



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
WASHINGTON, D.C. 20546

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REPLY TO  
ATTN OF: GP

TO: KSI/Scientific & Technical Information Division  
Attention: Miss Winnie M. Morgan

FROM: GP/Office of Assistant General Counsel for  
Patent Matters

SUBJECT: Announcement of NASA-Owned U.S. Patents in STAR

In accordance with the procedures agreed upon by Code GP and Code KSI, the attached NASA-owned U.S. Patent is being forwarded for abstracting and announcement in NASA STAR.

The following information is provided:

U.S. Patent No. : 3,744,794

Government or Corporate Employee : U.S. Government

Supplementary Corporate Source (if applicable) : \_\_\_\_\_

NASA Patent Case No. : MFS-21,046-1

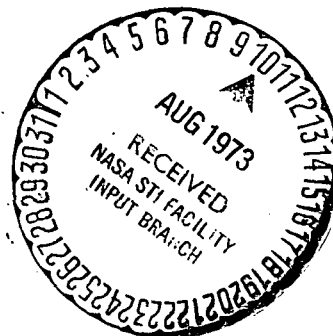
NOTE - If this patent covers an invention made by a corporate employee of a NASA Contractor, the following is applicable:

Yes  No

Pursuant to Section 305(a) of the National Aeronautics and Space Act, the name of the Administrator of NASA appears on the first page of the patent; however, the name of the actual inventor (author) appears at the heading of column No. 1 of the Specification, following the words ". . . with respect to an invention of . . ."

*Elizabeth G. Carter*

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Enclosure  
Copy of Patent cited above



N73-27377

Unclas  
10028  
00/14

(NASA-Case-MFS-21046-1) RESTRAINT SYSTEM FOR ERGOMETER Patent (NASA) 5 P

CSCI 14B

[54] **RESTRAINT SYSTEM FOR ERGOMETER** 703,483 7/1902 Schreck ..... 119/96  
 1,369,456 2/1921 Meredith ..... 297/389 X  
 [75] **Inventors: Raymond L. Gause; Raymond A. Spier, both of Huntsville, Ala.** 1,507,554 9/1924 Cooper ..... 272/73  
 3,467,373 9/1969 Justice ..... 35/12 C X

[73] **Assignee: The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, D.C.**

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[22] **Filed: June 25, 1971**

[21] **Appl. No.: 156,725**

[57] **ABSTRACT**

[52] **U.S. Cl.** ..... 272/73, 35/12 C  
 [51] **Int. Cl.** ..... A63b 23/04  
 [58] **Field of Search** ..... 272/73; 119/96;  
 128/25 R, 133, 134; 244/4A, 122 R; 297/385,  
 389; 35/12 C

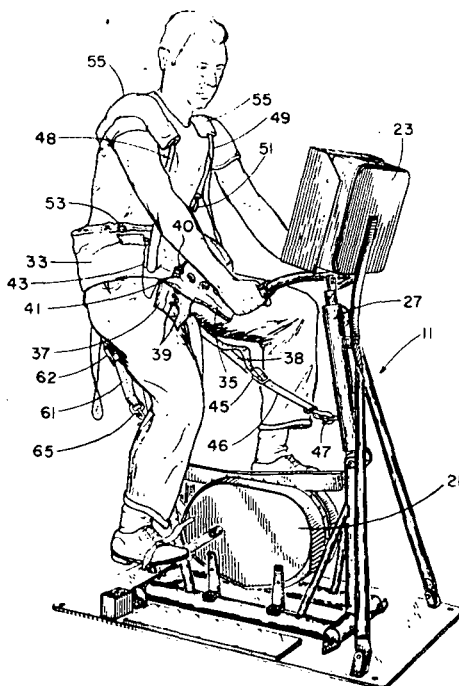
A restraint system for securing a person to an ergometer while exercising under zero gravity conditions or while operating the ergometer in earth environment in a position other than the upright position. A padded, form-fitting body belt fits around the operator's waist and suspenders are attached to the body belt. The body belt is secured to the ergometer forwardly and rearwardly of the ergometer seat by adjustable belts joined to the body belt and releasably hooked to the ergometer frame.

