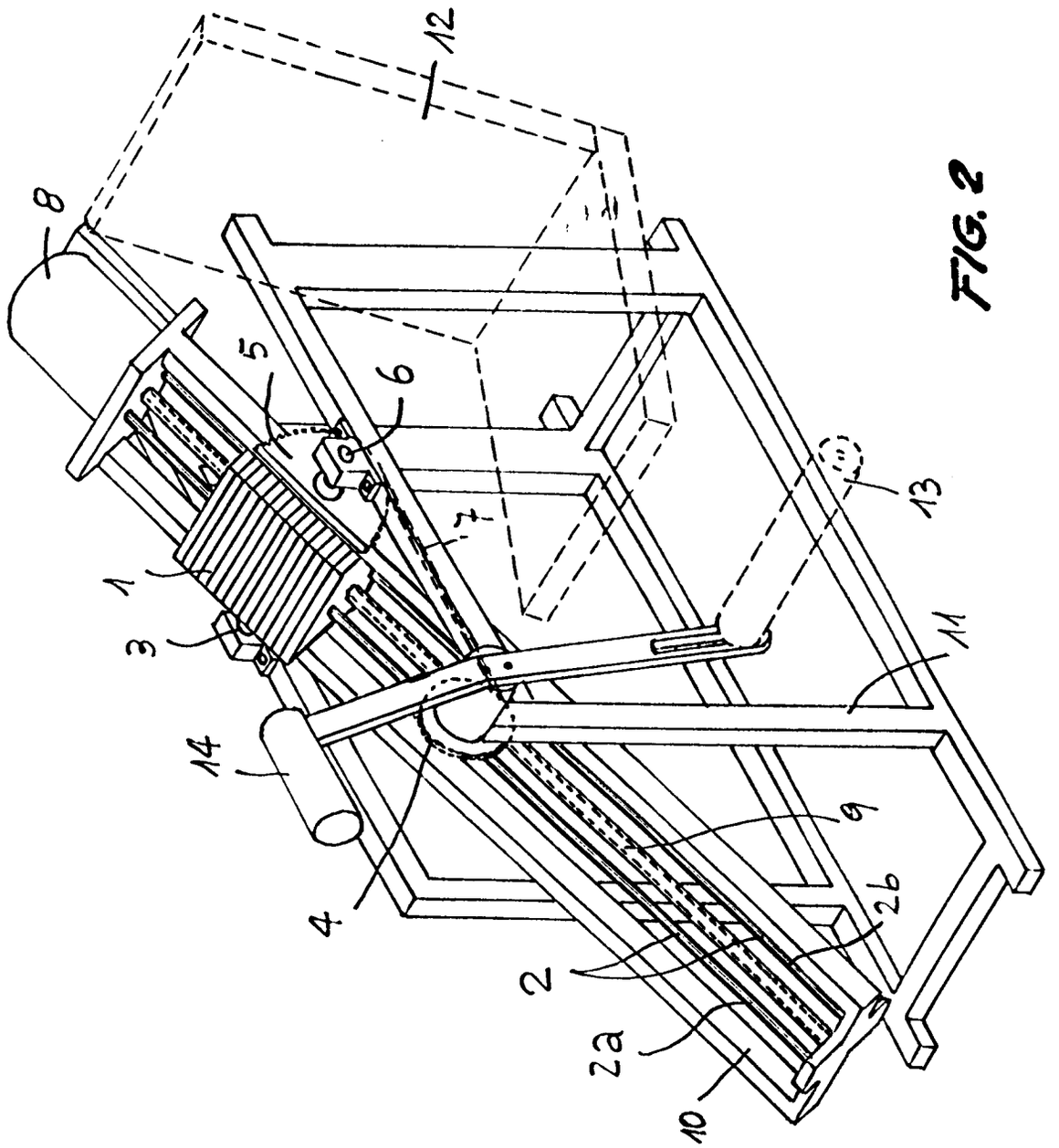


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 92/00072

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. 5 A63B21/06

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)

Int. Cl. 5 A63B

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,3 573 865 (ANNAS ET AL.) 6 April 1971 see the whole document ---	1-8
X	US,A,4 863 161 (TELLE) 5 September 1989 see column 3, line 53 - column 5, line 43; figures ---	1-8
X	US,A,4 650 185 (CARTWRIGHT) 17 March 1987 see the whole document ---	1-8
X	US,A,3 731 922 (JUNGREIS) 8 May 1973 see abstract; figures ---	1-8

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☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"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	Date of mailing of the international search report
03 June 1993 (03.06.93)	14 June 1993 (14.06.93)
Name and mailing address of the ISA/ European Patent Office	Authorized officer
Facsimile No.	Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 92/00072

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 322 071 (LAMBERT, JR. ET AL.) 30 March 1982 see figures -----	1