

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 October 2009 (08.10.2009)



(10) International Publication Number
WO 2009/123641 A1

- (51) International Patent Classification:
A47C 27/08 (2006.01)
- (21) International Application Number:
PCT/US2008/059409
- (22) International Filing Date:
4 April 2008 (04.04.2008)
- (25) Filing Language: English
- (26) Publication Language: English
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- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ,
EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO,
NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG,
SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG,
US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR IMPROVED PRESSURE ADJUSTMENT

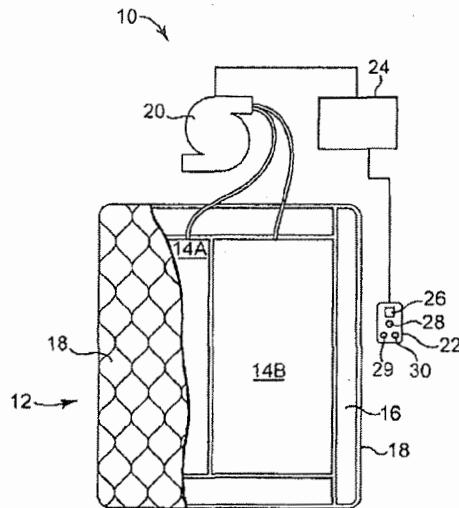


Fig. 1

(57) Abstract: A method for adjusting pressure within an air bed comprises providing an air bed that includes an air chamber and a pump having a pump housing, selecting a desired pressure setpoint for the air chamber, calculating a pressure target, adjusting pressure within the air chamber until a pressure within the pump housing is substantially equal to the pressure target, determining an actual chamber pressure within the air chamber, and comparing the actual chamber pressure to the desired pressure setpoint to determine an adjustment factor error. The pressure target may be calculated based upon the desired pressure setpoint and a pressure adjustment factor. Furthermore, the pressure adjustment factor may be modified based upon the adjustment factor error determined by comparing the actual chamber pressure to the desired pressure setpoint.

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TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

Declarations under Rule 4.17:

5 **SYSTEM AND METHOD FOR IMPROVED PRESSURE ADJUSTMENT****BACKGROUND OF THE INVENTION**

[0001] The present invention relates to a system and method for adjusting the pressure in an inflatable object. More particularly, the present invention relates to a system and method for adjusting the pressure in an air bed in less time and with greater accuracy.

[0002] Advances made in the quality of air beds having air chambers as support bases have resulted in vastly increased popularity and sales of such air beds. These air beds are advantageous in that they have an electronic control panel which allows a user to select a desired inflation setting for optimal comfort and to change the inflation setting at any time, thereby providing changes in the firmness of the bed.

[0003] Air bed systems, such as the one described in U.S. Patent No. 5,904,172 which is incorporated herein by reference in its entirety, generally allow a user to select a desired pressure for each air chamber within the mattress. Upon selecting the desired pressure, a signal is sent to a pump and valve assembly in order to inflate or deflate the air bladders as necessary in order to achieve approximately the desired pressure within the air bladders.

[0004] In one embodiment of an air bed system, there are two separate air hoses coupled to each of the air bladders. A first air hose extends between the interior of the air bladder and the valve assembly associated with the pump. This first air hose fluidly couples the pump to the air bladder, and is structured to allow air to be added or removed from the air bladder. A second hose extends from the air bladder to a pressure transducer, which continuously monitors the pressure within the air bladder. Thus, as air is being added or removed from the air bladder, the pressure transducer coupled to the second hose is able to continuously check the actual air bladder pressure, which may then be compared to the

5 desired air pressure in order to determine when the desired air pressure within the bladder has been reached.

[0005] In another embodiment of an air bed system, there is only a single hose coupled to each of the air bladders. In particular, the hose extends between the interior of the air bladder and the valve assembly associated with the pump, and is structured to allow air to be added or removed from the air bladder. Instead of having a second hose with a pressure transducer coupled thereto for continuously reading the pressure within the air bladder, a pressure transducer is positioned within a chamber of the valve assembly. Once the user selects the desired air pressure within the air bladder, the pressure transducer first senses a pressure in the chamber, which it equates to an actual pressure in the air bladder. Then, air is added or removed from the bladder as necessary based upon feedback from the sensed pressure. After a first iteration of sensing the pressure and adding or removing air, the pump turns off and the pressure within the chamber is once again sensed by the pressure transducer and compared to the desired air pressure. The process of adding or removing air, turning off the pump, and sensing pressure within the chamber is repeated for several more iterations until the pressure sensed within the chamber is within an acceptable range close to the desired pressure. As one skilled in the art will appreciate, numerous iterations of inflating and deflating the air bladder may be required until the sensed chamber pressure falls within the acceptable range of the desired pressure.

[0006] Thus, while this second embodiment of an air bed system may be desired because it minimizes the necessary number of hoses, it is rather inefficient in that numerous iterations may be required before the sensed pressure reaches the desired pressure. Furthermore, the pump must be turned off each time the pressure transducer takes a pressure measurement, which increases the amount of time that the user must wait until the air bladder reaches the desired pressure.

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[0007] Therefore, there is a need for an improved pressure adjustment system and method for an air bed that is able to minimize the amount of time and the number of adjustment iterations necessary to achieve a desired pressure in an air bladder, while also increasing the accuracy of the actual bladder pressure.

[0007A] Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present disclosure as it existed before the priority date of each claim of this application.

BRIEF SUMMARY OF THE INVENTION

[0007B] Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

[0008] The present invention solves the foregoing problems by providing a method for adjusting pressure within an air bed comprising providing an air bed that includes an air chamber and a pump having a pump housing, selecting a desired pressure setpoint for the air chamber, calculating a pressure target, adjusting pressure within the air chamber until a pressure within the pump housing is substantially equal to the pressure target, determining an actual chamber pressure within the air chamber, and comparing the actual chamber pressure to the desired pressure setpoint to determine an adjustment factor error. The pressure target may be calculated based upon the desired pressure setpoint and a pressure adjustment factor. Furthermore, the pressure adjustment factor may be modified based upon the adjustment factor error determined by comparing the actual chamber pressure to the desired pressure setpoint.

[0009] The present invention also provides a pressure adjustment system for an air bed comprising an air chamber, a pump in fluid communication with the air chamber

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