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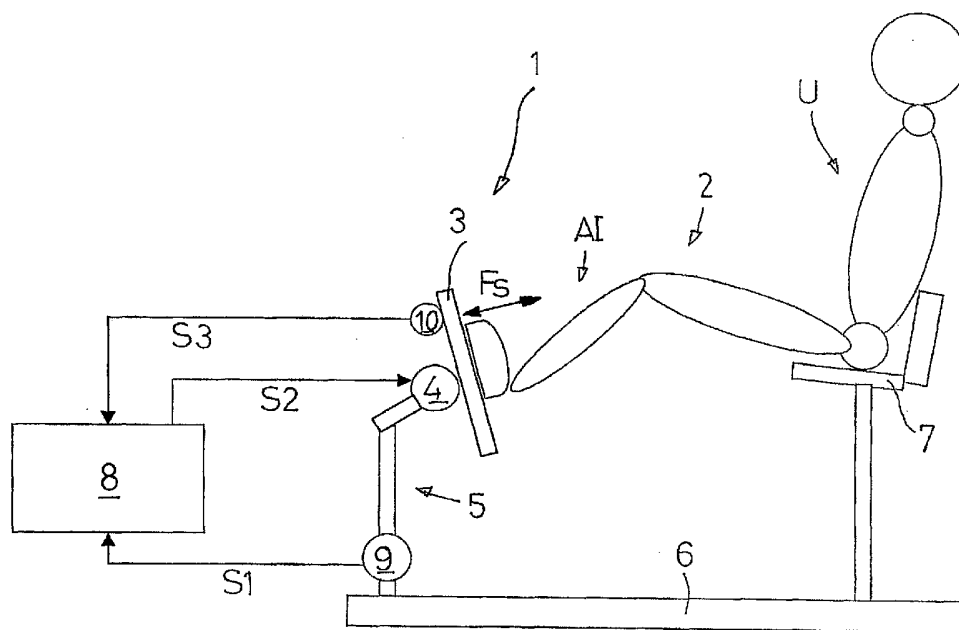
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(54) Title: STIMULATING APPARATUS AND METHOD FOR THE IMPROVEMENT OF THE PERFORMANCE OF THE NEUROMUSCULAR HUMAN SYSTEM



(57) Abstract: A stimulating apparatus (1) for the improvement of the performance of the neuromuscular human system (2), comprises stimulating means (3) adapted to be engaged by a user (U); generating means (4) connected to said stimulating means (3) for moving them with oscillating motion; and surveying and checking means (8, 9, 10) adapted to be connected to said generating means (4) for starting them up and for checking the oscillating motion of said stimulating means (3) generated by said generating means (4).

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"Stimulating apparatus and method for the improvement of the performance of the neuromuscular human system"

Technical field of the invention

5 The present invention relates to an stimulating apparatus and method for the improvement of the performance of the neuromuscular human system. Especially, the present invention can be advantageously applied to improve neuromuscular features of the whole human body or, specifically, certain parts of it, through stimulation of muscular tissues by using mechanical vibration, to which
10 reference is made specifically in the present technical description albeit implying no limitation of the scope.

Background Art

15 First studies relating to use oscillating mechanical movements as stimulus on human body started at the end of 19th century, and therefore in medical bibliography many documents are known as a prove of the efficacy of such methodology in aesthetic-medical field, since vibration represents the fundamental stimulus received by muscles of the human body before any response movement. Moreover, further important studies have shown the great efficacy in re-activation
20 of energetic and nervous neuromuscular channels, so confirming the validity of oscillating mechanical movement methodology as a basis of every recovery and rehabilitative neuromuscular program.

Also relating to some biochemical changing occurring in physiologic human system, some important positive modifications of the plasmatic hormonal
25 concentrations have been obtained by using such mechanical oscillating methodology.

In fact, such positive modifications are extremely important for human body, especially in view of the prevention of the osteo-articular degeneration of tissues, therefore they represent a optimum prevention method for preventing pathology connected to abovesited tissues degeneration.

5 Relating to motor-physical field, which the present invention specifically refers to, the use of mechanic oscillations proved extremely good results in improvements of neuro-motor performance capacity, for returning effects and also for strenght effect, realizing non only a valid tool to use during sports training, but also as a prevention instrument to prevent overload pathologies during high performance
10 and long-term sports training.

