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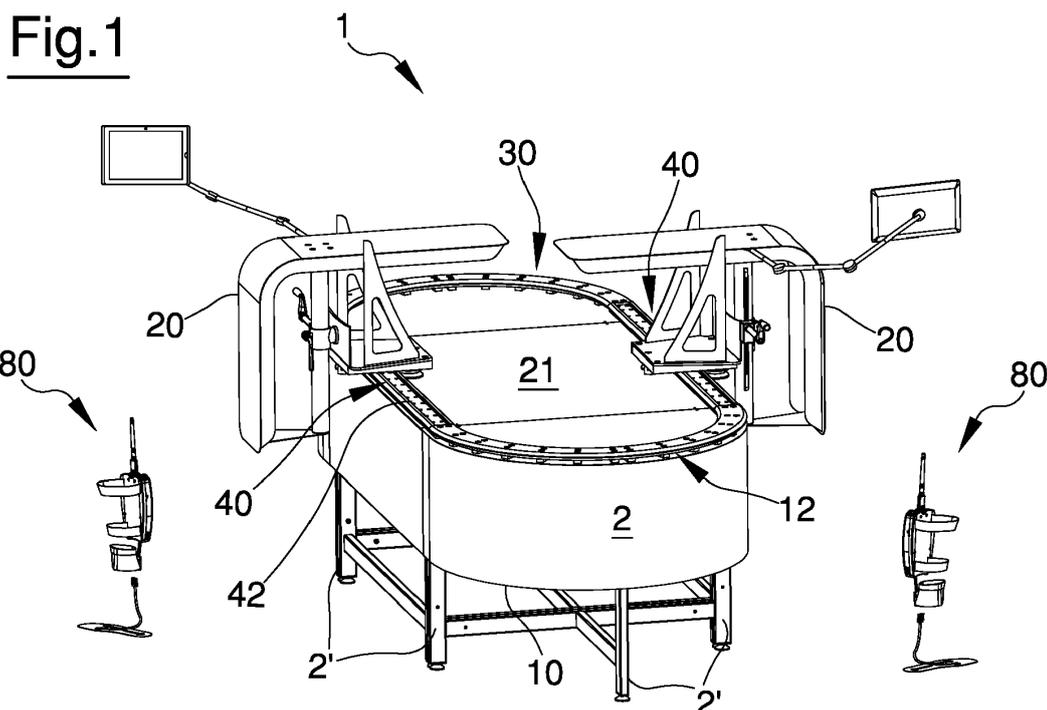
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(54) **REHABILITATION UNIT**

(57) Rehabilitation unit (1) comprising a frame (10) peripherally delimited by a respective first edge (12) defining a first annular path (30) of given shape and supporting at least one carriage (20); constraint members (40) comprising a first guide (42) laterally carried by the first edge (12) and shaped like the first annular path (30);

each carriage (20) having a support (22) externally delimited by a sheet (23) extending above and at the side of the first guide (42) and adjusting means (24) for adjusting the position of the sheet (23) with respect to the first guide (42).



Description

[0001] The present invention relates to a rehabilitation unit. In particular, the present invention relates to a rehabilitation unit comprising a plurality of stations for assisted walking.

[0002] In particular, the present invention relates to a rehabilitation unit comprising a plurality of stations for assisted walking that are movable along an annular path.

BACKGROUND TO THE INVENTION

[0003] As it is well known, in the field of rehabilitation of patients with walking troubles it is crucial for the patients to train their lower limbs. Moreover, it is understood that patients suffering from hemiplegia shall also restore their ability of controlling and balancing the functions of their own torso, what is usually not deemed crucial by various rehabilitation approaches and is therefore disregarded, usually focussing attention mainly on the recovery of the paralysed limb.

[0004] Equipment are well known, provided with harnesses carried by a guide extending along a given path, whose function is to support the patients unable to walk autonomously.

[0005] The use of this type of equipment put the patient in conditions very different than the real walking conditions, as the patient cannot control again the correct posture to manage his/her body on the legs in static and dynamic conditions in order to keep his/her balance autonomously. Therefore, this kind of equipment, in addition to engage significant portions of the areas destined to walking training, are unsatisfactory as regards the recovery of paralysed limbs and, in particular, the recovery of the mobility ability.

