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(11) **EP 1 491 237 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
29.12.2004 Bulletin 2004/53

(51) Int Cl.7: **A63B 23/00**

(21) Application number: **04015024.5**

(22) Date of filing: **25.06.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL HR LT LV MK

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(30) Priority: **27.06.2003 ES 200301564 U**

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(54) **Device for rehabilitation of upper extremity joints**

(57) The invention refers to a device which has been especially designed for carrying out physical exercises constituted of two vertically elongated supports, provided with respective longitudinal alignments of openings for selective coupling of the pivot shaft of respective connecting rods, which are thus height adjustable, each

connecting rod incorporating in turn, at its end opposite to the one pivoting on the corresponding support, another alignment of openings for selective coupling of the rotating shaft of a mitten, suitably shaped for receiving the corresponding hand of the user and provided with fixing means for fixing the mitten, such as a transverse belt.

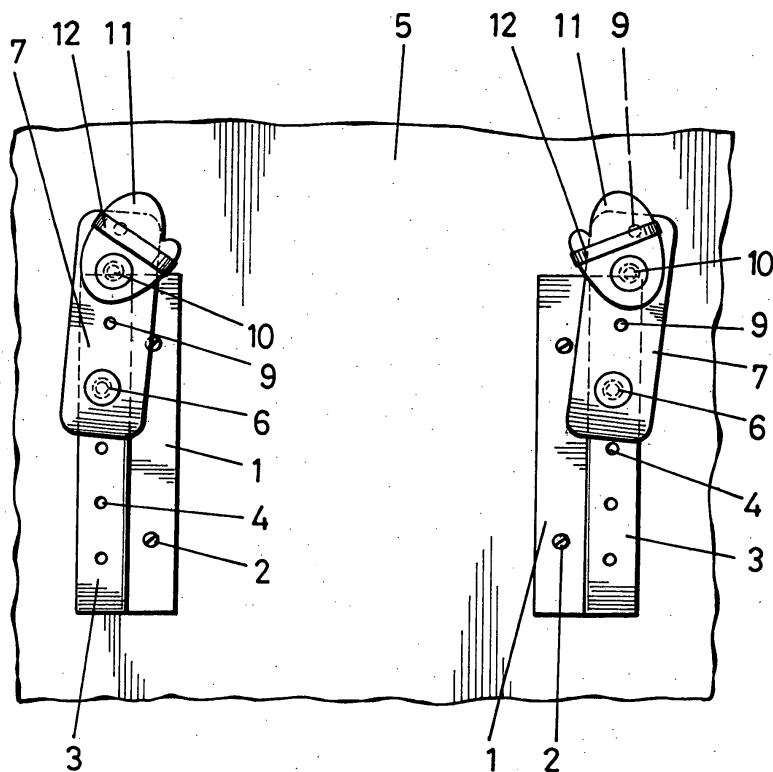


FIG.1

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Description

OBJECT OF THE INVENTION

[0001] The present invention refers to a device which has been especially designed for carrying out physical exercises, specifically at the level of the upper extremities of the users, achieving rotating motions in shoulders, shoulder blades, clavicles, elbows and wrists, mainly in rehabilitation processes, although it is also usable in prevention exercises.

[0002] The device is especially suitable for being used in rehabilitation centers, but it is likewise usable in gymnasiums or at the individual level.

BACKGROUND OF THE INVENTION

[0003] Certain physical problems such as tendinitis, among others, have as a consequence a limitation of mobility at the level of certain joints, such as at the level of the shoulder, elbow or wrist, which is necessary to recover by means of rehabilitation exercises.

[0004] It is also known that many problems in the joints are the result of a certain muscular weakness, specifically in the muscles surrounding a certain joint.

[0005] Consequently, both for preventing this type of problems and for the rehabilitation once they have occurred, physical exercises are carried out in rehabilitation centers and in gymnasiums, which obviously can also be carried out at the individual level, i.e. in the home of each individual and with suitable instructions from a professional, it having been proven that a plane motion provided to the hands, within an imaginary plane and with a circumferential trajectory, is especially suitable for rehabilitation and prevention of problems in any of the mentioned joints, i.e., shoulder, shoulder blade, clavicle, elbow or wrist. In fact, the mobility of the upper extremities in exercises similar to those carried out while cleaning windows is recommended as a therapy for these cases.

[0006] To date, no device facilitating this mobility is known, and much less doing so in optimal conditions, both referring to positioning of the level of the arms during the exercise and to the intensity of the latter.