The aim of the present invention is therefore to provide a stimulating apparatus which is able to obtain the known advantages of mechanical oscillating methodology applied to human body for the improvement of the performance of the neuromuscular system, further surveying and checking all the effects and all
15 physical parameters acting on neuromuscular system.

Especially, a scope of the present invention is to realize a stimulating apparatus able to lead to controlled improvement of neuro-motor performance of certain parts of human body, for example lower limbs, or upper limbs, or trunk of the human body, so to increase the efficacy of the apparatus itself, and also its simplicity use.

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Summary of the Invention

Accordingly, the present invention relates to stimulating apparatus for the improvement of the performance of the neuromuscular human system, characterized in that it comprises stimulating means adapted to be engaged by a
25 user; generating means connected to said stimulating means for moving them with oscillating motion; and surveying and checking means adapted to be connected to

said generating means for starting them up and for checking the oscillating motion of said stimulating means generated by said generating means.

Furthermore, the present invention relates to a stimulating method for the improvement of the performance and training of the neuromuscular human system, characterized in that it comprises the steps of engaging a stimulating
5 element and surveying starting force with which such engagement happened; moving said element with vibrating motion through starting up of oscillating means connected to said element depending on said starting force surveyed; and surveying and checking parameters of said vibrating motion.

10

Brief description of the Drawings

The present invention will be described by way of example with reference to the attached drawings showing schematic and diagrammatic partly sectional views of a preferred but not limiting embodiments of a stimulating apparatus, in which :

- 15 - Fig. 1 is a preferred embodiment of a stimulating apparatus of the present invention, in a schematic view showing its first operative or using position;
- Fig. 2 is a schematic view showing a second operative or using position of the apparatus in Fig. 1; and
- Fig. 3 is a schematic view showing a third operative or using position of the
20 apparatus in Fig. 1.

Description of the preferred embodiments.

The attached Fig. 1 shows a stimulating apparatus 1 for performance improvement of neuromuscular system 2 of user U by means of an inducted muscles motion.

25 The apparatus 1, specifically studied for muscular tissues mass so to obtain rapid and notable improvements to neuromuscular performance of user U, comprises a

stimulating element 3 adapted to be engaged by user U, as better explained in the following, and mounted on, and connected to, generator means 4 for generating oscillating movements, preferably mechanical vibrations.

Generator 4 means are adapted to move element 3 with oscillating motion with
5 fixed frequency, amplitude, power and term.

According to Fig.1 and Fig.2 and Fig. 3, stimulating element 3 is supported by a frame 5, which in turn is mounted on a basement 6 supporting a seat 7 for the accommodation of user U.

The abovesited generator 4 means are connected to a central processing unit 8
10 through surveying means 9.

Stimulating element 3 is also connected to sensor means 10 adapted to surveying and checking the vibration of the element 3 realized by generator 4 means.

In operation, surveying means 9 are adapted to survey and estimate power force applied above element 3 by user U and send to unit 8 an electrical first signal S1
15 corresponding to a value of such estimation.

Central unit 8 is adapted to evaluate such signal S1 and to send a second signal S2 to generating means 4 for their activation and then to cause mechanical vibration of the element 3, checking it by its frequency, power and amplitude.

Central processing unit 8 is also adapted to receive third signal S3 corresponding to
20 a survey by sensor means 10 of real vibration of element 3, in way that central unit 8 is able to evaluate such signal S3 for controlling correct vibration motion of element 3, for instance within values interval or bounds prefixed, and sending further correction signal S2 to generator means 4 in case of irregularity or values out of such interval.

25 According to Fig.1, stimulating element 3 is defined by a platform 3 adapted to be pushed by feet of user U, so that onto the platform 3 starting pushing force F_s is

realized, with said force F_s surveyed by surveying means 9.

Depending on signals S_1 and S_2 received-estimated-and sent by central processing unit 8, platform 3 is put into vibration by generating means 4, in way that to transmit pulse to user U muscular system 2 and triggering the positive stimulating effects of vibrations.

The embodiment of apparatus 1 with platform 3 as described above and shown in Fig. 1 is specifically studied and suggested for training and for improving of the performance of the muscular masses of lower limbs AI of user U, substantially without involving other parts of user U body.

That defines a localized use on neuromuscular system 2 of user U particularly advantageous, increasing the efficacy of apparatus 1 in respect of the prior art stimulating devices.

