

(19)



Europäisches  
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Patent Office  
Office européen  
des brevets



(11)

EP 3 865 008 A1

(12)

**EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:

18.08.2021 Bulletin 2021/33

(51) Int Cl.:

A47C 3/20 (2006.01)

A47C 9/08 (2006.01)

(21) Application number: 19813066.8

(86) International application number:

PCT/ES2019/070668

(22) Date of filing: 04.10.2019

(87) International publication number:

WO 2020/074761 (16.04.2020 Gazette 2020/16)

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
PL PT RO RS SE SI SK SM TR

Designated Extension States:

BA ME

Designated Validation States:

KH MA MD TN

(30) Priority: 08.10.2018 ES 201830974

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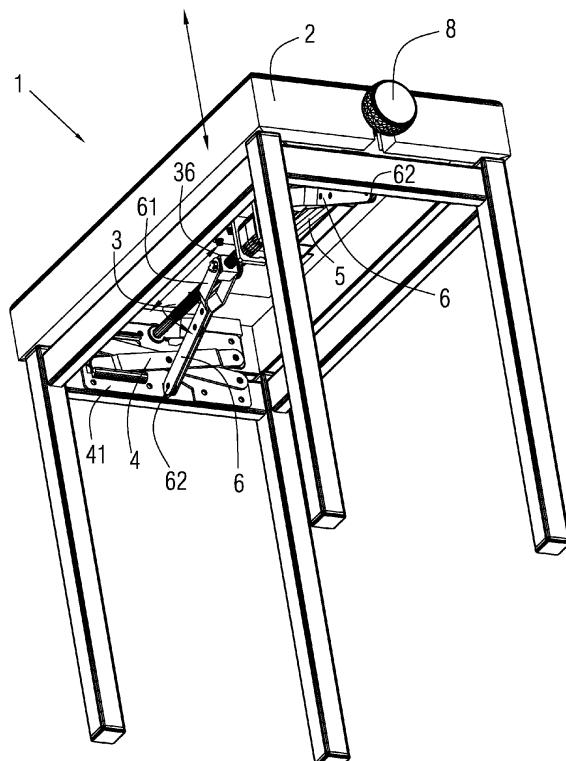
Avda. Diagonal, 463 Bis, 2º

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(54) **IMPROVED HEIGHT-ADJUSTABLE BENCH**

(57) The invention relates to an improved height-adjustable bench, comprising a seat with an adjustable useful height, and furthermore, two spindles mechanically linked to corresponding scissor lift mechanisms, a geared motor and two connecting rods each mechanically linked to each of the spindles, and being fastened and articulated on the platen for fastening the scissor lift to the bench itself; the scissor lift mechanisms being arranged such that they provide the capacity to adjust the useful height of the seat of the bench, and each of the spindles being mechanically linked to the geared motor, receiving a concentric rotating movement with the axial shaft thereof; the rotating movement of the spindles causing a linear movement of the connecting rods in relation to the spindles, and the same rotating movement of the spindle causes a vertical displacement which is transmitted to the scissor lift mechanism and from said mechanism to the seat.

*FIG. 1*



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## Description

### OBJECT OF THE INVENTION

**[0001]** The object of the present invention application is to register an improved height-adjustable bench, which incorporates notable innovations and advantages compared to the techniques used until now.

**[0002]** More specifically, the invention proposes the development of an improved height-adjustable bench, which due to the particular arrangement thereof, enables the useful height of the seat thereof to be adjusted in a motorised and automated manner, in a way that is fast, simple and effective, and minimising the needed manual effort.

### BACKGROUND OF THE INVENTION

**[0003]** Models of benches are known in the current state of the art which do not enable the useful height of the seat thereof to be automatically adjusted, but rather said adjustment is performed by means of a spindle-type mechanical system and is actuated manually by the user. This causes the user to have to make a significant effort to adjust the useful height of the seat of the bench.

**[0004]** Generally, said known height adjustment systems present various drawbacks, for example that they are systems which generate audible noise. This is particularly important and noticeable for users such as pianists, since the noise is audible from the normal use position of the pianist when they are playing the piano in a concert and slide from one side of the bench to the other.