[0006] Moreover, in order to maximise the treatment efficiency and to achieve the expected results, the equipment shall be used by the users under the continuous control and with the aid of specialized therapists able to continuously modulate their intervention according to the patients' needs. It is easily understood that, in order to do this, the rehabilitation departments for treating patients affected by reduced mobility of the lower limbs shall have a high number of specialised therapists in order to assist every patient individually during rehabilitation with this equipment. This procedure entails very high costs due to the need for performing rehabilitation for many days under the continuous control of specialized therapists. Moreover, as a therapist cannot manage more patients simultaneously, not all hospitals or care centres can ensure continuous rehabilitation as they do not have a sufficient number of specialized professionals available.

[0007] In view of what above, the problem of having a unit for immobilized patients rehabilitation allowing to perform the operations described above without the intervention of an operator is actually unsolved, and represents an interesting challenge for the Applicant.

[0008] Therefore, it would be desirable to have available a rehabilitation unit that, in addition to allow limiting and possibly overcoming the drawbacks of the prior art, defines a new standard for this kind of units.

SUMMARY OF THE PRESENT INVENTION

[0009] The present invention relates to a rehabilitation unit. In particular, the present invention relates to a rehabilitation unit comprising a plurality of stations for assisted walking.

[0010] In particular, the present invention relates to a rehabilitation unit comprising a plurality of stations for assisted walking that are movable along an annular path.

[0011] The object of the present invention is to provide a rehabilitation unit allowing the patient to move the lower limbs safely.

[0012] According to the present invention a rehabilitation unit is provided, whose main features will be described in at least one of the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

[0013] Further characteristics and advantages of the rehabilitation unit of the invention will be more apparent from the description below, set forth with reference to the attached drawings, that illustrate some examples of embodiment, where identical or corresponding parts of the system are identified by the same reference numbers. In particular:

- Fig. 1 is a schematic perspective view of a first preferred embodiment of a rehabilitation unit according to the present invention;
- Fig. 2 is a plan view of Fig. 1;
- Fig. 3 shows a detail of Fig. 1 in enlarged scale and with some parts removed for the sake of clarity;
- Figs. 4 and 5 are schematic plan views in reduced scale of some variants of a detail of Fig. 1;
- Figs. 6 and 7 are front views in different scales of variants of Fig. 1;
- Figs. 8 and 9 are perspective schematic views of a detail of Fig. 1.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0014] In Fig. 1, number 1 indicates a rehabilitation unit for patients with walking trouble, who shall recover muscle strength and the ability to move autonomously their weight from a leg to the other. The unit 1 comprises a frame 10 that is provided with a base 2 that is profiled in order to define a first annular flat path 30 of given shape. The base 2 is carried by a plurality of pillars 2' and is peripherally delimited by a respective first edge 12, which is so designed as to support at least one carriage 20 (coupled to the frame 10) in a sliding manner through bilateral constraint members 40. The constraint mem-

bers 40 comprise a first flat guide 42 laterally carried by the first edge 12 and geometrically shaped like the first annular path 30. The base 2 is delimited, at the top in Fig. 1, by a substantially horizontal plane 21, and also the first guide 42 is horizontal, without however limiting the scope of the present invention.

[0015] Each carriage 20 has a structure comprising a base 200 and a plate 200' supporting, outside the projection of the base 2, a box-shaped support shaped like an overturned L, to which the patient can rest the flank and an arm so as to be laterally supported. The first guide 42 is longitudinally delimited by opposite coplanar flanks 420, shaped in a given manner, and each base 200 of a respective carriage 20 carries further constraint members 40 constituted by pulleys 43 (only one of which is visible in Fig. 3) arranged at opposite sides from the first guide 4242. Each pulley 43 is provided with respective grooves, whose section is shaped in conjugated manner with the flanks 420 in order to couple in an angularly fixed and freely sliding manner to the first guide 42.

[0016] The support 22 is carried by the plate 200' through the interposition of a vertical rod 240 shown in Fig. 3. The rod 240 is coupled to the plate 200' in a manner adjustable in height through a crank mechanism 242 embodied in a known manner and provided with a toothed wheel 242' engaging a tothing 242" longitudinally coupled to the rod 240 in a rigid manner in order to be vertically moved.

[0017] Each support 22 is externally delimited by a sheet 23 extending above and at the side of the first guide 42, as it is shown in Fig. 3. The sheet 23 is externally delimited by a L-shaped smooth surface 220, comprising a first flat part 222 substantially parallel to the first guide 42, and a second flat part 224 substantially transverse to the first guide 42.

[0018] The first part 222 and the second part 224 are connected together by means of a curved part 226, whose purpose is to optimize the contact with a patient's armpit and to avoid to constrain him/her, so as to stimulate the patient's ability to find autonomously a balance condition, gradually loading a paralysed limb where he/she has reduced sensitivity.