DESCRIPTION OF THE INVENTION

[0007] The device proposed by the invention fills in this technological gap, constituting a simple and effective solution for carrying out the previously mentioned exercises.

[0008] To that end and more specifically, said device is constituted of a pair of supports which are intended for being fixed to a wall or the like in their simplest version, but which can form part of an autonomous apparatus in which said supports are carried out in columns projecting from a base platform, which grants to said columns the suitable stability, above all taking into account

that the user is intended to be located thereon while doing the exercise.

[0009] In any case, each one of these supports, vertically elongated and with the possibility of adjustment regarding the mutual spacing thereof, is arranged with a kind of guide for adjusting it to the body width of the user, for example based on an alignment of likewise vertical openings, such that these openings are selectively usable for the articulated connection of a connecting rod which, according to the selected opening of the guide, will adopt a determined height, also according to the body size of the user.

[0010] Each one of these connecting rods is finished off at its free end with a kind of mitten, connected also in an articulated manner thereto, a mitten which can include a belt in order to improve the fixing of the former to the hand of the user, a hand which must be maintained outstretched since the efficacy of the exercise is greater in this position.

[0011] According to another feature of the invention, it has been provided that both the articulated connection of each connecting rod to the corresponding support, and of the mitten to the corresponding connecting rod are carried out by means of conical bearings which, according to a greater or lesser axial tightness, oblige a greater or lesser effort in the rotating motion both of the connecting rods and of the mittens, in order to intensify the exercise to be carried out or not.

[0012] The possibility that the pivot shafts of the connecting rods are finished off with respective pinions at their rear ends, i.e. behind the supports or support columns, has also been provided for, especially when it is an autonomous device, such that with the help of a crank and a transmission chain, the therapist is the one providing the motion to the upper extremities of the patient, which are fixed to the mittens by means of corresponding belts, with the speed which the therapist considers suitable.

[0013] Each connecting rod will additionally incorporate a longitudinal alignment of openings for the selective use in the coupling of the corresponding mitten, also for the purpose of regulating at will the plane motion of the latter by means of a greater or smaller spacing with regard to the pivot shaft of the connecting rod on the support, i.e. with a greater or smaller effective length of the connecting rod.

DESCRIPTION OF THE DRAWINGS

[0014] To complement the description being made and for the purpose of helping to better understand the features of the invention, a set of drawings is attached as an integral part of said description, according to a preferred practical embodiment example thereof, in which the following has been shown in an illustrative and non-limiting manner:

Figure 1 shows a front elevational view of a device

for rehabilitation of upper extremity joints, carried out according to the object of the present invention and according to the embodiment variant thereof in which the latter is fixed to a wall.

Figure 2 shows a side elevational view of the device of the previous Figure.

Figure 3 shows a plan view of the same device.

Figure 4 finally shows a schematic perspective view of the support of the device when it is an autonomous apparatus not requiring a wall for its fixing.

PREFERRED EMBODIMENT OF THE INVENTION

[0015] In view of the described Figures, it can be observed how the device proposed by the invention is constituted of two vertical supports which, according to the embodiment variant shown in Figures 1. to 3, are carried out in respective approximately Z-shaped section profiles (1), such that by means of one of the branches thereof, the one corresponding to reference number (1), and with the collaboration of openings (2), its fixing to the wall is carried out by means of screwing, whereas its other branch (3) has a longitudinal alignment of openings (4) and is markedly distant from the wall (5) for the purpose of allowing the necessary manipulations for fixing and changing the position of the rotating shaft (6) for a connecting rod (7), which will be described below.

[0016] However, the device can be autonomous, i.e. the wall (5) not being necessary for the fixing of the former, in which case the supports (1) are carried out in columns (1') extending to the floor, as is observed in Figure 4, specifically the columns are fixed with the possibility of adjusting the spacing thereof on a platform (8), granting the columns (1') the suitable stability, above all during the exercise, in which the user is standing on said platform (8), loading it with his or her body weight, these columns (1') having respective longitudinal alignments of openings (4) for the same purpose of adjusting the height level for the connecting rods (7).

[0017] On the end opposite to the hinge pin (6) with regard to the supports (1-1'), these connecting rods (7) incorporate in turn an alignment of openings (9) allowing for selective coupling for the shaft (10) of respective mittens (11), preferably provided with belts (12) for fixing of the hand which, outstretched, perfectly adapts to the mittens (11).