According to Fig.2 and Fig. 3, stimulating element 3 is defined by a bar 3 protruding above user U head as shown in Fig. 2, and protruding horizontally substantially from user U shoulders in case shown in Fig. 3.

The ends of bar 3 are adapted to be grasp by user U hands, so that on bar 3 starting traction force F_t is realized (reference F_{t1} in Fig.2, and reference F_{t2} in Fig.3), with said force F_t surveyed by surveying means 9.

Depending on signals S_1 and S_2 received-estimated-and sent by central processing unit 8, bar 3 is put into vibration by generating means 4, under control by sensor means 10, in way that to transmit pulse to user U muscular system 2 and triggering the positive stimulating effects of vibrations.

The embodiment of stimulating apparatus 1 with bar 3 as described above and shown in Fig. 2 and Fig. 3 is specifically studied and suggested for training and for improving of the performance of the muscular masses of trunk T, and respectively, of upper limbs AS of user U, substantially without involving other parts of user U

body.

Also in that case, that defines a localized use on neuromuscular system 2 of user U particularly advantageous, increasing the efficacy of apparatus 1 in respect of the prior art stimulating devices.

5 At last, it's very important to highlight that central processing unit 8 is able to store different kinds of training and/or neuromuscular recovery settings or protocols, so that operating advantageously for reproducing prefixed setting or protocol, also depending from physical features/parameters of user U, obviously always under supervision of skilled technicians.

10 Although the present invention has been described with reference to the preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

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Claims

1. Stimulating apparatus (1) for the improvement of the performance of the neuromuscular human system (2), characterized in that it comprises stimulating means (3) adapted to be engaged by a user (U); generating means (4) connected
5 to said stimulating means (3) for moving them with oscillating motion; and surveying and checking means (8,9,10) adapted to be connected to said generating means (4) for starting them up and for checking the oscillating motion of said stimulating means (3) generated by said generating means (4).
2. Apparatus according to claim 1, characterized in that said stimulating means (3)
10 are adapted to be engaged by user (U) with fixed starting force (Fs;Ft1;Ft2); said surveying and checking means (8,9,10) being adapted to survey said force (Fs;Ft1;Ft2) and to start up said generating means (4) at least depending on said starting force (Fs;Ft1;Ft2).
3. Apparatus according to claim 2, characterized in that said surveying and
15 checking means (8,9,10) comprise a central processing unit (8), at least surveying means (9) adapted to survey said starting force (Fs;Ft1;Ft2), and at least sensor means (10) adapted to survey and checking the oscillating motion of said stimulating means (3); said central processing unit (8) being adapted to receive and evaluate from said surveying means (9) at least first signal (S1) corresponding
20 to said starting force (Fs;Ft1;Ft2), to emit and send to said generating means (4) at least a second signal (S2) for starting up said generating means (4) depending on said first signal (S1), and to receive and evaluate from said sensor means (10) at least third signal (S3) corresponding on oscillations of said stimulating means (3).
4. Apparatus according to any preceding claim from claim 1 to 3, characterized in
25 that said surveying and checking means (8,9,10) are adapted to check frequency, amplitude, term and power of said oscillating motion of said stimulating means (3).

- 5 **5.** Apparatus according to any preceding claim from claim 1 to 4, characterized in that said stimulating means (3) comprise a platform (3) adapted to be pushed by feet of user (U); said starting force (Fs;Ft1;Ft2) being defined by pushing force (Fs) produced at least by muscle of lower limbs (Al) of said user (U) onto said platform (3).
- 6.** Apparatus according to any preceding claim from claim 1 to 4, characterized in that said stimulating means (3) comprise a bar (3) adapted to be grasped by hands of user (U); said starting force (Fs;Ft1;Ft2) being defined by traction force (Ft1) produced at least by muscle of upper limbs (AS) of said user (U) on said bar (3).
- 10 **7.** Apparatus according to any preceding claim from claim 1 to 4, characterized in that said stimulating means (3) comprise a bar (3) adapted to be grasped by hands of user (U); said starting force (Fs;Ft1;Ft2) being defined by traction force (Ft1) produced at least by muscle of trunk (T) of said user (U) on said bar (3).
- 8.** Stimulating method for the improvement of the performance and training of the neuromuscular human system, characterized in that it comprises the steps of
15 engaging a stimulating element and surveying starting force with which such engagement happened; moving said element with vibrating motion through starting up of oscillating means connected to said element depending on said starting force surveyed; and surveying and checking parameters of said vibrating motion.