[0019] If necessary, vacuum cushions can be associated with the sheet 23, in order to optimize the contact especially during the rehabilitation first steps, when the patient resting on the carriage 20 has the impression of needing more support. For instance, vacuum cushions 23' like the "Stabilo" cushions can be associated with the sheet 23, as schematically shown only in Fig. 3, where the cushions have been indicated with a broken line.

[0020] In Figs. 1 and 2, the carriages carried by the frame 10 are two and are arranged at opposite sides from the annular path 30.

[0021] With reference only to Fig. 3, each carriage 20 is provided with a digital communication device 50 suitable for electronic data wireless exchange, an electronic computer 60 electronically connected to the communication device 50 and a monitor 62 connected to the elec-

tronic computer 60.

[0022] Moreover, sensors 222S, 224S and 226S are respectively associated with the first part 222, the second part 224 and the curved part 226 of the surface 220 and are connected (in a wired known manner, not shown for the sake of drawing economy) to the electronic computer 60 in order to detect the pressure acting onto the sheet 23, as exerted by a patient interfacing the support 22.

[0023] The rehabilitation unit 1 comprises a central computer 64 carried by the frame 1 (only in Fig. 1) and so designed as to receive and process information from the electronic computers 60 of each carriage 20 through the respective communication devices 50. The electronic connections between the components 60 and 64 are known and have not been shown for the sake of drawing economy.

[0024] With reference to Figs. 1, 8 and 9, the unit 1 comprises a detection device 80 for detecting the pressure exerted on the ground by the patient at the side of each carriage 20 and therefore of the frame 10 during a rehabilitation session resting on a carriage 20. The detection unit 80 comprises at least one plate 82 shaped substantially as an insole in order to be inserted inside a patient's shoe.

[0025] Each plate 82 is provided with at least one sensor 820 suitable to detect the pressure exerted by the moving patient. The detection unit 80 is electronically connected (in a known and therefore not shown manner) to the electronic processing means 60 remotely and wirelessly.

[0026] With reference to Fig. 9, the detection unit 80 is provided with a box-shaped body 81 containing a processing unit 822 electronically connected to each sensor 820. The box-shaped body 81 has fastening members 810, in particular a pair of laces 811 that can be associated to a patient's leg in order to measure the variable load that can be applied to the at least one plate 82 during a rehabilitation session on the unit 1.

[0027] The use of the rehabilitation unit 1 is clearly apparent from the description above and does not require further explanations. However, it should be useful to specify that the use of the rehabilitation unit 1 allows a patient to find a mechanical support for walking adequate to his/her anthropometric measures and physical conformation since the first steps of rehabilitation for recovering his/her mobility.

[0028] Moreover, the fact of having provided the plate 23 and the plate 82 with sensors allows the users to verify on the monitor 62 the trend of the rehabilitation session, so as to match it to the therapeutic indications received. Moreover, a rehabilitation therapist can contemporaneously control the trends of rehabilitation treatments of more patients through the processing device 64 communicating with the computers 60 carried on board of the carriages 20 of each rehabilitation unit 1.

[0029] Obviously, by connecting more rehabilitation units 1 to the processing device 64 it will be possible to monitor even more users performing rehabilitation ses-

sions contemporaneously. By providing the carriages 20 of the various rehabilitation units 1 connected to the processing device 64 with audio equipment, it will be possible to communicate with the patients and to help them to improve the rehabilitation sessions.

[0030] Lastly, it is clearly apparent that variants and modifications can be done to the rehabilitation unit described and illustrated herein without however departing from the protective scope of the invention.

[0031] In particular, in Figs. 4a) and 4b) the frame 10 may be of the modular type and may comprise at least one first support 14, delimited by rectilinear edges 12', and at least two second supports 16, delimited by a curved edge 12", in order to provide annular paths whose shape can be defined at will.

[0032] In Fig. 4a) a frame 10 is illustrated like that of Fig. 1, divided into parts, and in Fig. 4b) a frame 10 is illustrated composing two first supports 14, three second supports 16 and a third, substantially T-shaped, joining support 17.

[0033] Obviously, also the guide 42 is modular and composed of segments associated with the rectilinear and/or curved edges of the various supports composing the desired version of the frame 10.

[0034] Fig. 5 shows an annular frame 10 having a second annular path 30' inside and parallel to the first path 30. In this way, the frame 10 is so designed as to carry a second guide 42', substantially identical to the first guide 42, so that the frame 10 is suitable to support the carriages 20 (illustrated only schematically) on parallel tracks of substantially identical geometry. A given moving direction for the respective carriages 20 corresponds to each path 30 and 30'.