[0018] Each connecting rod (7) rotates around its shaft (6) with interposition of a conical bearing, such that according to a greater or lesser tightness of said bearing, it is achieved that the turn of each connecting rod (7) requires a greater or lesser physical effort, and the same occurs with the rotating shaft (10) of each mitten (11) with regard to the corresponding connecting rod (7).

[0019] The front offset of the branch (3) of the supports (1) with regard to the wall (5) allows for the necessary manipulations on the rear side of said branch in order to carry out the fixing of the shafts (6), as is especially observed in Figure 3, whereas when an autono-

mous support such as that in Figure 4 is used, there is no problem whatsoever in manipulating the locking screws of the shafts (6) on the rear side of the columns (1'), said shafts (6) in this case, as has already been stated previously, being able to be finished off on the rear side of the support with respective pinions which, with the collaboration of a third pinion, a chain and a crank, not shown in said Figure 4, allow the physical therapist to provide motion to said crank, and, by means of the connecting rods (7), to the mittens (11), in order for the physical therapist to be the one who moves the arms of the patient with the suitable speed.

Claims

1. A device for rehabilitation of upper extremity joints which, having a purpose of guiding the hands of the user with a plane motion within the same plane, is **characterized in that** it is constituted of two vertically elongated supports, provided with respective longitudinal alignments of openings for selective coupling of the pivot shaft of respective connecting rods, which are thus height adjustable, each connecting rod incorporating in turn, at its end opposite to the one pivoting on the corresponding support, another alignment of openings for selective coupling of the rotating shaft of a mitten, suitably shaped for receiving the corresponding hand of the user and provided with fixing means for fixing the mitten, such as a transverse belt.
2. A device for rehabilitation of upper extremity joints according to claim 1, **characterized in that** said supports are carried out in respective Z-shaped section profiles intended for being fixed to a wall or the like by one of the branches thereof, whereas the other one, markedly projecting in a front direction, is the one incorporating the openings for selective fixing of the shaft of the connecting rods.
3. A device for rehabilitation of upper extremity joints according to claim 1, **characterized in that** said supports are carried out in columns projecting, with the possibility of adjusting the spacing thereof, from a lower base support platform on the ground which stabilizes the columns in the working position with the body weight of the user.
4. A device for rehabilitation of upper extremity joints according to the previous claims, **characterized in that** both the pivot shafts for the connecting rods and the rotating shafts for the mittens include conical bearings, the greater or lesser tightness of which allows for regulating the effort necessary for the rotation of said elements.
5. A device for rehabilitation of upper extremity joints

according to the previous claims, **characterized in that** the pivot shafts for the connecting rods are susceptible to being finished off with respective pinions between which a chain is arranged which, with the collaboration of a third pinion to which the corresponding crank is associated, allows the physical therapist to provide a rotating motion to the connecting rods and consequently a plane motion to the hands of the patient.

