



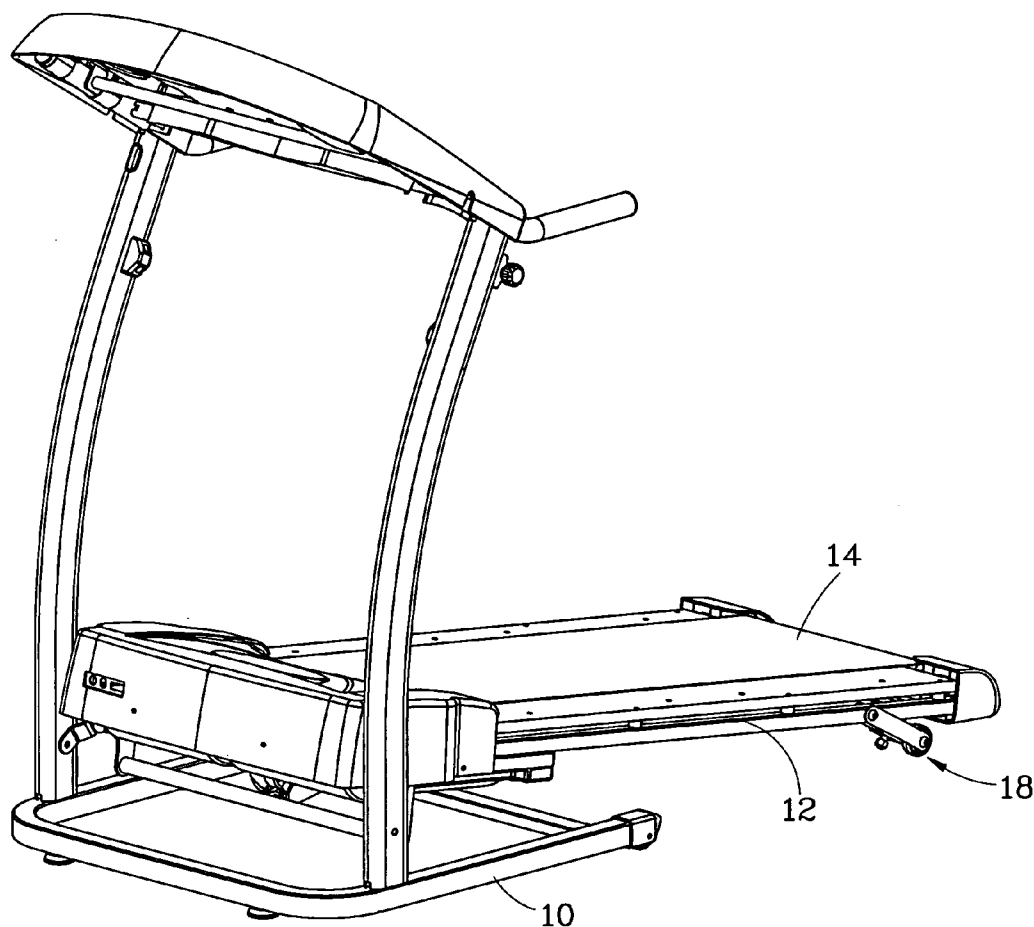
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(19) **United States**(12) **Patent Application Publication****Pan et al.**(10) **Pub. No.: US 2007/0225127 A1**(43) **Pub. Date: Sep. 27, 2007**(54) **CUSHION DEVICE FOR EXERCISE MACHINE****Publication Classification**(75) Inventors: **Francis Chung Hwa Pan**, Taichung County (TW); **Pao-Chuan Wang**, Taichung County (TW)(51) **Int. Cl.**
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FALLS CHURCH, VA 22040-0747 (US)(57) **ABSTRACT**

A cushion device for an exercise machine, such as treadmill, includes a linkage, a spring and a mount. The linkage is pivoted on a bottom of the exercise machine, and wheel is pivoted on a distal end of the linkage. The mount is fixed to the bottom of the exercise machine, on which the spring is provided to urge the linkage. When user takes exercise on the machine, the vibration from different orientations will transmit to the linkage and make it swing, such that the spring is compressed to absorb the vibration.