[0035] With reference to Fig. 6, the rehabilitation unit 1 can be modified by providing carriages 20 supporting a U-shaped arm 201 provided with a supplemental support 22' aligned with the support 22 carried by the plate 200. In this way, a patient with high mobility difficulties can rest both arms on the carriage 20, being therefore supported on both the right and left flank.

[0036] Alternatively, in Fig. 7 the rehabilitation unit 1 of Fig. 6 may be simplified and may have an arm 201' for each carriage 20 provided with only one ascending branch 202 ending with an end portion 203 that supports a harness 204 through a crutch 205.

[0037] In view of what described above, the rehabilitation unit 1, in the embodiments described above, solves the problem of having available a rehabilitation unit for immobilized patients allowing them to perform rehabilitation sessions autonomously under the remote control of an operator safely, minimizing the times necessary to recover autonomous mobility.

Claims

1. A rehabilitation unit (1) comprising a frame (10) peripherally delimited by a respective first edge (12)

that defines a first annular path (30) of given shape and supporting at least one carriage (20) coupled to said frame (10) in a sliding manner along said first path (30) through bilateral constraint means (40); said constraint means (40) comprising a first guide (42) laterally carried by said first edge (12) and shaped like said first annular path (30); **characterized in that** each said carriage (20) has a support (22) externally delimited by a sheet (23) that extends above and at the side of said first guide (42) and adjusting means (24) for adjusting the position of said sheet (23) with respect to said first guide (42).

2. Unit according to claim 1, **characterized in that** said first guide (42) is substantially horizontal and said sheet (23) is externally delimited by a surface (220) shaped like an overturned L; said surface comprising a first flat part (222) substantially parallel to said first guide (42), and a second flat part (224) substantially transverse to said first guide (42); said first part (222) and second part (224) being connected by means of a curved part (226).

3. Unit according to claim 2, **characterized in that** said first guide (42) is longitudinally delimited by opposite flanks (420) shaped in a given manner and said at least one carriage (20) having pulleys (43), arranged at opposite sides from said first guide (42) and provided with respective grooves whose section is shaped in conjugated manner with said flanks (420) in order to couple in an angularly fixed and freely sliding manner to said first guide (42).

4. Unit according to any one of the previous claims, **characterized in that** said frame (10) is modular and comprises at least one first support (14), delimited by at least one rectilinear edge (12'), and at least two second supports (16), delimited by a curved edge (12"), in order to provide annular paths whose shape can be defined at will.

5. Unit according to any one of the previous claims, **characterized by** comprising a plurality of carriages (20) arranged along said first path (30).

6. Unit according to claim 5, **characterized in that** each said carriage (20) is provided with digital communication means (50) suitable for electronic data wireless exchange, electronic processing means (60) connected to said communication means (50) and a monitor (62) connected to said electronic processing means (60).

7. Unit according to claim 6, **characterized in that** sensing means (222S)(224S)(226S) are associated with said first part (222), second part (224) and curved part (226) and are connected to said electronic processing means (60) in order to detect the

pressure acting on said sheet (23).

an end portion (203) that supports a harness (204) through a crutch (205).

8. Unit according to claim 7, **characterized in that** pressure detection means (80) are electronically connected to said electronic processing means (60) of each said carriage (20) remotely and wireless so as to be usable at the side of said frame (10); said detection means (80) comprising at least one pressure detection member (82). 5
9. Unit according to claim 8, **characterized in that** said detection means (80) are provided with a box-shaped body (81) containing a processing unit (822) connected to each said pressure detection member (82); said box-shaped body (81) having fastening members (810) suitable to be associated to a variable load that can be applied to said pressure detection member (82); said processing unit (822) being connected, remotely and wireless, to said electronic processing means (60). 10 15 20
10. Unit according to any one of claims 6-9, **characterized in that** processing means (64) are provided in order to receive and process, in a single station, information received from said electronic processing means (60) of each said carriage (20) through the respective communication means (50). 25
11. Unit according to any one of claims 2-10, **characterized by** comprising vacuum containment means (90) associated with said sheet (23) that can be shaped at will. 30
12. Unit according to any one of the previous claims, **characterized in that** said frame (10) is of the annular type in order to have a second inner annular path (30') parallel to said first path (30) and so designed as to carry a second guide (42') substantially identical to said first guide (42) so that said frame (10) is suitable to support said carriages (20) on parallel tracks of substantially identical geometry. 35 40
13. Unit according to any one of claims 2-12, **characterized in that** said at least one carriage (20) is provided with support means (201)(201') for supporting a patient and extending at opposite side from said first part (222) with respect to said first guide (42) in order to support a load at the side of said sheet (23). 45
14. Unit according to claim 13, **characterized in that** said support means (201) comprise a U-shaped arm (201) provided with a further support (22') aligned with said support (22). 50
15. Unit according to any one of claims 2-12, **characterized in that** said at least one carriage (20) is provided with support means (201') comprising an arm (201') having an ascending branch (202) ending with 55