[56] **References Cited**

**UNITED STATES PATENTS**

928,305 7/1909 Carrington ..... 297/385  
 1,636,459 7/1927 Chappel ..... 119/96

**3 Claims, 3 Drawing Figures**



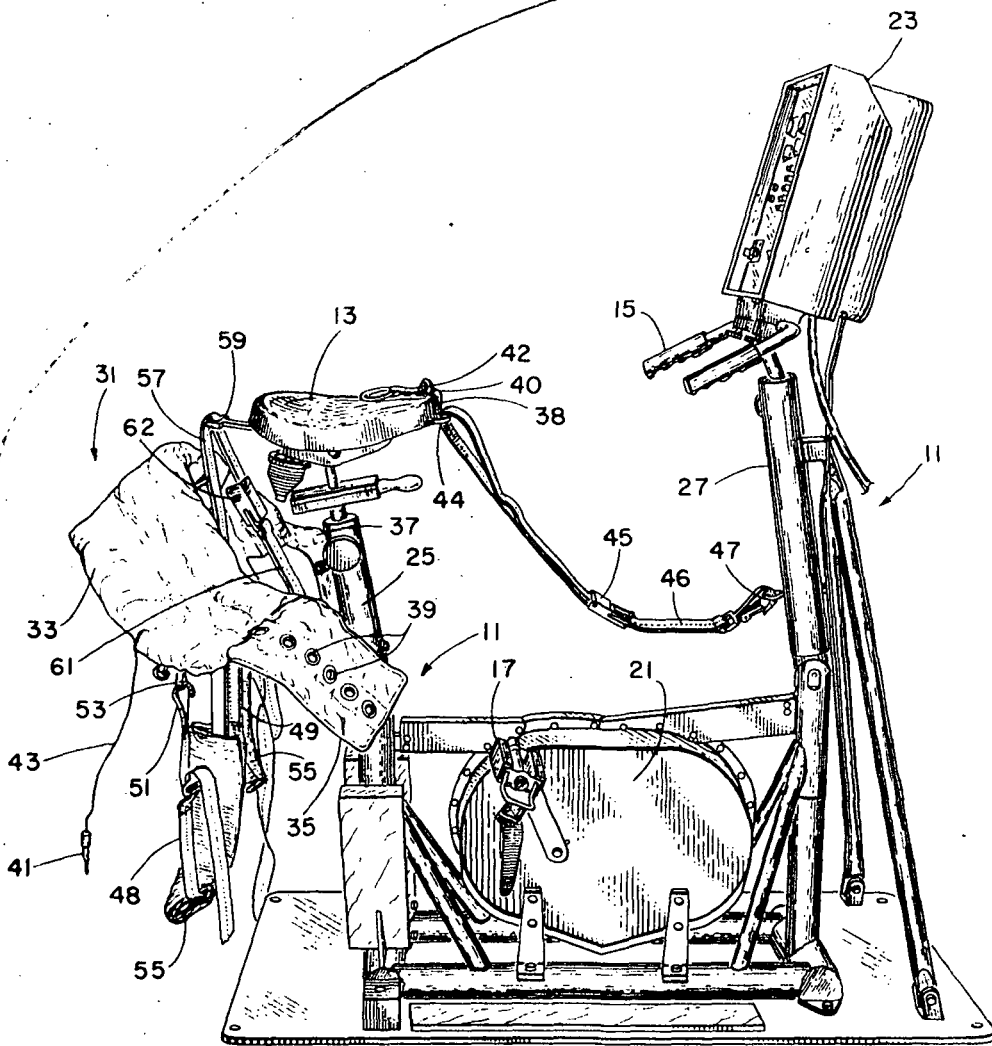


FIGURE 1

PAT 3,744,794  
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N73-27377

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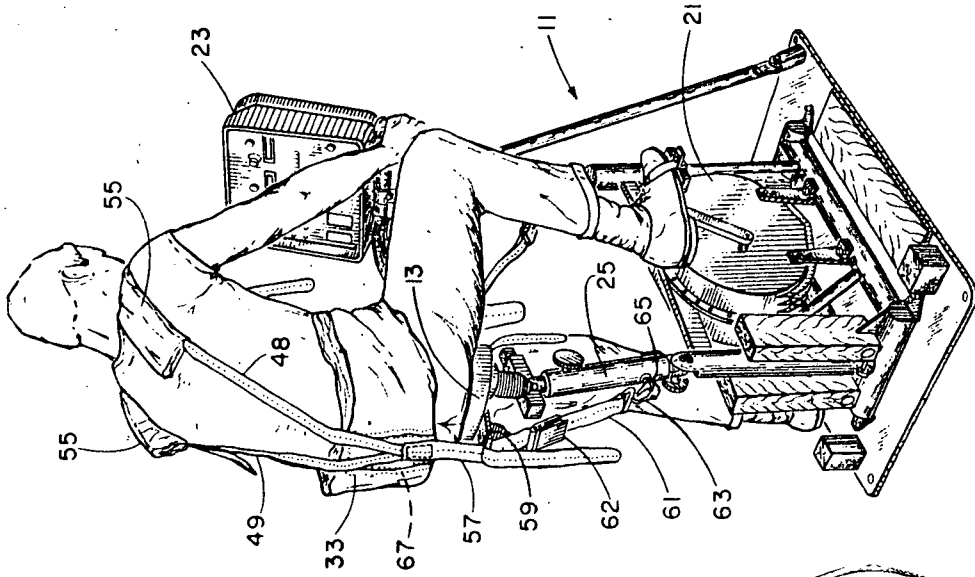