**[0005]** Furthermore, these systems are not easy or comfortable to use, requiring a certain effort from the user. Another additional problem is that the systems used are not easy to assemble or disassemble if repairs are required, and the elements used are complex, whereby requiring a long amount of time in order to be adjusted, repaired or calibrated.

**[0006]** The present invention contributes to solving the present problem, since it adjusts the useful height of the seat thereof in a motorised and automated manner, and also facilitates a quick adjustment for the user, with little effort, without perceptible noises, and completely ensuring the stability, rigidity and comfort of the bench when in use.

### DESCRIPTION OF THE INVENTION

**[0007]** The present invention has been developed with the aim of providing an improved height-adjustable bench, comprising a seat with an adjustable useful height, and which is essentially characterised in that it comprises two spindles which are mechanically linked to corresponding scissor lift mechanisms, a geared motor and two connecting rods each mechanically linked at each of the ends thereof to each of the spindles, the other

end of each connecting rod being fastened and articulated on the platen for fastening the scissor lift to the bench itself, all the previous elements being arranged in the bench in the lower portion of the seat thereof, and the 5 geared motor and the spindles being further fastened at the same time in the position thereof with respect to the same seat; the scissor lift mechanisms being arranged such that they provide the capacity to adjust the useful 10 height of the seat of the bench, and each of the spindles being mechanically linked to the geared motor, such that they receive, from the same geared motor, a concentric rotating movement with the axial shaft thereof; the rotating movement of the spindles causing a linear movement of the ends of the connecting rods along and in relation 15 to the spindles themselves, for which reason since the other end of the connecting rods is fastened and articulated in the bench itself, the same rotating movement of the spindle causes a vertical displacement of the spindle which is transmitted to the scissor lift mechanism and 20 from said mechanism to the seat.

**[0008]** Preferably, in the improved height-adjustable bench, the two connecting rods are connected at the ends thereof to the spindles by means of a nut threaded on each spindle and joined and articulated simultaneously 25 to said end of the connecting rod, such that the rotational movement of the spindles causes a linear movement of said nut along the threaded path of the spindle itself.

**[0009]** Preferably, in the improved height-adjustable 30 bench, the two spindles are coaxial, and the scissor lift mechanisms are arranged on opposite sides of the seat.

**[0010]** Preferably, the improved height-adjustable bench incorporates an adjustment mechanism, which 35 comprises a position reader for the linear displacement of the end of the connecting rod in relation to the spindle itself and a microprocessor, said position reader and the microprocessor being linked to communicate data, and the same microprocessor having at the same time the ability to control the geared motor.

**[0011]** Preferably, in the improved height-adjustable 40 bench, the microprocessor is linked to communicate data with a portable electronic device of a user, the same microprocessor being able to be controlled by the same user through said portable electronic device.

**[0012]** Preferably, in the improved height-adjustable 45 bench, the communication between the microprocessor and the portable electronic device is wireless.

**[0013]** Preferably, the improved height-adjustable bench incorporates at least one manually-actuated wheel mechanically linked to the spindles, and with the 50 ability to transmit a concentric rotating movement to the same spindles with the axial shaft thereof.

**[0014]** Thanks to the present invention, it is possible 55 to adjust the useful height of the seat thereof in a motorised and automated manner, in a way that is fast, simple and effective, and minimising the manual effort necessary.

**[0015]** Other features and advantages of the improved height-adjustable bench will become apparent from the

description of a preferred but not exclusive embodiment, illustrated by way of non-limiting example in the attached drawings, in which:

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** Figures 1 and 2 are schematic views from different perspectives of a preferred embodiment of the improved height-adjustable bench according to the present invention.

#### DESCRIPTION OF A PREFERRED EMBODIMENT

**[0017]** As shown schematically and from different perspectives in Figures 1 and 2, the improved height-adjustable bench, indicated generally with reference number 1, comprises a seat 2 with a useful height adjustable in the direction indicated by the arrows in Figures 1 and 2.

**[0018]** In accordance with the invention itself, the bench 1 comprises two spindles 3 mechanically linked to corresponding scissor lift mechanisms 4 with elastic properties, a geared motor 5 and two connecting rods 6.