Fig.1

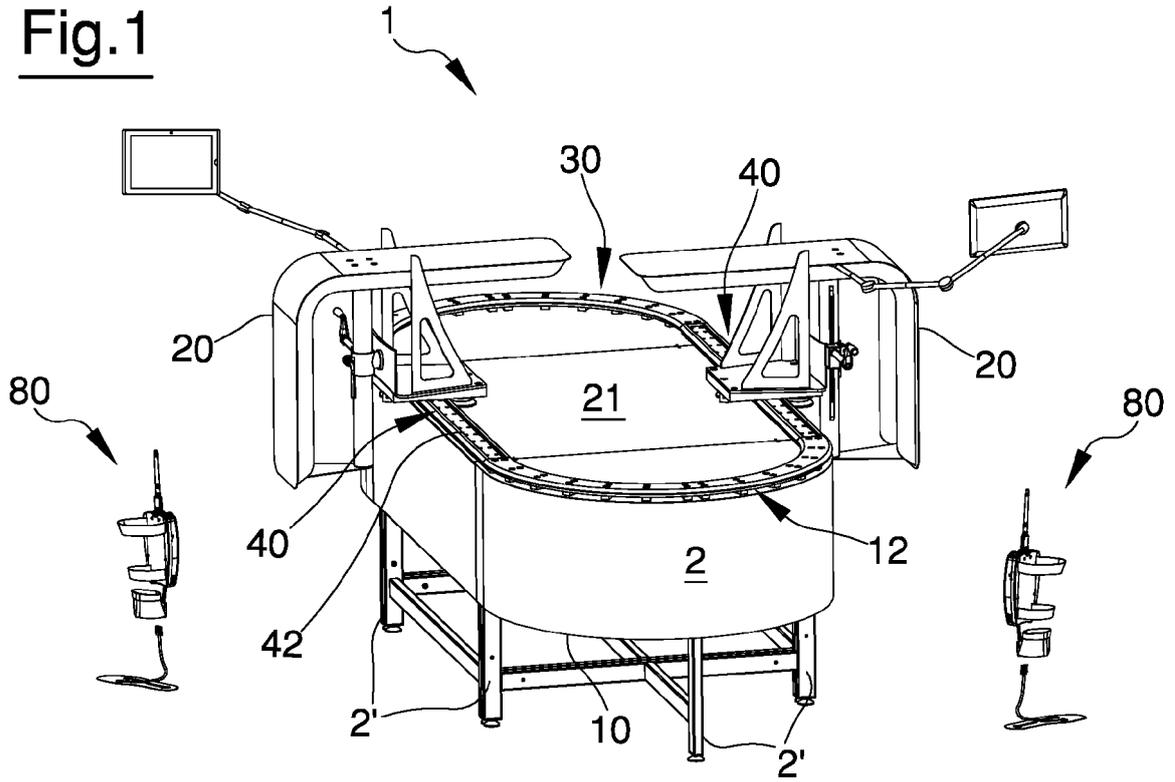


Fig.2

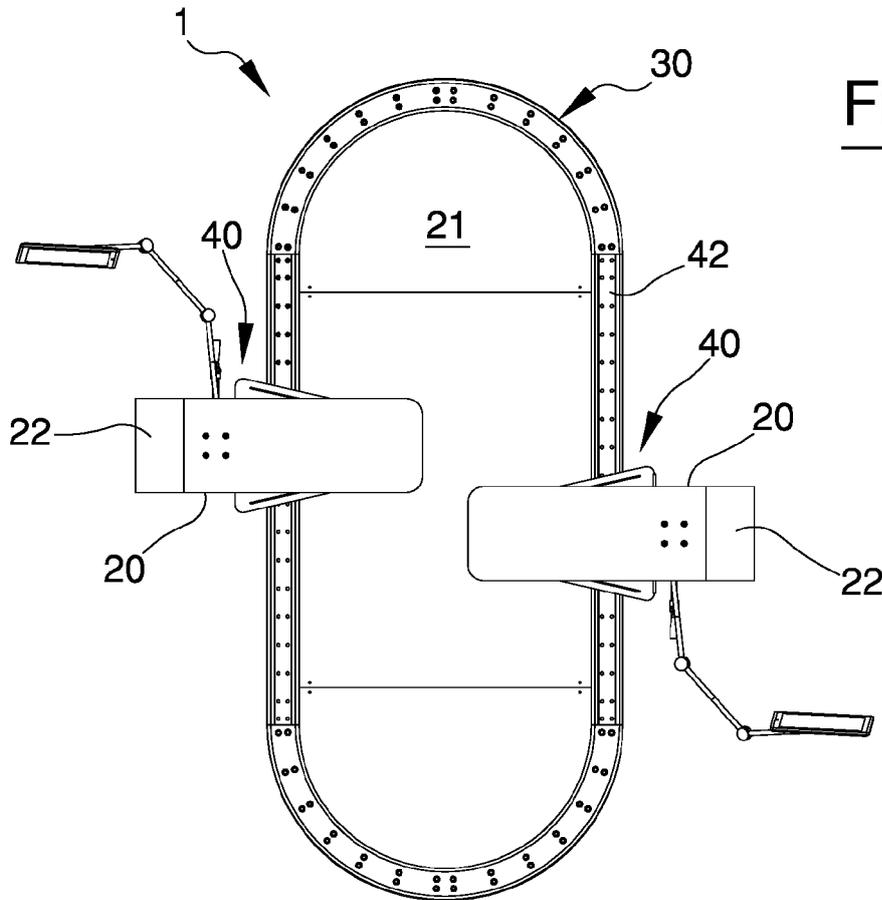