(73) Assignee: **Forhouse Corporation**(21) Appl. No.: **11/385,691**(22) Filed: **Mar. 22, 2006**

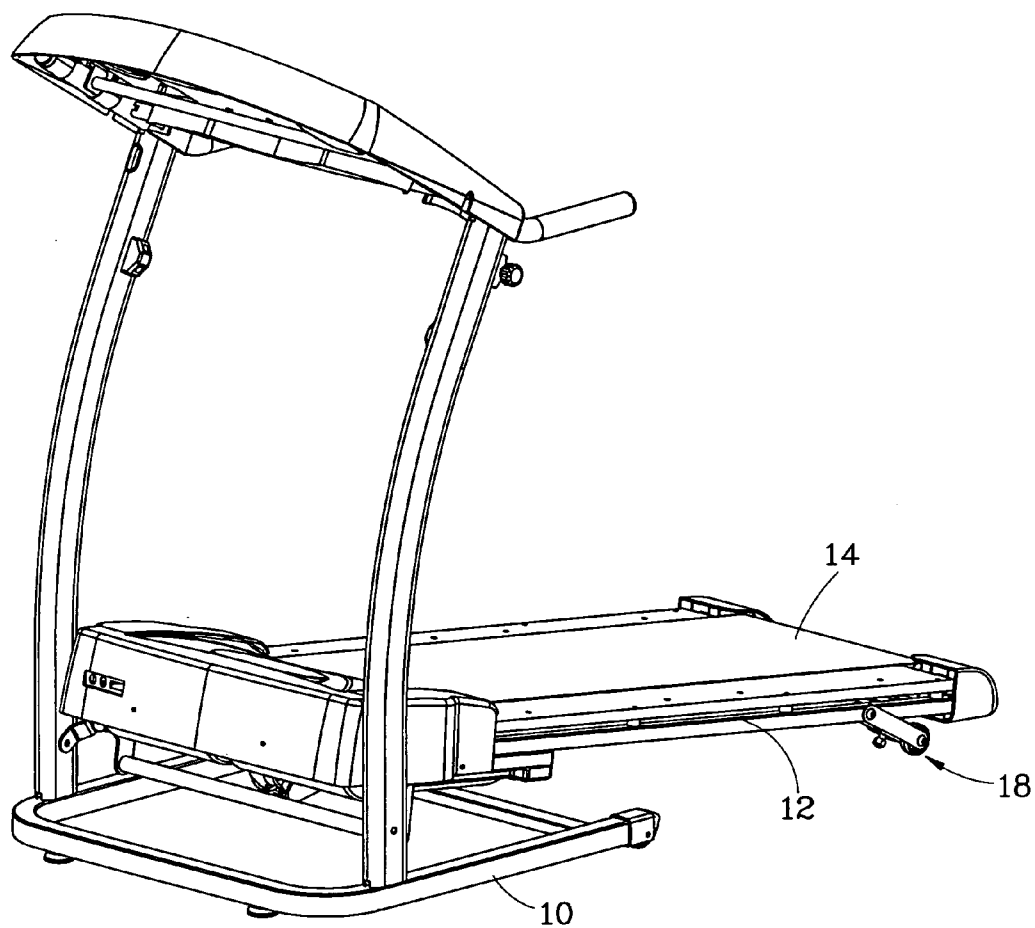


FIG. 1

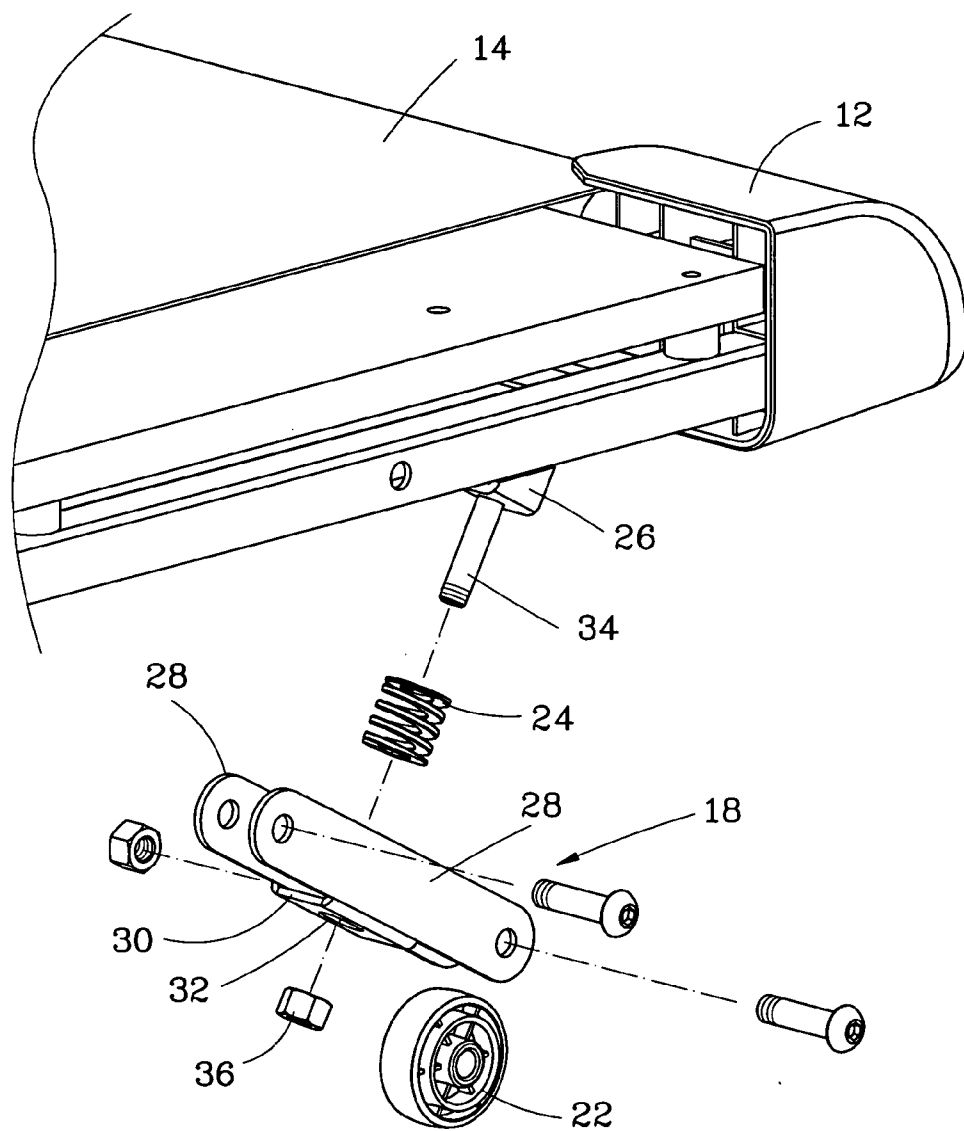


FIG. 2

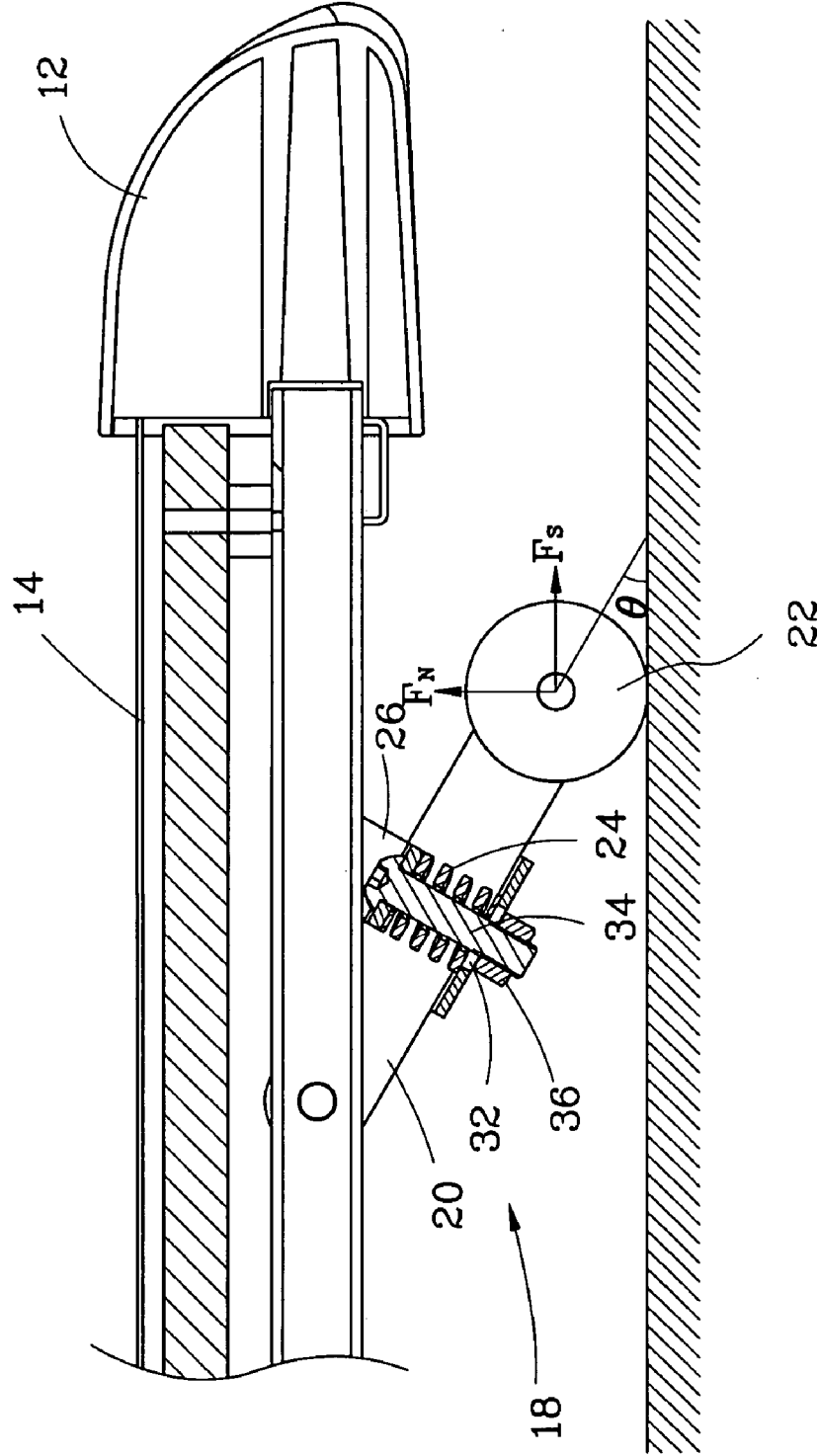


FIG. 3

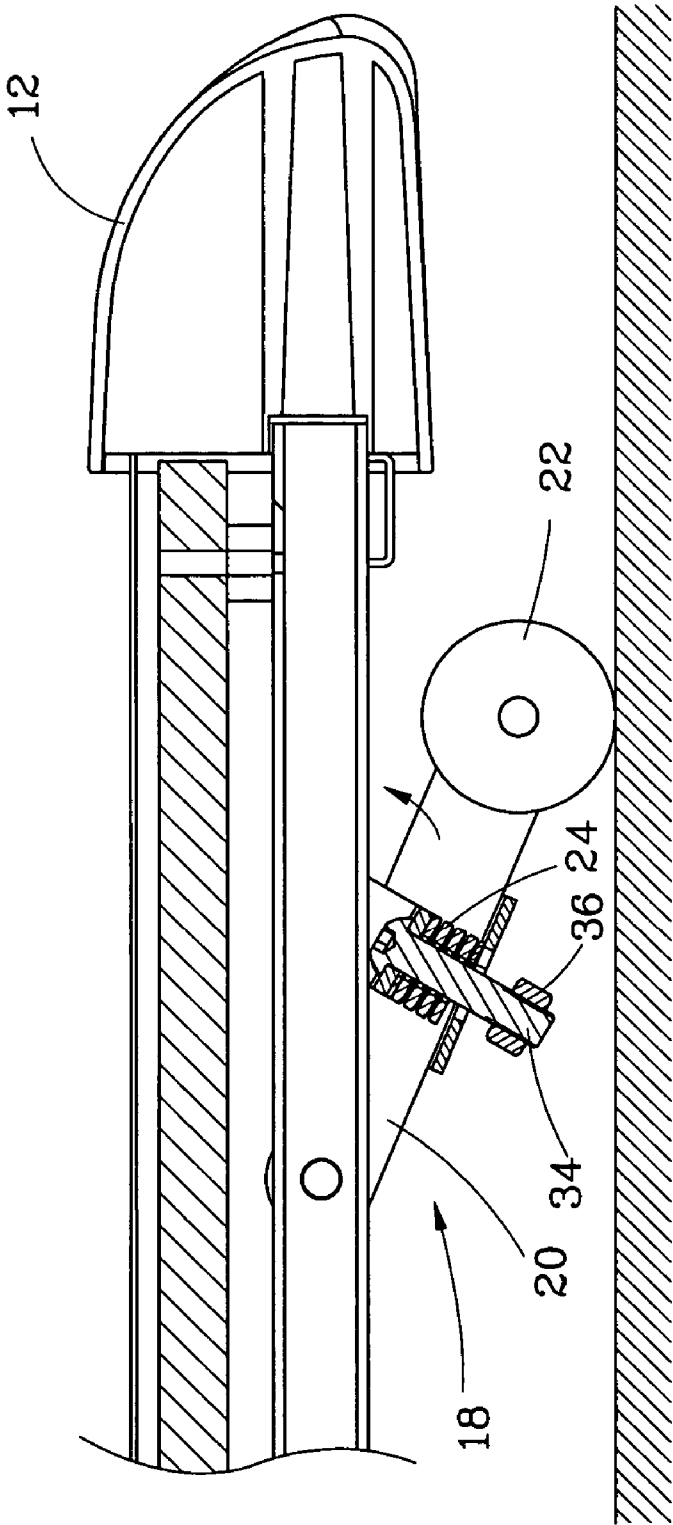


FIG. 4

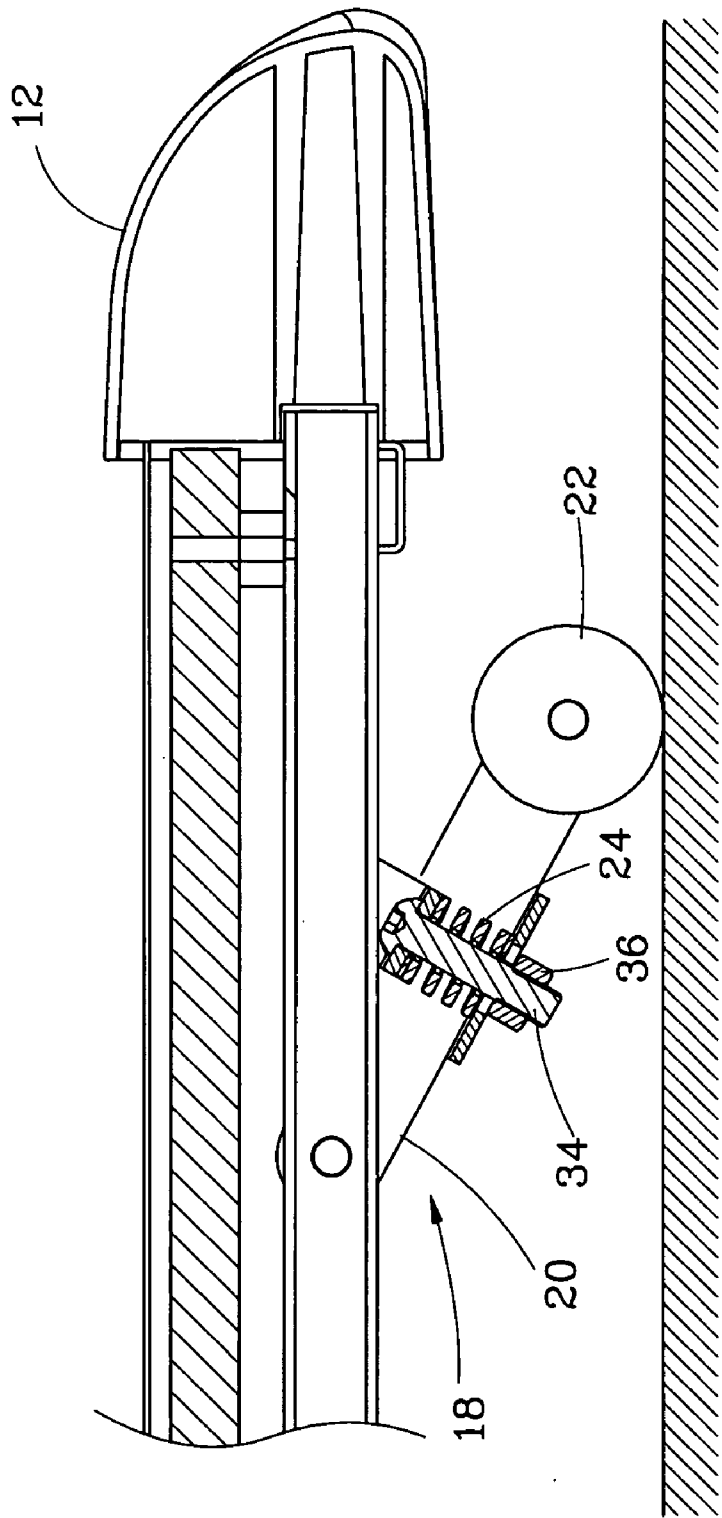


FIG. 5

CUSHION DEVICE FOR EXERCISE MACHINE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to an exercise machine, and more particularly to a cushion device of the exercise machine, such as treadmill, which can absorb the vibration from various orientations.