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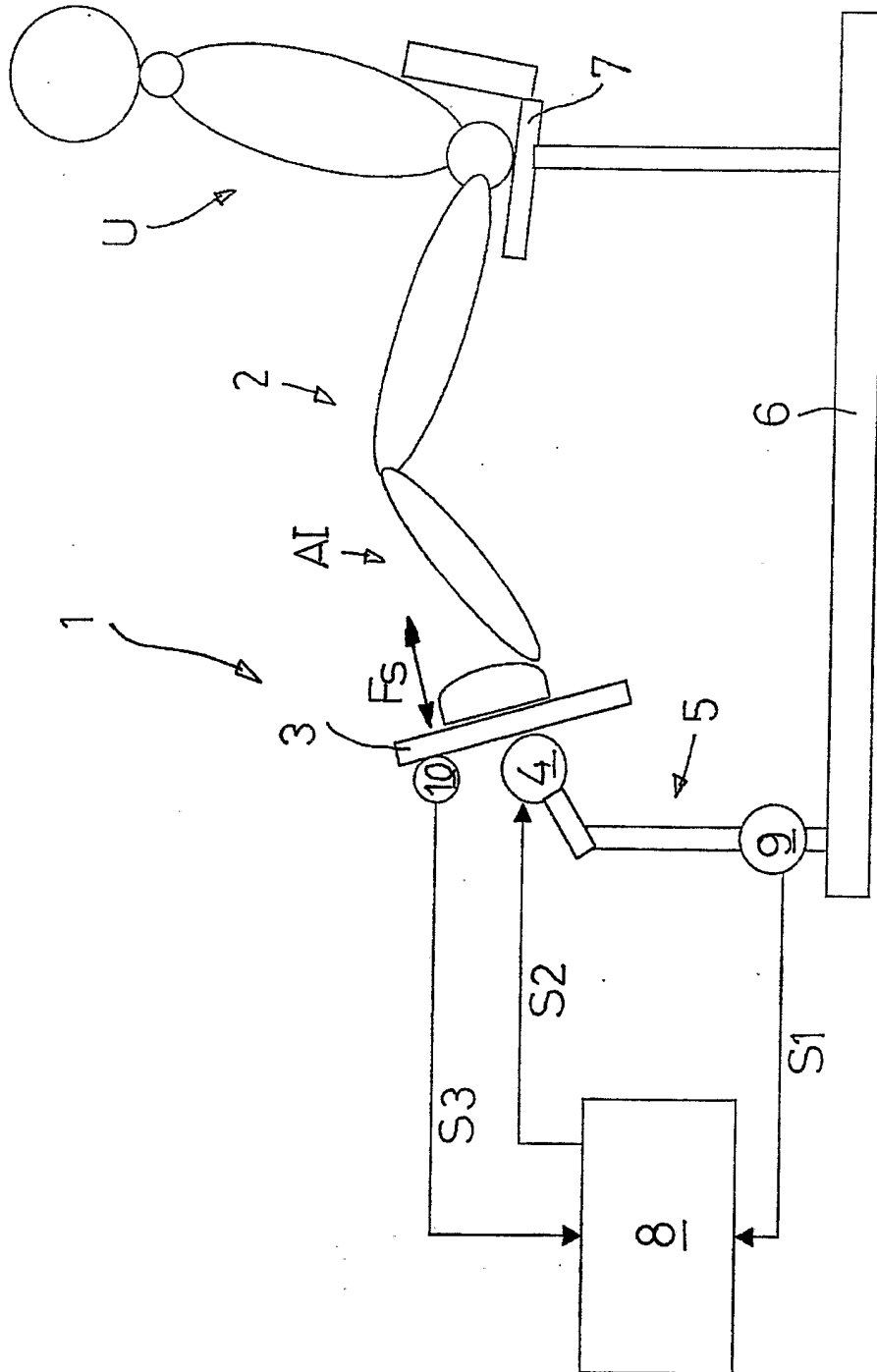
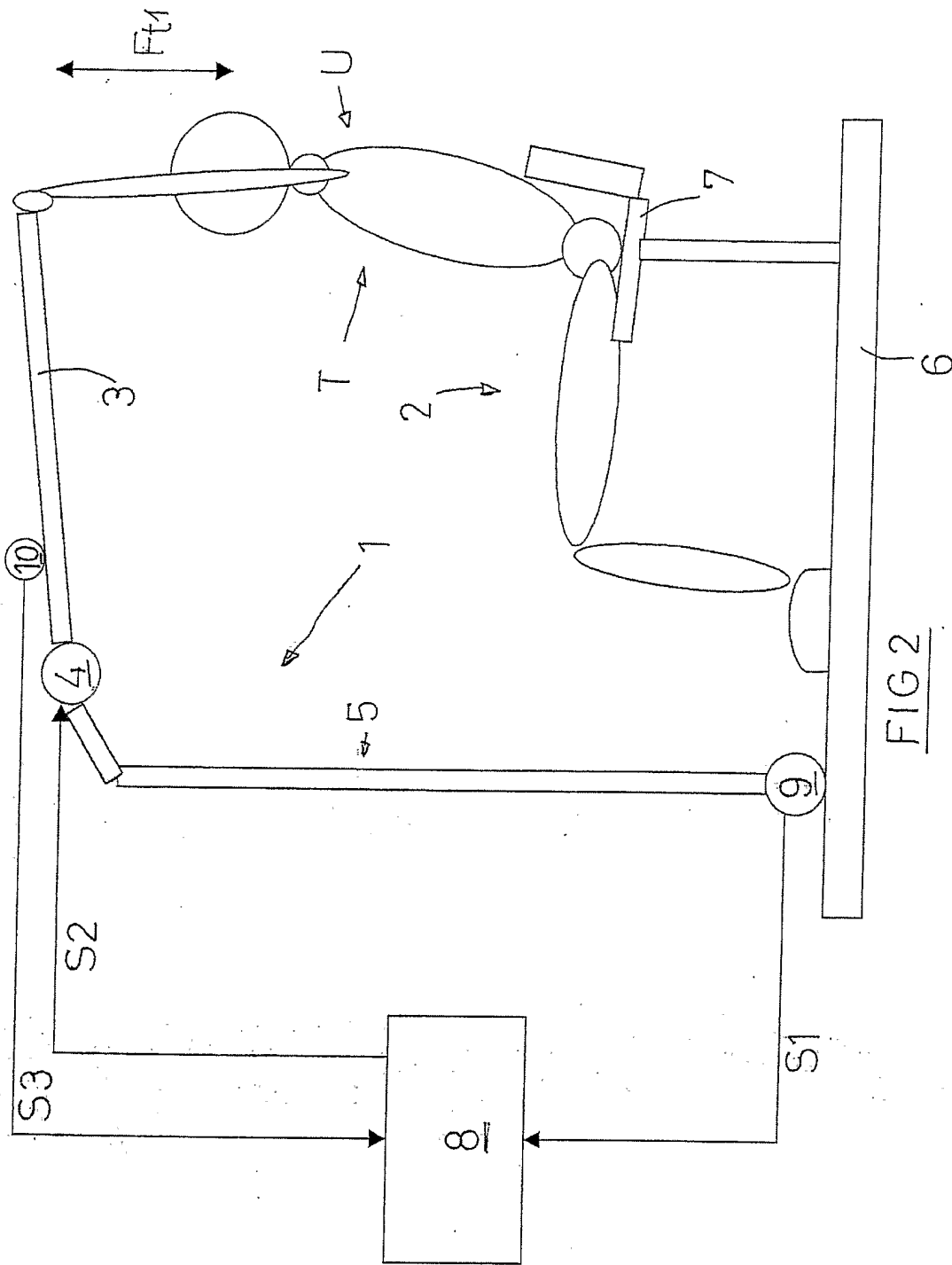