Fig.3

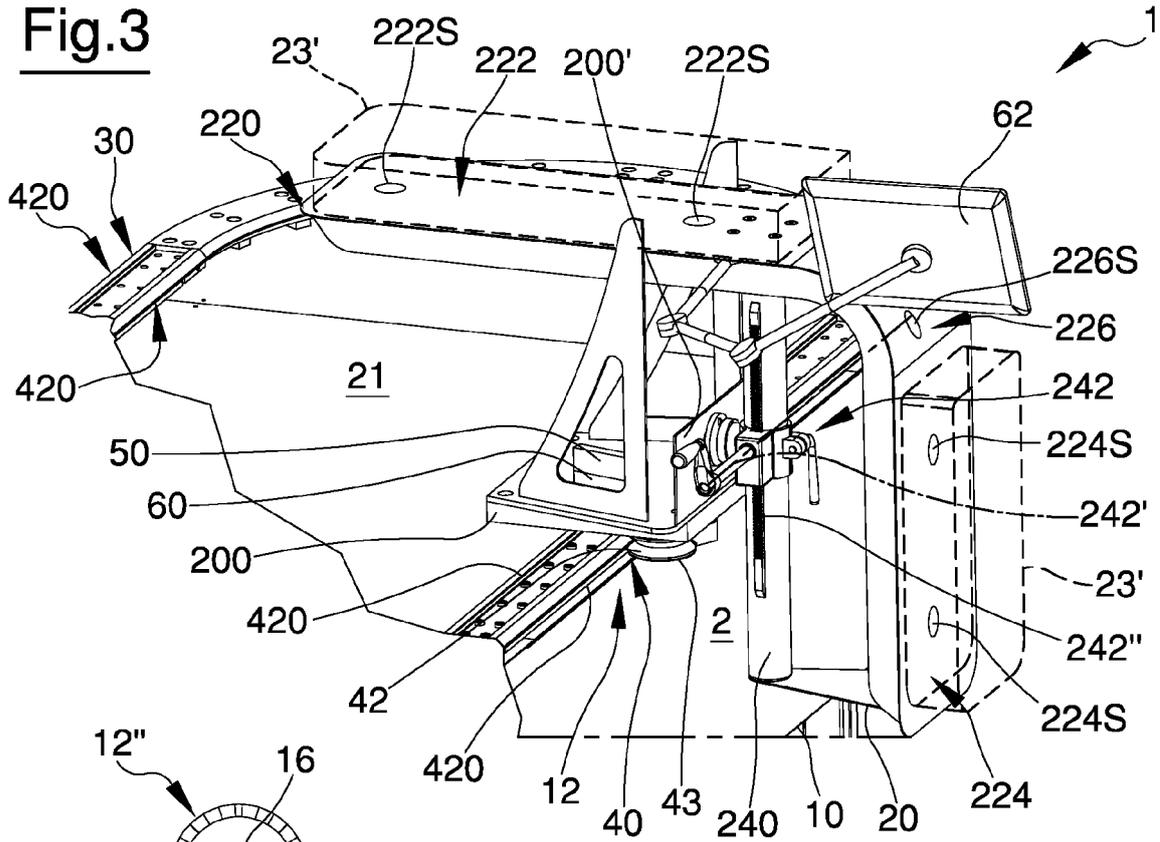


Fig.4a

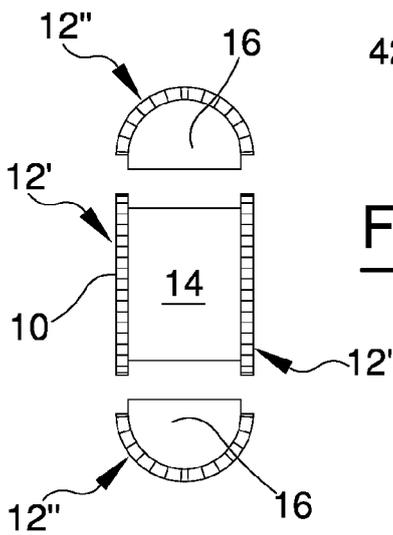