FIGURE 3

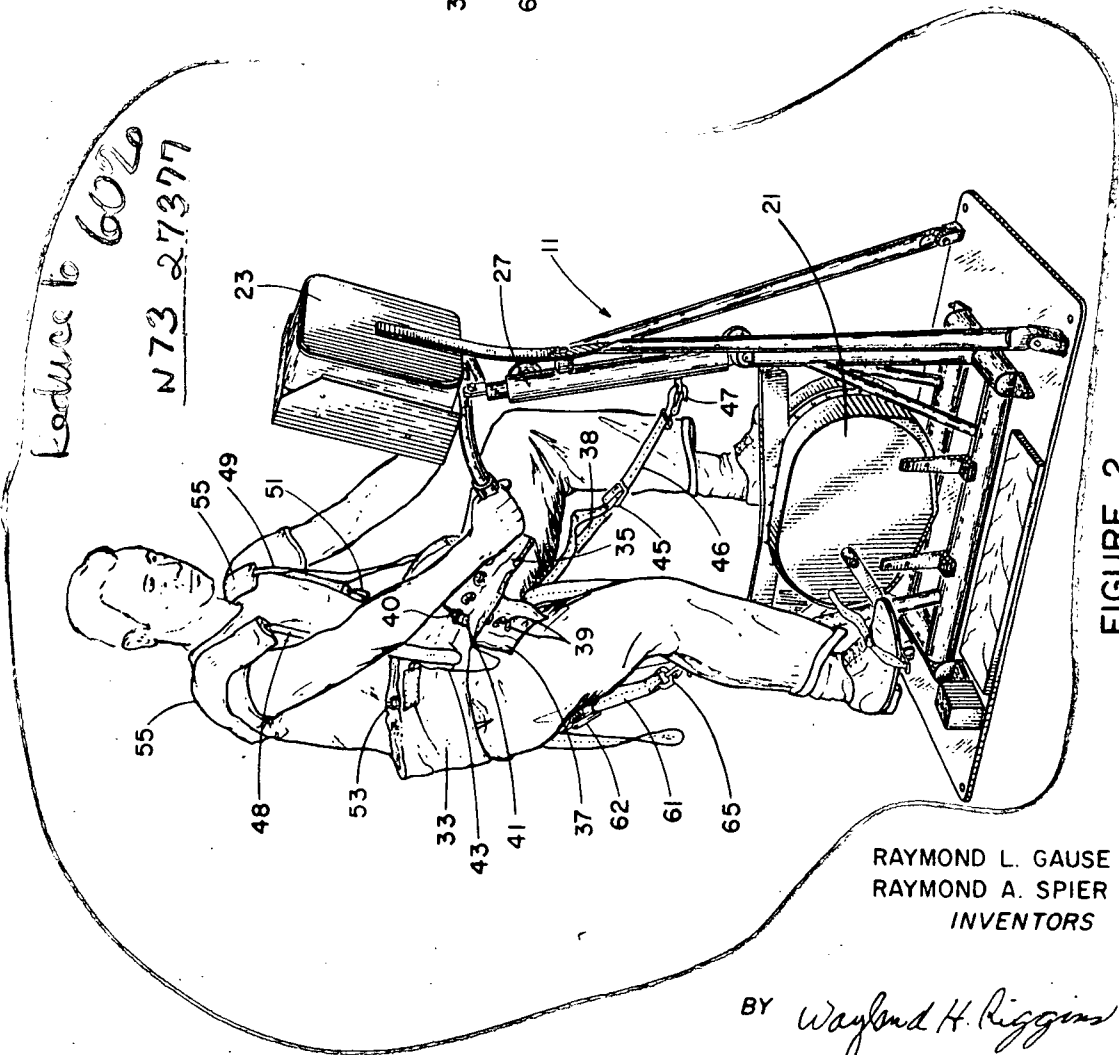


FIGURE 2

Reduces to 60%  
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**RESTRAINT SYSTEM FOR ERGOMETER****ORIGIN OF THE INVENTION**

The invention described herein was made by employees of the United States Government and may be manufactured and used by or for the Government for governmental purposes without the payment of any royalties thereon or therefor.

**BACKGROUND OF THE INVENTION**

This invention relates generally to exercising equipment and more particularly to a device for securing a person on an ergometer while operating the ergometer in a zero gravity environment or while exercising in a position other than the upright position.

Ergometers are currently used for laboratory testing and training of astronauts so that the physical effects on an astronaut of a measured amount of exertion can be determined. These exercising machines will also be installed on future orbiting space stations to provide a means for crewmen to regularly engage in known levels of exertion during long duration space flights. The operators of the ergometers will be fitted with instruments for obtaining medical data to permit doctors to monitor the physical condition of crewmen under a prolonged zero gravity environment.

When operating an ergometer of a type that is similar to a bicycle frame in having a seat and handle bars a system is required for securing the operator to the ergometer when operating the ergometer in a zero gravity environment or when operating in a non-upright position in an earth environment. The system for securing the operator to the ergometer must provide firm securement while being comfortable, easy to don and remove, and must avoid undue restriction of body movement and blood circulation. The system must also enable the operator to be fitted with the necessary medical instruments such as EKG electrodes and wiring.

Prior art systems for restraining a person on a chair or seat do not satisfy the requirements indicated in that the number and location of straps and tethers causes intolerable interference with medical instruments, blood circulation, body motion and comfort and are too complicated for easy donning and removal.

**SUMMARY OF THE INVENTION**

The invention comprises a padded form-fitting body belt adapted to fit around the waist of the ergometer operator. Suspenders are attached to the body belt for extending over the operator's shoulders. The end portions of the body belt are releasably fastened to each other and to an adjustable belt at the front portion of the ergometer seat while the center of the body belt is releasably secured to the ergometer rearwardly of the ergometer seat.