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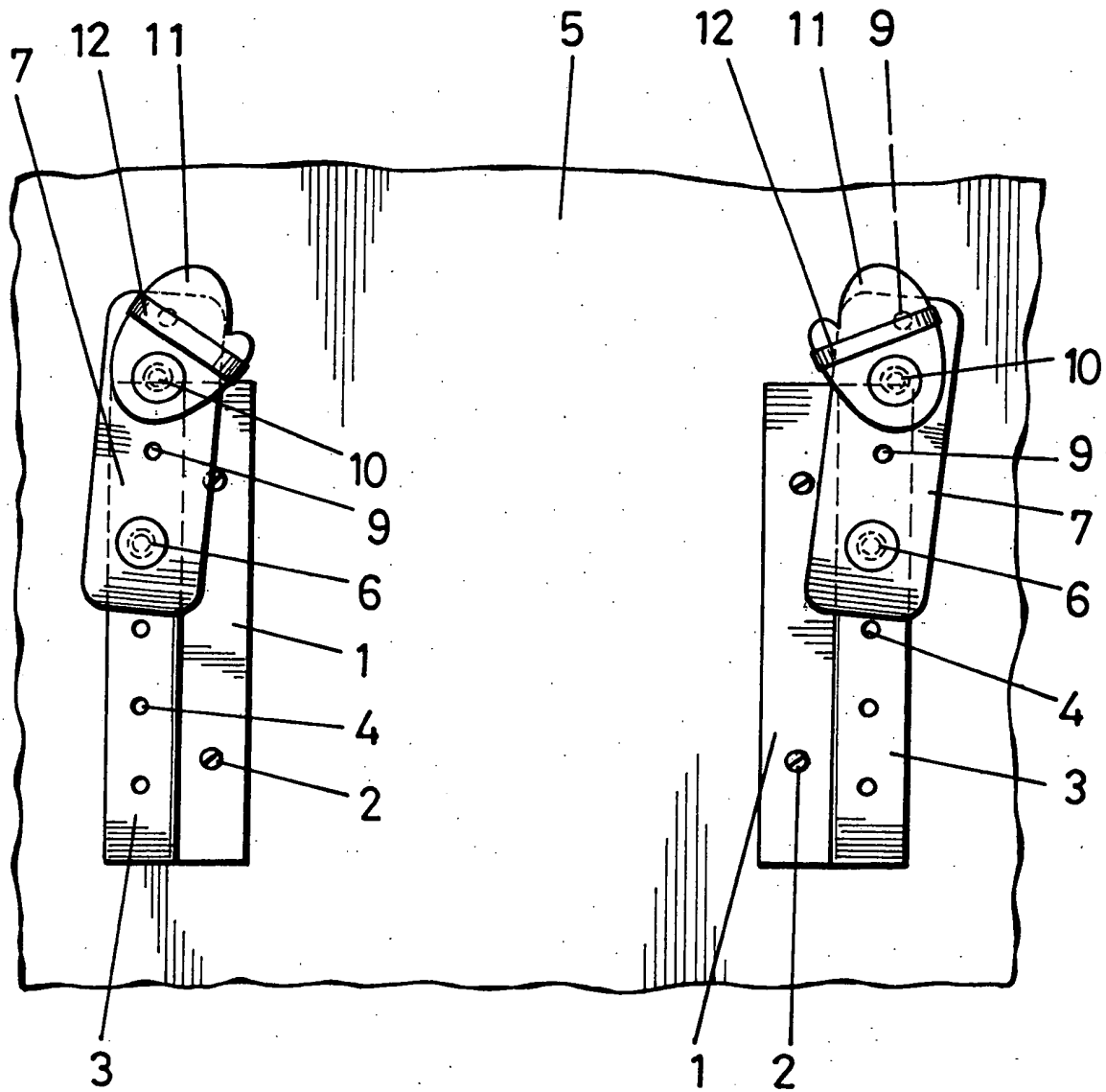


