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(54) **RESISTANCE MECHANISM WITH IMPROVED STABILITY FOR SKI SIMULATION EQUIPMENT**

(57) The present invention refers to a resistance mechanism for ski simulation equipment with improved stability, which reduces the vibration of the ski simulation equipment where it is used and also prevents the loss of resistance due to stress from the tension elements of the resistance mechanism.

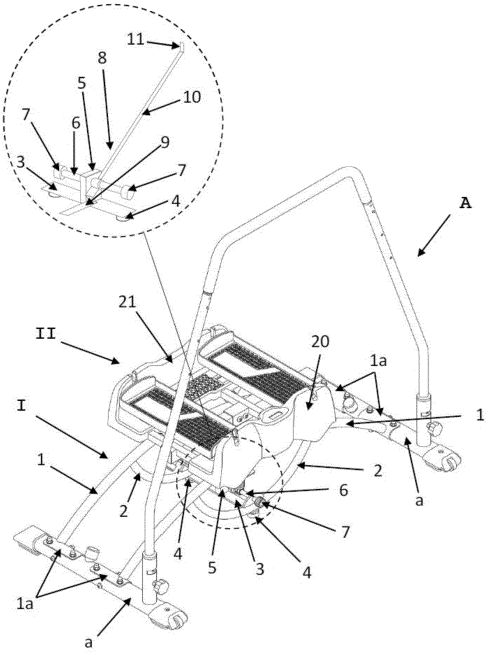

Figure 1

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Description

Field of Invention

[0001] The present invention relates to a resistance mechanism for ski routine simulation equipment, and more particularly relates to a resistance mechanism with improved stability for ski simulation equipment, which uses springs to improve the resistance control of the same, avoiding the loss of tension associated with the wear of elastic elements based on polymeric materials, caused by mechanical stress and temperature changes. Likewise, the present invention provides a resistance mechanism with improved stability, in which the forces applied to the equipment are transmitted more efficiently to the supporting ground, thus limiting the vibration caused during the use of the equipment, thus improving safety, and increasing the useful life of the support frame of said equipment.

BACKGROUND OF THE INVENTION

[0002] Ski routine simulation equipments are exercise devices that are made up of a rigid support frame, which in most of its versions have a pair of convex rails on which a platform that tilts to the sides is arranged, to simulate the action of skiing in a controlled environment. These equipments provide the advantages of downhill skiing without the dangers associated with it and allow such exercise to be carried out even out of season or in regions where snowfall is not observed.

[0003] Although it is true that these equipments have proven to be effective in simulating ski routines, allowing to perform most of the movements associated with practicing this sport, they tend to be equipment with complex resistance mechanisms, which must be adapted to allow the platform to move along the entire length of the rail without losing resistance, and must also be designed to provide a smooth and without jolting ride to guarantee the safety and comfort of the user.

[0004] In order to achieve a smooth and without jolting ride in ski simulation equipment, several types of resistance mechanisms have been proposed to be used in this exercise equipment, which use elastic elements to simulate the effort required to make the changes of direction during the practice of descent in a ski. For example, the resistance mechanism used in the development shown in Patent Application KR20130078839A, is made up of a sliding platform that has a pair of elastic strips at its ends that are anchored to the sides of its support frame, in such a way that when stretched alternately apply resistance to the platform. However, this mechanism is unstable and tends to jolt during exercise routines, since only one end of the platform is under tension. In addition to the above, because the strips tend to be overstretched, they have a short useful life as they are subjected to a lot of wear. Furthermore, the resistance mechanism shown in the above-cited application does not allow for the selection of different stress levels and because the rails are free structures, the equipment tends to be unstable.