Accordingly, it is an object of the present invention to provide a restraint system for securing a person on the seat of an ergometer while operating the ergometer in a zero gravity environment or in an earth environment while the operator is in a non-upright position.

Another object of the present invention is to provide a comfortable, easy to put on restraint system for securing an ergometer operator on the ergometer seat which restraint system will provide firm securement but will not unduly restrict body motion or blood circulation and will not interfere with placement of medical instrumentation on the operator's body.

These and other objects and advantages of the invention will become apparent upon reference to the following specification, attendant claims and drawing.

**BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a pictorial view of an ergometer equipped with a restraint system embodying the present invention.

FIG. 2 is a front pictorial view of the ergometer of FIG. 1 occupied by an operator secured to the ergometer by the restraint system shown in FIG. 1.

FIG. 3 is a rear pictorial view of the ergometer occupied by an operator fitted with the restraint system as in FIG. 2.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to FIG. 1 there is shown an ergometer 11 somewhat similar to a bicycle in having a saddle type seat 13, handle bars 15 and pedals 17. The work required to rotate the pedals 17 is imposed by a load module 21, and an instrument and control panel 23 provides a means for the ergometer operator to read and vary the energy required to rotate the pedals 17. The seat 13 is joined to the remainder of the ergometer 11 through a seat pedestal 25 and the handle bars 15 are mounted on an upright tubular frame member 27 of the ergometer.

The present invention comprises a restraint system indicated generally at 31 for securing the operator on the ergometer seat particularly in a zero gravity environment or when the ergometer is being operated in a non-upright position. The restraint system 31 includes a form-fitting body belt 33 that has a padded portion that encircles the operator's waist. The padding inside the covering of the body belt 33 may be any suitable material such as foam rubber. The body belt has opposite end portions 35 and 37, with each portion having therein a centrally located row of grommets 39.