**[0019]** In this preferred embodiment represented in Figures 1 and 2, the two spindles 3 are coaxial, and the scissor lift mechanisms 4 are arranged on opposite sides of the seat 2.

**[0020]** The connecting rods 6 are each mechanically linked at one of the ends 61 thereof to each of the spindles 3.

**[0021]** The other end 62 of each connecting rod 6 is fastened on the platen 41 for fastening the scissor lift 4 to the bench 1 itself.

**[0022]** All of the above elements are arranged in the bench 1 in the lower portion of the seat 2, as seen in Figures 1 and 2, the geared motor 5 and the spindles 3 being further fastened at the same time in the position thereof with respect to the same seat 2.

**[0023]** The scissor lift mechanisms 4 are arranged such that they provide the capacity to adjust the useful height of the seat 2 of the bench 1, as indicated by the arrows of Figures 1 and 2.

**[0024]** Moreover, each of the spindles 3 is mechanically linked to the geared motor 5, such that said geared motor 5 provides a rotating movement to the spindles 3 which is concentric with the axial shaft thereof, as represented by the rotating arrow of Figures 1 and 2 on the spindle 3.

**[0025]** The two connecting rods 6 are linked at the ends 61 thereof to the spindles 3, by means of a nut 36 threaded on each spindle 3 and joined and articulated at the same time to said end 61 of the connecting rod 6.

**[0026]** With this arrangement, it achieves that the rotating movement of the spindles 3 represented by the rotating arrows in Figures 1 and 2 and provided by the geared motor 5 causes a linear movement of the nut 36 along the threaded path of the spindle 3 itself, and therefore a movement of said ends 61 of the connecting rods 6 along and in relation to the spindles 3 themselves, as

indicated by the arrows next to the nut 36 of Figures 1 and 2.

**[0027]** Therefore, since the other end 62 of the same connecting rods 6 is fastened and at the same time articulated in the bench 1 itself, more specifically in the platen 41 for fastening the scissor lift 4, this causes a vertical displacement of the spindle 3 which is transmitted to the scissor lift mechanism 4 and from said mechanism to the seat 2, which ends up causing an adjustment of the height of the seat 2 of the bench 1 already referred to from the beginning.

**[0028]** As seen in Figures 1 and 2, the improved height-adjustable bench of the invention can also comprise manually-actuated wheels 8 which are mechanically linked to the spindles 3.

**[0029]** Said wheels 8 can transmit a concentric rotating movement to the same spindles 3 with the axial shaft thereof, and with a result similar to the movement transmitted from the geared motor 5, in case of failure from the geared motor 5 fails.

**[0030]** Furthermore, the improved height-adjustable bench of the proposed invention can comprise an adjustment mechanism, which adjusts the useful height of the seat 2 in the desired position.

**[0031]** To do so, said adjustment mechanism comprises a position reader 7 for the linear displacement of the end 61 of the connecting rod 6 in relation to the spindle 3 itself, as shown in figure 2, and a microprocessor (not shown in the drawings).

**[0032]** As seen in Figure 2, the position reader 7 comprises a linear potentiometer, which, according to the linear position of the position reader 7 itself, provides a different electrical signal. Furthermore, the position reader 7 and the microprocessor are linked to communicate data.

**[0033]** At the same time, the same microprocessor enables to control the geared motor 5, according to the data representing the position transmitted by the position reader 7 indicating the linear displacement of the end 61 of the connecting rod 6, which is directly associated to the useful height of the seat 2.

**[0034]** Said adjustment mechanism enables the adjustment when the seat 2 goes up or down, by simply inverting the polarity of the geared motor 5 by means of the microprocessor.

**[0035]** Moreover, the microprocessor can in turn be linked to communicate data with a portable electronic device of a user, for example a mobile phone. Using said mobile phone, the user can remotely control the microprocessor, and therefore, the operation of the improved height-adjustable bench of the invention.

**[0036]** The communication between the microprocessor and the mobile phone is wireless, for example by means of Bluetooth technology, said mobile phone may even be provided with an application to this end.

**[0037]** Thanks to the improved height-adjustable bench of the proposed invention, a suitable and effective adjustment is achieved without manual effort, since it is

motorised.