[0005] The Patent Application PCT/IB2018/057739 shows a resistance mechanism made up of an elastic cable that is anchored to the ends of the support base of the equipment, which runs under two rollers that change their direction so that said cable is received in a bearing located below the equipment platform. This mechanism, while providing a smooth ride, is subject to several stress points, where the friction caused by stretching can break the elastic cable. In addition to the above, due to the presence of the rollers, it is not possible to place securing elements that allow the platform to be blocked to facilitate the ascent of a user to the equipment. On the other hand, it is not possible to regulate the intensity of the ski routines since the cable should be changed for a different one to vary the resistance of the equipment and the support frame is not very stable, so the equipment during its operation tends to vibrate too much.

[0006] Utility Model MX 4382 B shows a resistance mechanism in which a plurality of elastic bands is used that are anchored to grip points located on a lower crossbar of the support frame and to anchor points arranged in the lower part of the sliding platform. Said arrangement avoids the presence of friction zones, so that a smooth ride is obtained without jolting. However, due to their configuration, the elastic bands used tend to suffer a lot of stress, which is why they crack quickly and suffer from dryness due to the great increase in temperature they suffer during ski simulation routines, thus losing rapidly its elasticity, which significantly decreases its resistance. In addition, the type of rails used tend to vibrate too much due to the movement of the platform, which makes ski routines uncomfortable and can only be used by users with a maximum weight of 120 kg.

[0007] None of the aforementioned equipment allows ski simulation routines to be carried out without jolting since their elastic elements tend to lose strength quickly. In addition, the available mechanisms tend to cause considerable vibrations in the ski simulation equipment, so the routines performed mostly provide a feeling of instability. Furthermore, due to their construction, the frames of the resistance mechanisms only allow access for people of normal or low weight.

[0008] In view of the above problems, there is a need to provide a resistance mechanism with improved stability for ski simulation equipment, which avoids the loss of resistance of its force generation elements and that at the same time allows smooth and without jolting ski simulation routines. In addition to the above, there is a need to provide a resistance mechanism with improved stability that reduces the vibration of the ski simulation equipment during exercise routines, and that also allows the use of the equipment per user with a greater weight.

SUMMARY OF THE INVENTION

[0009] In order to overcome the limitations of existing ski simulation equipment, the present invention aims to provide a resistance mechanism with improved stability for ski simulation equipment, which avoids the loss of resistance during ski simulation routines, so that the resistance of the equipment can be more precisely controlled.

[0010] Another objective of the present invention is to provide a resistance mechanism with improved stability for ski simulation equipment, which has adaptations to transfer the force applied on the equipment frame directly to the ground, in order to decrease the vibrations caused during ski simulation routines.

[0011] A further objective of the present invention is to provide a resistance mechanism with enhanced stability for ski simulation equipment, which is adapted to prevent deformation of the ski simulation equipment rails due to the constant travel of the equipment carriage, and that also allows increasing the weight limit supported by the equipment, so that it is safe for heavier users.

[0012] Yet another objective of the present invention is to provide a resistance mechanism with improved stability for ski simulation equipment, adapted to withstand intense exercise routines without suffering damage due to overheating of its components and without the risk of breaking its resistance-generating elements.

[0013] The foregoing, as well as other, objects and advantages of the present invention, will become apparent from the following detailed description thereof.

DESCRIPTION OF THE FIGURES OF THE INVENTION

[0014]

Figure 1 shows a front perspective view of a ski simulation exerciser kit (A) in which the resistance mechanism with enhanced stability of the present invention is placed.

Figure 2 shows a front view of ski simulation equipment (A) in which the resistance mechanism with enhanced stability of the present invention is placed.

Figure 3 shows a bottom perspective view of the sliding platform (II) of the resistance mechanism with improved stability for ski simulation equipment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0015] The present invention provides a resistance mechanism with improved stability for ski simulation equipment, which uses a plurality of springs that have wear protection elements at their ends, which reduce the stresses caused by anchoring on the base elements of the equipment and the exercise platform so that the terminations of said springs do not undergo alterations or lose their tenacity, which significantly increases the useful life of said elements. In addition, the resistance mechanism with improved stability for ski simulation equipment of the present invention is designed to transmit the forces applied on the rails of the ski simulation equipment directly to the ground of support, so that vibration is reduced of the rails and the use of the equipment by users of greater weight is allowed.