Fig.4b

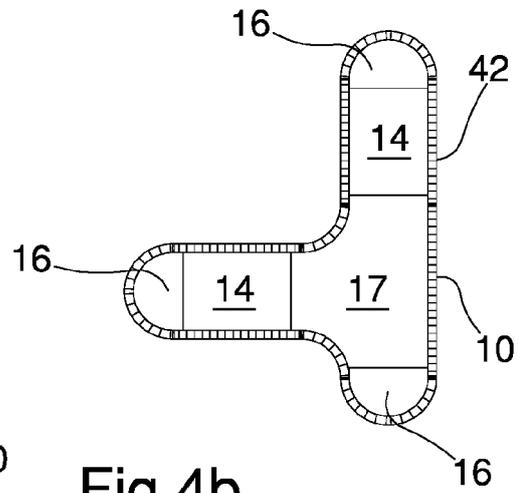
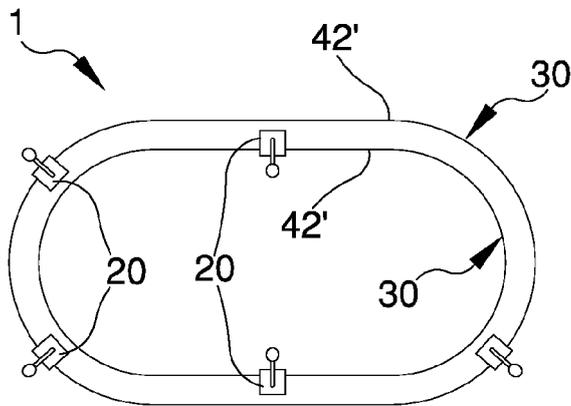