[0003] 2. Description of the Related Art

[0004] Treadmill is the most popular machine to provide a place for user walking, jogging or running indoors. When user is running or walking on the treadmill, every step will give the knee joints and heel joints a reactive force. It is easy to get musculoskeletal injury when a user running or walking on the treadmill for a long time. Some new treadmills are provided with a cushion device to reduce the loading of knee joints and heel joints, when user is running or walking on the treadmill.

[0005] There was a treadmill equipped with a cushion device between the deck and base. The cushion device may be a spring or hydraulic pump to absorb the vibration when user is running or walking on the treadmill. Such invention includes U.S. Pat. No. 5,072,928 issued to Stearns, et al. and U.S. Pat. No. 6,872,168 issued to Wang, et al.

[0006] U.S. Pat. No. 5,441,468, issued to Deckers, et al., taught a treadmill with cushion pads under the running belt to absorb vibration. Similar inventions include Buhler's invention (U.S. Pat. No. 5,542,892) and Chiu's invention (U.S. Pat. No. 6,117,053).

[0007] Other cushion devices for treadmill include Eschenbach's invention (U.S. Pat. No. 6,053,848) providing a rope to be the cushion medium and the invention issued to Dalebout et al. (U.S. Pat. No. 6,821,230) providing a cushion block with holes thereon. The sizes of the holes are different, so that the block is rotated to give different cushion capacities.

[0008] The above cushion devices only absorb the vibration normal to the cushion device. There is a poor absorbing capacity for the vibration not normal to the cushion device. For a spring cushion device, the vibration not normal to the axis of the spring will provides a shear force that the spring has a weak capacity to absorb it and the shear force may damage the spring.

SUMMARY OF THE INVENTION

[0009] The primary objective of the present invention is to provide a cushion device of an exercise apparatus, which can absorb the vibration from various orientations.