FIG 1



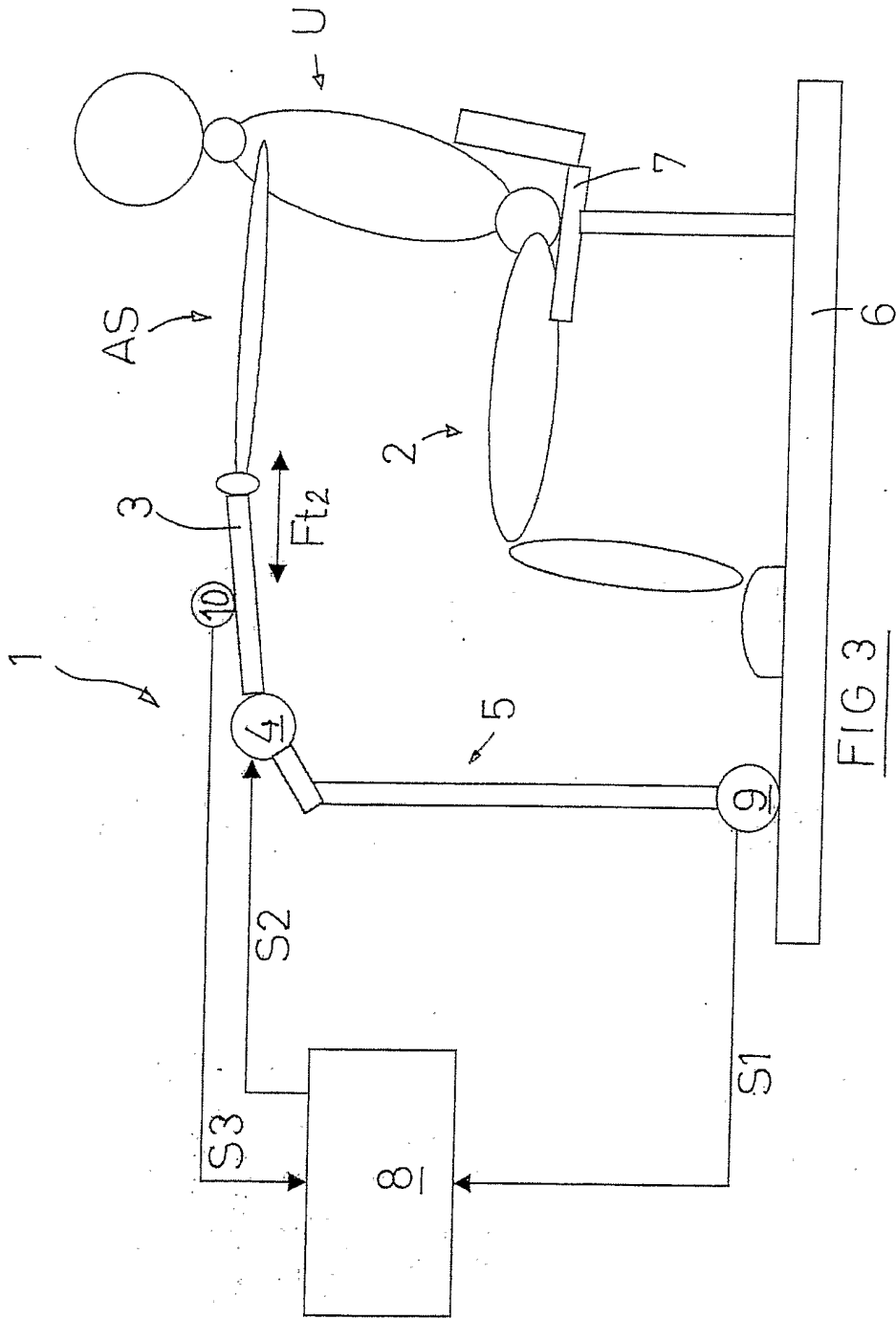


FIG 3

INTERNATIONAL SEARCH REPORT

 International Application No
 PCT/IB2005/002743

 A. CLASSIFICATION OF SUBJECT MATTER
 A61H1/00

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)
 A61H

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)

EPO-Internal, WPI Data, 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 2004/068211 A1 (LEIVSETH GUNNAR ET AL) 8 April 2004 (2004-04-08) the whole document	1-7
X	US 2002/183667 A1 (KITADOU MASAKO ET AL) 5 December 2002 (2002-12-05) the whole document	1-7
X	WO 03/030805 A (RESEARCH FOUNDATION OF SUNY; MCLEOD, KENNETH, J) 17 April 2003 (2003-04-17) the whole document	1-7
X	WO 96/03104 A (OSTEO-DYNE, INC) 8 February 1996 (1996-02-08) the whole document	1-5

 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

13 January 2006

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2005/002743

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: 8
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by therapy
2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB2005/002743

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