**[0038]** In the improved height-adjustable bench of the invention, no audible noise is generated from the normal use position, for example of a pianist when they are playing the piano in a concert and slide from one side to the other when sitting, therefore being very useful and suitable in said use.

**[0039]** Furthermore, the improved height-adjustable bench of the present invention is very easy and comfortable to use. The actuation is ensured by means of the application of minimal effort by the user since the manual action is minimised, such that the use thereof is comfortable.

**[0040]** It even enables the user to be linked to it, using a smartphone, by means of a computer application and using a Bluetooth wireless network connection. Through this application, the user can adjust the height of the improved height-adjustable bench of the invention by means of touch buttons, which will enable them to easily adjust the height. The height used can also be stored for future occasions, since it can be used by different users.

**[0041]** The invention is easy to assemble and disassemble for possible repairs, incorporating simple elements which enable the assembly to be equipped with an ease of use, with a simplification in the parts and cost savings for the company in the manufacturing.

**[0042]** The details, shapes, dimensions and other secondary elements, as well as the materials used in manufacturing the improved height-adjustable bench of the invention, may be suitably replaced with others that are technically equivalent and do not depart from the essential nature of the invention or from the scope defined by the claims included below.

## Claims

1. An improved height-adjustable bench, comprising a seat (2) with an adjustable useful height, **characterised in that** it comprises two spindles (3) which are mechanically linked to corresponding scissor lift mechanisms (4), a geared motor (5) and two connecting rods (6) each mechanically linked at each of the ends (61) thereof to each of the spindles (3), the other end (62) of each connecting rod (6) being fastened and articulated on the platen (41) for fastening the scissor lift (4) to the bench (1) itself, all the previous elements being arranged in the bench (1) in the lower portion of the seat (2) thereof, and the geared motor (5) and the spindles (3) being further fastened at the same time in the position thereof with respect to the same seat (2); the scissor lift mechanisms (4) being arranged such that they provide the capacity to adjust the useful height of the seat (2) of the bench (1), and each of the spindles (3) being mechanically linked to the geared motor (5), such that they receive, from the same geared motor (5), a concentric rotating movement with the axial shaft

thereof; the rotating movement of the spindles (3) causing a linear movement of the ends (61) of the connecting rods (6) along and in relation to the spindles (3) themselves, for which reason since the other end (62) of the connecting rods (6) is fastened and articulated in the bench (1) itself, the same rotating movement of the spindle (3) causes a vertical displacement of the spindle (3) which is transmitted to the scissor lift mechanism (4) and from said mechanism to the seat (2).

2. The improved height-adjustable bench, according to claim 1, **characterised in that** the two connecting rods (6) are linked at the ends (61) thereof to the spindles (3), by means of a nut (36) threaded on each spindle (3) and joined and articulated simultaneously to said end (61) of the connecting rod (6), such that the rotary movement of the spindles (3) causes a linear movement of said nut (36) along the threaded path of the spindle (3) itself.
3. The improved height-adjustable bench, according to claim 1 or 2, **characterised in that** the two spindles (3) are coaxial, and the scissor lift mechanisms (4) are arranged on opposite sides of the seat (2).
4. The improved height-adjustable bench, according to any of the preceding claims, **characterised in that** it incorporates an adjustment mechanism, which comprises a position reader (7) for the linear displacement of the end (61) of the connecting rod (6) in relation to the spindle (3) itself and a microprocessor, said position reader (7) and the microprocessor being linked to communicate data, and said microprocessor having at the same time the ability to control the geared motor (5).
5. The improved height-adjustable bench according to claim 4, **characterised in that** the microprocessor is linked to communicate data with a portable electronic device of a user, the same microprocessor being able to be controlled by the same user through said portable electronic device.
6. The improved height-adjustable bench, according to claim 5, **characterised in that** the communication between the microprocessor and the portable electronic device is wireless.
7. The improved height-adjustable bench, according to any of the preceding claims, **characterised in that** it comprises at least one manually-actuated wheel (8) mechanically linked to the spindles (3), and enabling to transmit a concentric rotating movement to the same spindles (3) with the axial shaft thereof.