[0016] To achieve the above, the resistance mechanism with improved stability for ski simulation equipment of the present invention is made up of a reinforcing frame (I) and a sliding platform (II), adapted to be used in ski simulation equipment (A) that have a base made up of two transversal ends (a and a') joined together by a bridge (b). Said reinforcing frame (I) and sliding platform (II) will be described in more detail below.

Reinforcing frame (I)

[0017] The reinforcing frame (I) is made up of two convex tubulars (1) that have anchoring bases (1a) at their ends and lower reinforcing arches (2) arranged on their concave surface, said lower reinforcing arches (2) being joined at its distal end, by a crosspiece (3) that has on its lower surface, a pair of cylinders made of elastomeric material (4); an anchoring block (5) with a receiving tubular (6), which has at its ends, threaded locks (7) that allow said receiving tubular (6) to be extracted from the anchoring block (5) and; a folding lock (8), attached in a swinging way by screws to the anchoring block (5), which has a pedal (9) at its lower end and an elongated arm (10) with a terminal hook (11) at its other end. Said reinforcing frame (I) is adapted to be attached by screws to the transversal ends (a and a') of the base of the ski simulation equipment (A) using the anchoring bases (1a), in this way any force applied on the convex tubulars (1), it is transmitted along them and sent to the supporting ground through the lower reinforcement arches (2) and the anchorage bases (1a), in such a way that each one of said convex tubulars (1) has 3 force discharge points, which significantly increases the stability of the ski simulation equipment, reducing the vibrations caused by the exercise routines and also increases the structural force, so the equipment can support users weighing up to 150 kg without suffering deformations, consequently increasing the safety of the ski simulation equipment.

sliding platform (II)

[0018] The sliding platform (II) is made up of two support structures (12) each one with two perpendicular square profiles (13a and 13b) that receive bearings (14) between them and an absorption block (14a) arranged in its distal end to prevent the sliding platform (1) from crashing against the transversal ends (a and a') of the base of the ski simulation equipment (A); a connection stringer (15) designed to join the support structures (12) together by means of screws, which has a perpendicular tubular in its middle part (16) with threaded locks (17) at

its ends; a plurality of springs (18) that each provide 20 kg of resistance, with terminal rings with O-rings (19), adapted to be received in the perpendicular tubular (16), being secured to it by the threaded locks (17), in such a way that when the sliding platform (II) is placed on the reinforcement frame (I), the free ends of the springs (18) can be anchored to the receiving tubular (6) in a separable way, securing them by means of the threaded locks (7); an anchoring bar (19) arranged in one of the absorption blocks (14), adapted to interact with the terminal hook (11) of the elongated arm (10), so that when pressing the pedal (9) of the folding lock (8), said terminal hook (11) is connected to the anchoring bar (19), blocking the sliding platform (II) on the reinforcing frame (I), to allow a user to climb onto the ski simulation equipment and ; a pair of anchor points arranged in the support structures (12), designed to store the springs (18) when they are not used.

[0019] Likewise, the sliding platform (II) can also comprise a pair of casings (20) and (21), adapted to cover the adjacent ends of the perpendicular square profiles (13a and 13b) of the support structures (12) in order to serve as anchor points for tilting pedals.

[0020] In order to demonstrate the advantages of the resistance mechanism with improved stability for ski simulation equipment of the present invention, a comparative study was carried out in which a ski simulation equipment with a resistance mechanism of elastic bands with conventional support frame and resistance mechanism with enhanced stability of the present invention. In said study, both equipment underwent a stress test in which their platform was oscillated for 50,000 cycles by placing a 70 kg weight on it, monitoring the entire test with seismographs attached to the equipment bridge. Once the stress test was completed, the elastic bands and springs (18) were subjected to a traction test in which the traction force of said elements was assessed after being subjected to the stress test, comparing the results with the obtained with bands and springs (18) that were not subjected to the stress test. Likewise, a visual inspection was carried out to assess the presence of cracks and deformations in the bands and springs (18) after being subjected to the wear test.