[0010] According to the objective of the present invention, a cushion device, which is mounted on an exercise machine to absorb vibration, comprises a linkage having an end pivot on a bottom of the exercise machine, and an elastic member having opposite end urging the exercise machine and the linkage respectively. An angle between the linkage and the ground is less than ninety degrees, such that the vibration from different orientation will transmit to the linkage and make it swing, and the elastic member is elastically deformed to absorb the vibration.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view of the treadmill of a preferred embodiment of the present invention;

[0012] FIG. 2 is an exploded view of the cushion device of the preferred embodiment of the present invention;

[0013] FIG. 3 is a sectional view of the cushion device of the preferred embodiment of the present invention, showing the condition of unloading;

[0014] FIG. 4 is a sectional view of the cushion device of the preferred embodiment of the present invention, showing the condition of loading; and

[0015] FIG. 5 is a sectional view of the cushion device of the preferred embodiment of the present invention, showing the nut is screwed to comprise the spring.

DETAILED DESCRIPTION OF THE INVENTION

[0016] As shown in FIG. 1 and FIG. 2, a treadmill 1 of the preferred embodiment of the present invention includes a base 10 and a deck 12 with a front end connected to the base, on which a running belt 14 and two cushion devices 18 (only show one of which in drawings) are provided.

[0017] Each of the cushion devices 18 has a linkage 20, a wheel 22, an elastic member 24, which is a spring in the embodiment, and a mount 26. The linkage 20 has two parallel arms 28 and a plate 30 fixed to the arms 28. The plate 30 has a bore 32 between the arms 32. The arms 28 have inner ends pivoted on a bottom of the deck 12 and outer ends pivoted with the wheel 22. The wheel 22 is rested on the ground for running. The mount 26 is fixed to the bottom of the deck 12 with a shaft 34 through the bore 32 of the plate 30 of the linkage 20. A nut 36 is screwed to the distal end of the shaft 34 and against the plate 30. The spring 24 is fitted to the shaft 34 with opposite ends urging the mount 26 and the plate 30 of the linkage 20 respectively.

[0018] As shown in FIG. 3, when an user (not shown) is running or walking on the running belt 14 of the treadmill of the present invention, the steps will provide vibrations from various orientations and transmit to the linkages 20 of the cushion devices 18. In analysis of mechanics, the force of vibrations from every orientation to the linkages 20 can be resolved into a normal component (Fn) and a horizontal component (Fs). The normal component (Fn) will swing the linkages 20 and compress the spring 24, as shown in FIG. 3. When the vibration is gone, the spring 24 will force the linkages 20 back to the initial position, as shown in FIG. 2.

[0019] The ratio of the normal component (Fn) and the horizontal component (Fs) is relative to an angle θ between the linkage 20 and ground. When the value of the normal component (Fn) is positive related to the angle θ . The present invention recommends the angle θ is less than 45 degrees, and more preferred, the angle θ is between 25 degrees and 35 degrees.

[0020] In operation, the nut 36 may be screwed to adjust the pre-compression of the spring 24. FIG. 3 shows the spring 24 in the condition of less pre-compression, which provides the cushion device 18 with a "soft" cushion capacity. FIG. 5 shows the nut 36 is screwed to compress the

spring **24** much. The cushion device **18** of FIG. **5** will provide a “hard” cushion capacity.

What is claimed is:

1. A cushion device, which is mounted on an exercise machine to absorb vibration, comprising a linkage having an end pivot on a bottom of the exercise machine to be swung by the vibration; and an elastic member having opposite end urging the exercise machine and the linkage respectively to be elastically deformed when the linkage is swung, wherein an angle between the linkage and the ground is less than ninety degrees.

2. The cushion device as defined in claim 1, further comprising a mount fixed to the exercise machine, which has a shaft through a bore of the linkage and a nut screwed to a distal end of the shaft, wherein the elastic member is fitted to the shaft.

3. The cushion device as defined in claim 1, further comprising a wheel pivoted on the linkage to touch the ground.

4. The cushion device as defined in claim 1, wherein the linkage includes two substantially parallel arms and a plate connected to the arms.

5. The cushion device as defined in claim 4, further comprising a wheel between the arms and pivoted thereon to touch the ground.

6. The cushion device as defined in claim 4, further comprising a mount fixed to the exercise machine, wherein the mount has a shaft through a bore on the plate with a nut screwed to a distal end thereof and the elastic member is fitted to the shaft.

7. The cushion device as defined in claim 1, wherein the angle between the linkage and the ground is preferred less than forty-five degrees.

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