FIG.1

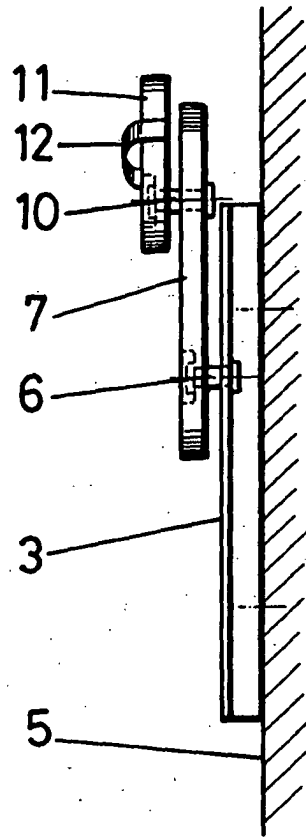


FIG. 2

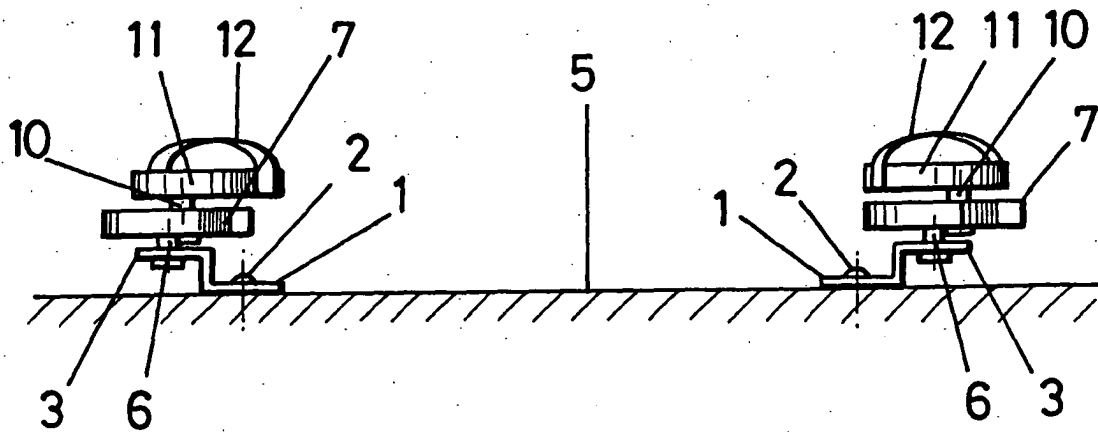
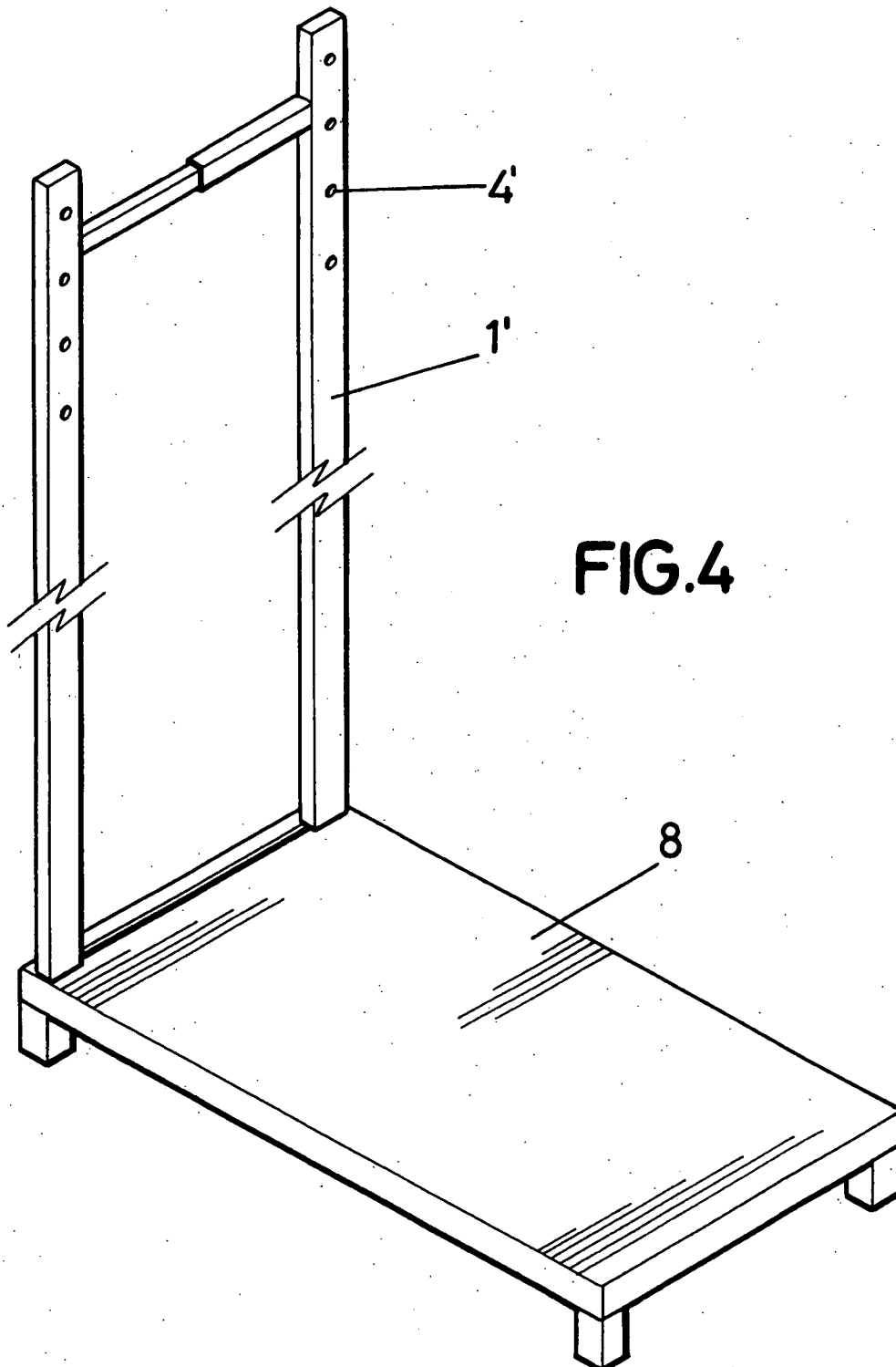


FIG. 3





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EUROPEAN SEARCH REPORT

Application Number
EP 04 01 5024

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A	WO 94/01180 A (MONTE LOUIS ; DAVIES RONALD C (US); SOWINSKI THOMAS (US)) 20 January 1994 (1994-01-20)		TECHNICAL FIELDS SEARCHED (Int.Cl.7) A63B A61H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 October 2004	Examiner Sánchez y Sánchez, J
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 04 01 5024

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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