[0021] After the comparative study was carried out, it was observed that the bands used in the wear test lost 450 of their traction force with respect to the bands used as a reference pattern and presented cracks along their surface. In contrast, the springs (18) subjected to the same treatment did not present a decrease in their tensile strength, and no cracks or alterations were observed on their surface after their visual inspection. It should be noted that the vibration level in both equipments during the test was significantly different, presenting a reduction of approximately 70% of the vibration in the equipment that used the resistance mechanism with improved stability of the present invention, with respect to the readings obtained by the equipment with bands.

[0022] On the other hand, both equipments underwent a load resistance test with dead weight, in which bags with weights were placed on the equipment platforms, increasing the load of the same of 5 by 5 kg. After each weight increment, a visual inspection of the equipment rails was performed and deviations in their curvature were measured. The equipment with bands and conventional frame, presented a deviation in the curvature of its rails from a weight of 125 kg, while the equipment with the resistance mechanism of the present invention presented a deviation in the curvature of its rails until reaching the 155 kg.

[0023] The aforementioned results show that the use of the resistance mechanism with improved stability for ski simulation equipment of the present invention significantly reduces the vibration of the equipment compared to the conventional mechanism of elastic bands, observing a decrease of up to 70% in vibrations and, furthermore, it prevents the loss of tension in the equipment, since even after 50,000 repetition cycles, the springs (18) of the resistance mechanism of the present invention maintain their traction force.

[0024] The present invention has been described in accordance with a preferred embodiment; however, it will be apparent to a technician with average knowledge in the matter, that modifications may be made to the invention, without departing from its spirit and scope.

Claims

1. A resistance mechanism with improved stability for ski simulation equipment (A), which has a base with two transversal ends (a and a') joined together by a bridge (b), **characterized in that** it comprises:

    • a reinforcement frame (I) made up of two convex tubulars (1) that have anchoring bases (1a) at their ends to be attached by screws to the transverse ends (a and a') of the ski simulation equipment (A) and, lower reinforcing arches (2) arranged on the concave surface of said convex tubulars (1), said lower reinforcing arches (2) being joined at their distal end, by a crosspiece (3) having on its lower surface a pair of cylinders of elastomer material (4), so that the lower reinforcing arches (2) transmit the force applied to the convex tubulars (1) towards the ground; an anchoring block (5) with a receiving tubular (6), which has at its ends, threaded locks (7) that allow said receiving tubular (6) to be extracted from the anchoring block (5) and; a folding lock (8), attached in a swinging way by screws to the anchoring block (5), which has a pedal (9) at its lower end and an elongated arm (10) with a terminal hook (11) at its other end, and;

    • a sliding platform (II), which has two support structures (12), each one with two perpendicular square profiles (13a and 13b) that receive bear-

ings (14) between them and an absorption block (14a) arranged in its distal end to prevent the sliding platform (1) from crashing against the transversal ends (a and a') of the base of the ski simulation equipment (A); a connection stringer (15) that joins the support structures (12) together by means of screws, which has a perpendicular tubular in its middle part (16) with threaded locks (17) at its ends; a plurality of springs (18) with terminal rings with O-rings (19), adapted to be received in the perpendicular tubular (16), being secured to it by the threaded locks (17), in such a way that when the sliding platform (II) is placed on the reinforcement frame (I), the free ends of the springs (18) can be anchored to the receiving tubular (6) in a separable way and; an anchoring bar (19) arranged in one of the absorption blocks (14), adapted to interact with the terminal hook (11) of the elongated arm (10), so that when pressing the pedal (9) of the folding lock (8), said terminal hook (11) is connected to the anchoring bar (19), blocking the sliding platform (II) on the reinforcing frame (I),

2. The resistance mechanism with improved stability according to claim 1, **characterized in that** the sliding platform (II) further comprises a pair of anchor points arranged on the support structures (12), designed to store the springs (18) when not in use.