FIG. 1

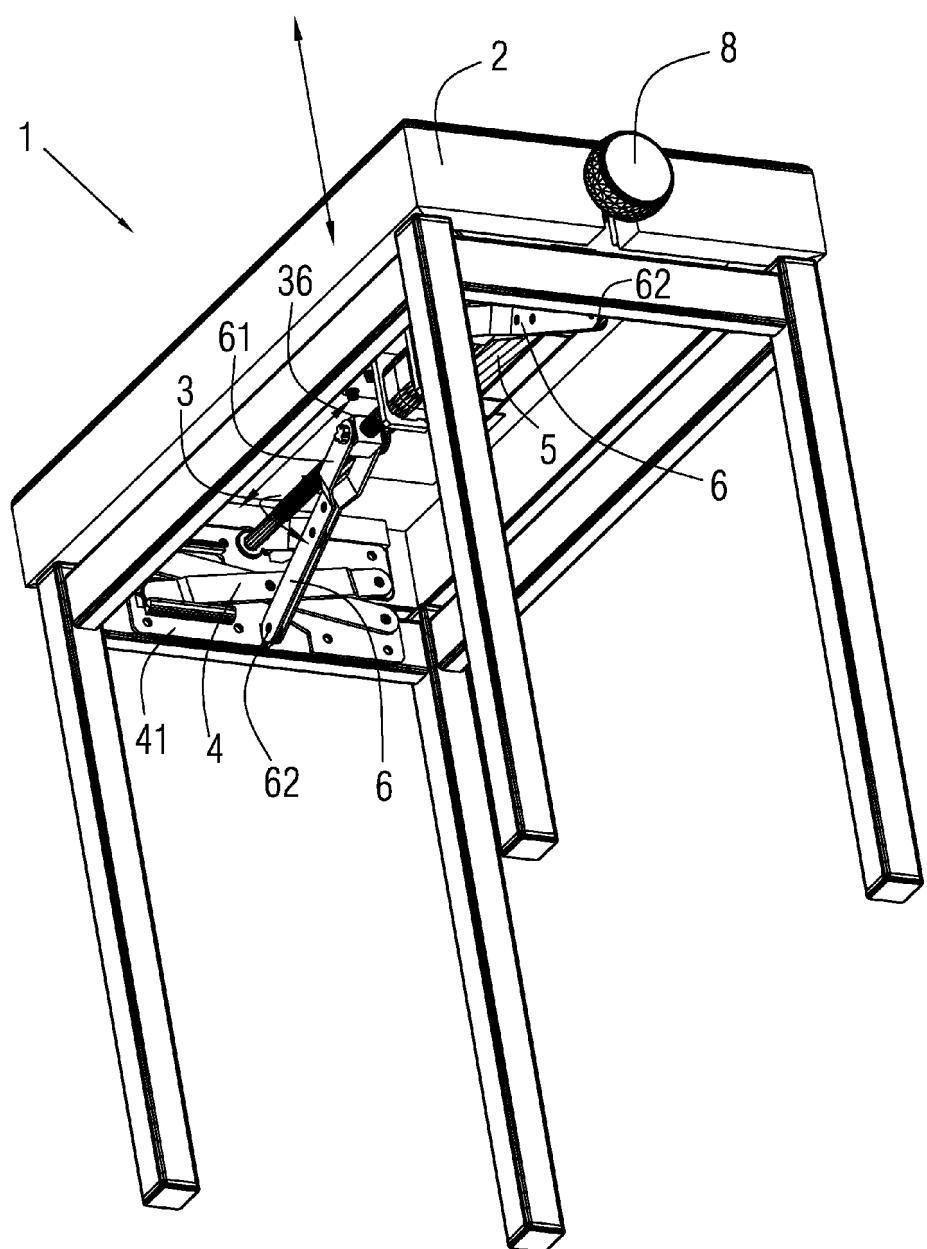
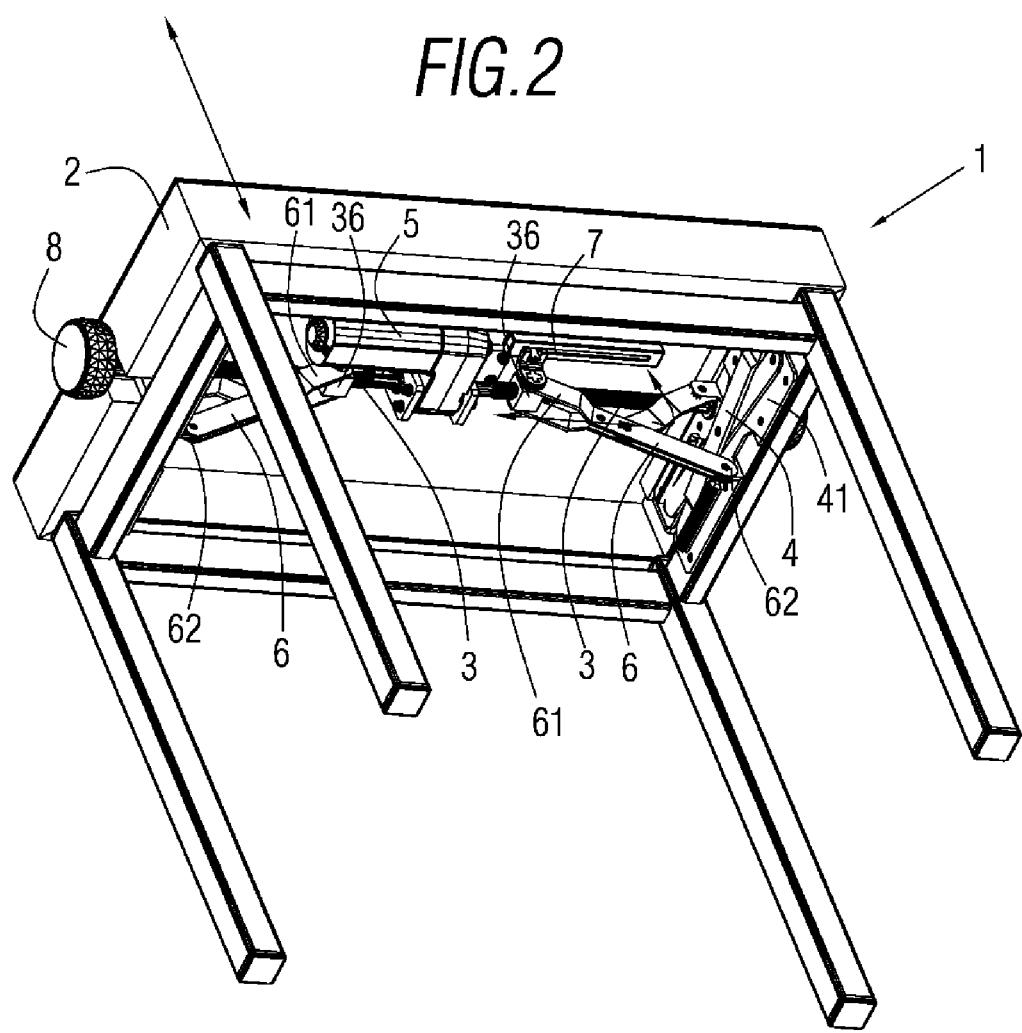


FIG.2



## INTERNATIONAL SEARCH REPORT

5	International application No PCT/ES2019/070668		
A. CLASSIFICATION OF SUBJECT MATTER	INV. A47C3/20 A47C9/08 ADD.		
10	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) A47C A47B B66F		
15	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
20	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
25	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
30	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
35	Y	JP 2006 330219 A (KAWAI MUSICAL INSTR MFG CO) 7 December 2006 (2006-12-07) figures 1-4 -----	1-7
40	Y	FR 2 956 800 A1 (PGA ELECTRONIC [FR]) 2 September 2011 (2011-09-02) page 9, lines 27-29; claims 1,2,3; figures page 8, lines 22-31 page 2, lines 13-18 -----	1-7
45	<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
50	* 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 application or patent 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		
55	Date of the actual completion of the international search  8 January 2020	Date of mailing of the international search report  17/01/2020	
	Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Amghar, Norddin	

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No  
PCT/ES2019/070668

5	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
10	JP 2006330219 A	07-12-2006	NONE	
15	FR 2956800 A1	02-09-2011	NONE	
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