Fig.5



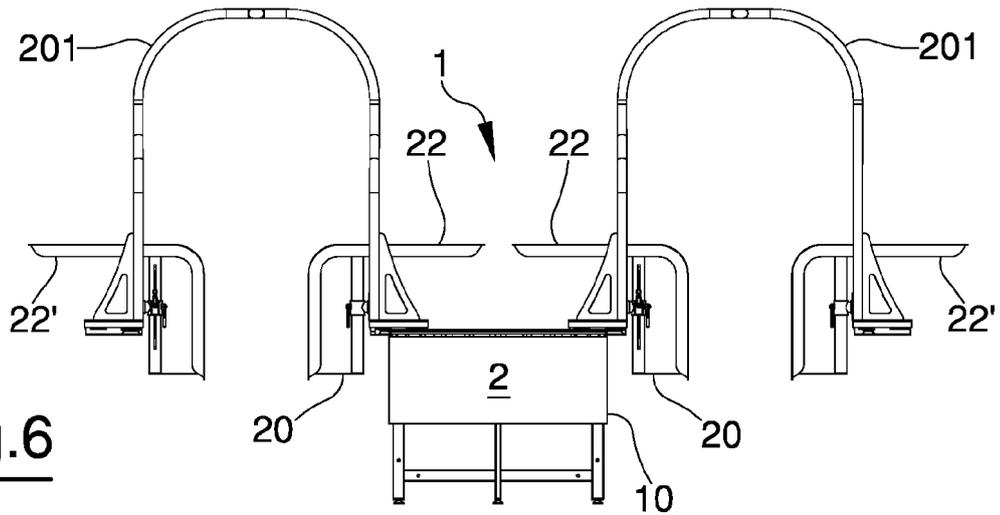


Fig. 6

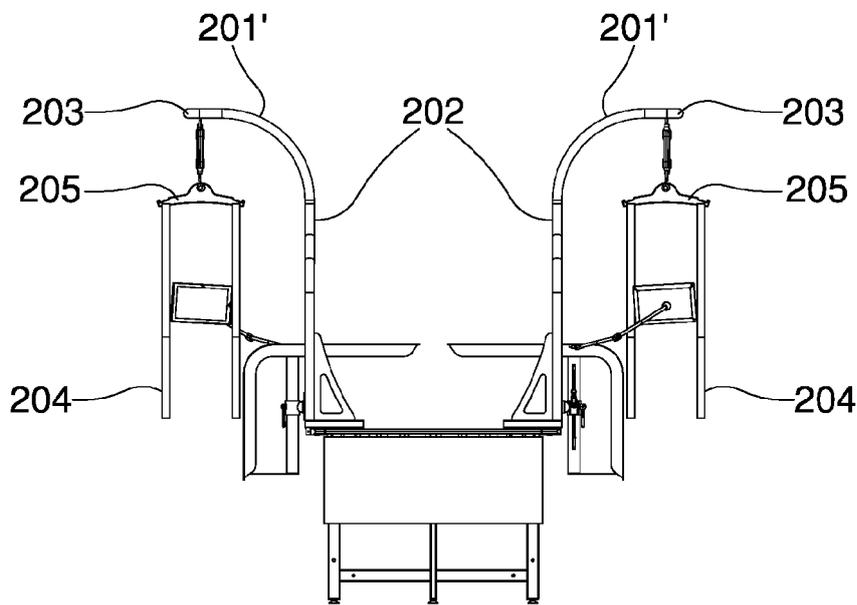


Fig. 7

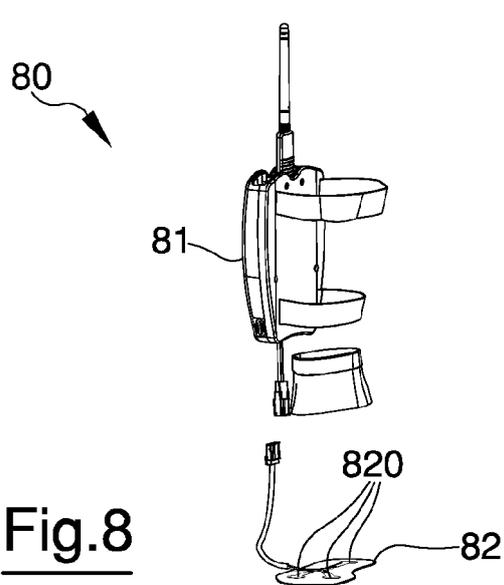


Fig. 8

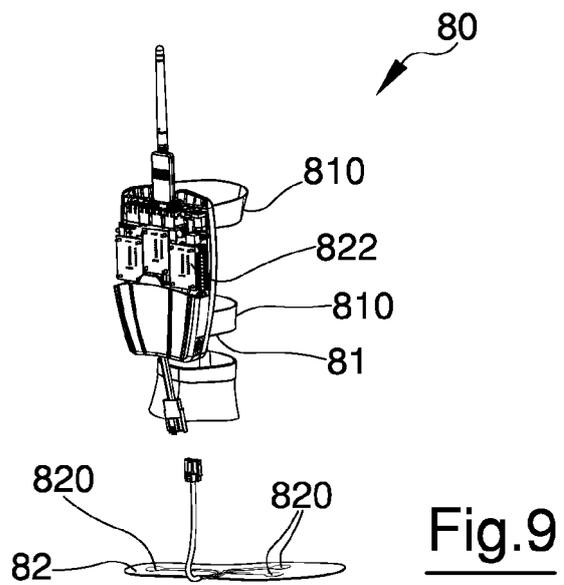


Fig. 9



EUROPEAN SEARCH REPORT

Application Number
EP 17 16 9594

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2015/335940 A1 (JOHNSON CYNTHIA LOUISE [US]) 26 November 2015 (2015-11-26) * abstract; figures 1-6,16,18 * -----	1-15	INV. A61H3/00 A63B23/04 A63B69/00
X	US 7 291 097 B1 (DACE LES N [US] ET AL) 6 November 2007 (2007-11-06) * abstract; figures 1,3,4 * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			A61H A63B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 September 2017	Examiner Fischer, Elmar
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 16 9594

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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07-09-2017

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 2015335940 A1	26-11-2015	NONE	

15	US 7291097 B1	06-11-2007	NONE	

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