3. The resistance mechanism with improved stability according to claim 1, **characterized in that** the sliding platform (II) further comprises a pair of casings (20) and (21), adapted to cover the adjacent ends of the perpendicular square profiles (13a and 13b) of the support structures (12), to serve as anchorage points for tilting pedals.

4. The exerciser equipment for simulating ski routines according to claim 1, **characterized in that** each of the springs of the plurality of springs (18) provides a resistance of 20 kg.

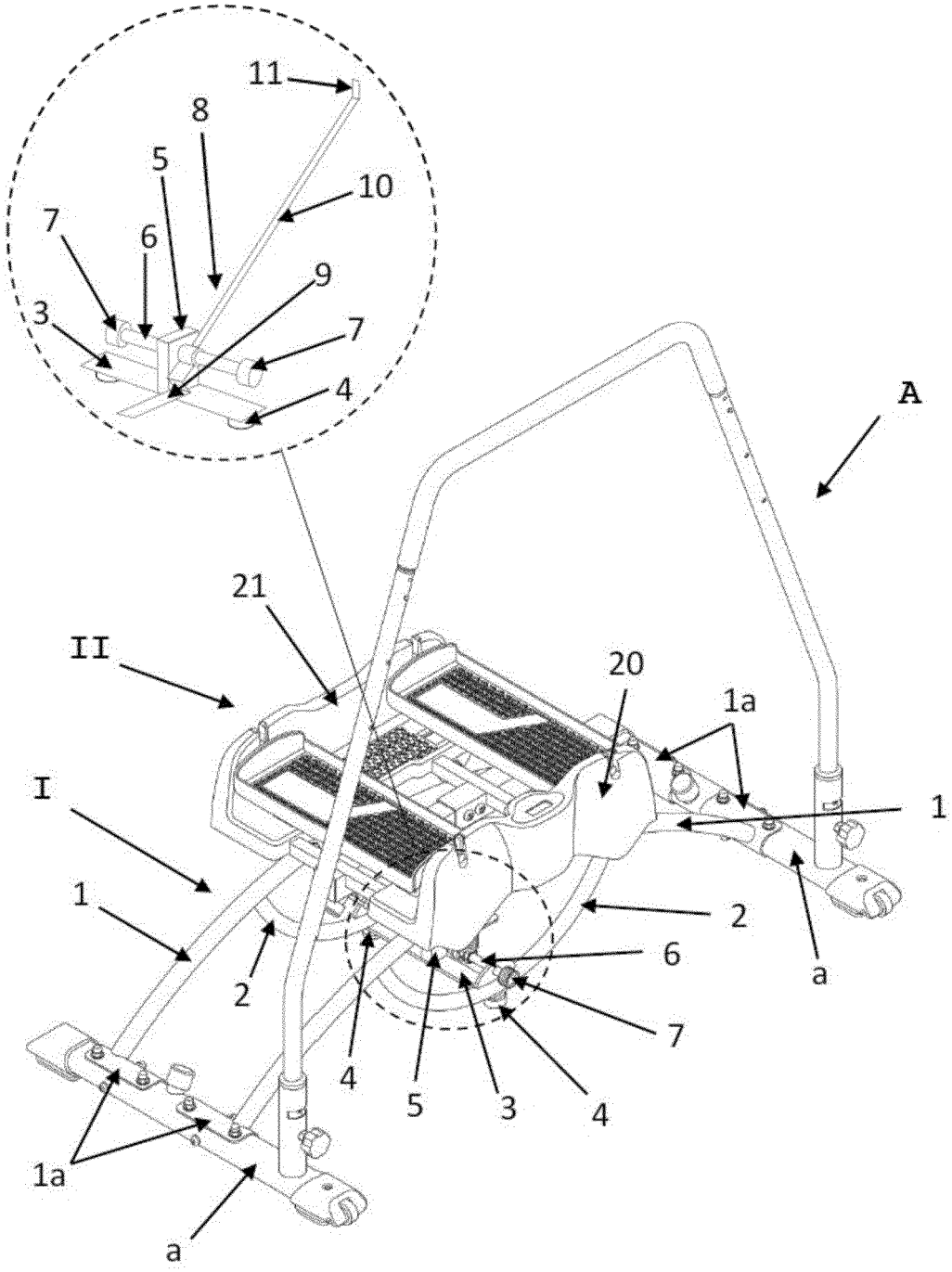

Figure 1

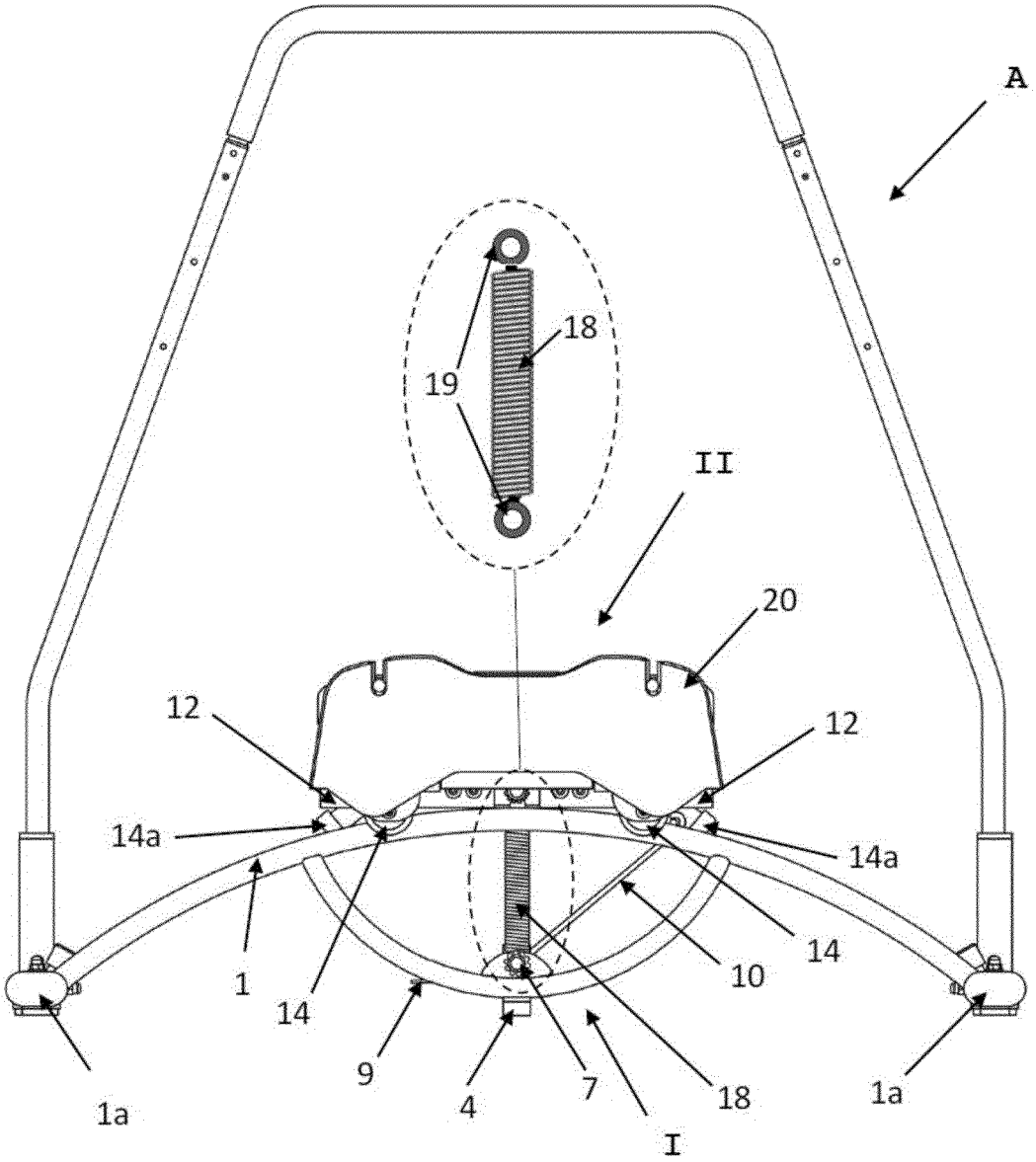

Figure 2

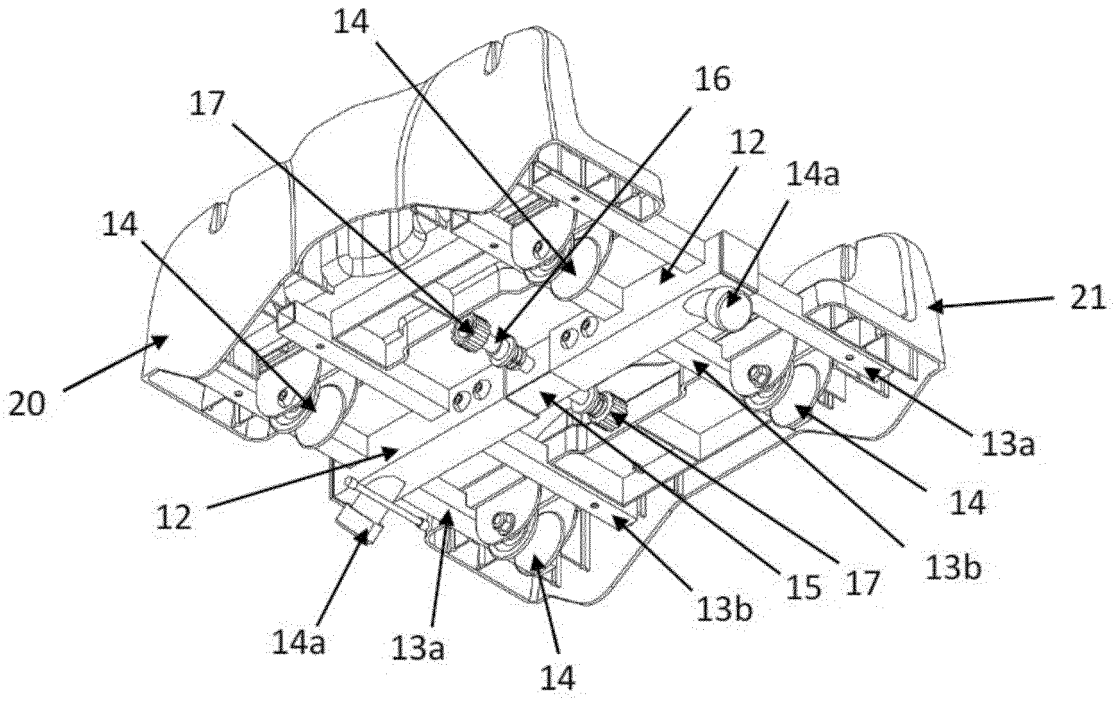

Figure 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MX2021/050089

A. CLASSIFICATION OF SUBJECT MATTER

A63B69/18 (2006.01)

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)
A63B

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 practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05/05/2022	**(06/05/2022)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer J. Moreno Rodriguez Telephone No. 91 3495556

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