When the body belt 33 is wrapped around the operator's waist (FIG. 2) the end portions 35 and 37 are fastened to each other and to an adjustable flexible strip in the form of a belt 38 by crossing the end portions and pressing them against the belt 38 with two aligned holes 39 receiving a conical stud 40 anchored in the belt 38 near one end thereof. A pin 41 is then inserted through an aperture 42 in the stud 40 to fasten the end portions 35 and 37 to the belt 38. The pin 41 is attached to the body belt 33 by a string 43. The belt 38 passes through a slot in a guide 44 anchored to and projecting forwardly of the seat 13 and is passed through and releasably clamped in a buckle 45 having quick-release adjustment and locking action similar to an automobile seat belt buckle. A belt 46 is secured to the buckle 45 at one end and to the tubular member 27 at the other end by a snap hook and eye assembly 47. When the end portions 35 and 37 of the body belt 33 are fastened to the belt 38 the belt is drawn tight through the buckle 45 so that the belts 38 and 45 between the conical stud 40 and the tubular member 27 are taut as shown in FIGS. 2 and 3. This arrangement secures the operator comfortably to the front portion of the seat 13.

A pair of shoulder straps or suspenders 48 and 49 are sewed at one end to the back central portion of the body belt 33 and the other ends are provided with snap fasteners 51 that interlock with rings 53 secured to the upper front portion of the body belt 33. Each of the

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shoulder straps 48 and 49 are adjustable in length and has a slidable pad 55 thereon for bearing on the operator's shoulder.

As shown in FIG. 3 a second flexible strip in the form of a belt section 57 is joined by sewing to the rear central portion of the body belt 33 and passes through a slot in a guide 59 anchored to the rear underside of the seat 13. The belt section 57 extends below the seat 13 and is joined to a second belt section 61 by a seat belt type buckle 62. The belt section 61 is fastened to the seat pedestal 25 through a snap hook 63 attached to the belt section 61 and an eye hook 65 connected to the pedestal 25. When the belt section 57 is drawn tight through the buckle 62 the ergometer operator is comfortably secured on the back portion of the seat 13.

A thin metal plate 67 (indicated in phantom line in FIG. 3) is placed inside the back portion of the body belt 33 to rigidize the area where the suspenders 48 and 49 and the belt section 57 are joined to the body belt 33.

As is apparent from the preceding description, the restraint system 31 positively secures the operator to the ergometer seat while permitting maximum comfort and body movement. Blood circulation is not significantly restricted since a minimum number of body contacting straps are employed. Moreover, the restraint equipment is quickly and easily put on and adjusted.

We claim:

1. In combination with an exercising machine having a frame and a saddle type seat mounted on a frame pedestal, a restraint system for securing the operator of said machine on said seat comprising:

- a padded body belt having opposite end portions and being adapted for encircling the operator's waist;
- a first flexible strip having one end connected to said frame at a point below said seat and having the

other end extending to the vicinity of the front portion of said seat;

means for releasably connecting said opposite end portions of said body belt to each other and to said other end of said first flexible strip when said body belt is encircling the operator's waist;

means for adjusting said first flexible strip whereby said strip may be drawn to and maintained in a taut condition;

a second flexible strip having one end releasably connected to said frame pedestal at a point below said seat and having the other end connected to said body belt in the rear central portion of said body belt when said belt is encircling the operator's waist;

means for adjusting said second flexible strip whereby said second strip may be drawn to and maintained in a taut condition.

2. The invention as defined in claim 1 wherein said

means for releasably connecting said ends of said body belt and said other end of said first flexible strip comprises an apertured projecting stud attached to said first flexible strip, a row of holes in each of said end portions of said body belt, said end portions being adapted to cross with two of said holes in alignment, said projecting stud being adapted to extend through said aligned holes with said aperture being clear for receiving a fastening pin.

3. The invention as defined in claim 1 wherein said exercising machine comprises a pair of pedals adapted to be actuated by the operator's legs and a handle bar adapted for the operator to hold, said handle bar being mounted on a tubular member of said frame, said one end of said first flexible strip being connected to said tubular member.

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