

Description

Device for training the back muscles by the transmission of oscillations to a sitting test subject

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The invention relates to a device with a seat carrier for improving the spinal column muscles by training these muscles with oscillations, without extreme excursive movements.

10 A variety of training apparatus for improving the function of the spinal column muscles are known. On the one hand, these are devices on which the test subject can train his muscle strength by executing more or less fixed movements counter to adjustable means of  
15 resistance. On the other hand, devices are known which are distinguished by an unstable base which allows the test subject to train his balance (Pezzy ball).

The complex link between specific training of certain areas of the back muscles and the simultaneous  
20 improvement in coordination and metabolic condition of the affected tissues, muscles, intervertebral disks, tendon and ligament structures, is employed in the context of so-called riding therapy, such as is described, for example, in the article "Neue Aspekte  
25 zur Behandlung des Morbus Scheuermann mit Hippotherapie" [New Aspects of Treatment of Scheuermann's Disease by Hippotherapy] by A. Gottwald et al., from Zeitschrift für Orthopädie [Journal of Orthopaedics] 119, (1981), pages 351 et seq., and in  
30 the book "Reiten aus der Körpermitte. Pferd und Reiter im Gleichgewicht" [Riding from the Centre of the Body. Horse and Rider in Equilibrium] by S. Swift, published by Räschlikon Verlag of Zurich, Stuttgart and Vienna, 1995.

35 These forms of therapy make use of the complex transmission of movement impulses which are transmitted from horses to their riders when riding at walking pace. The therapeutic starting point is the physiological back posture of the correctly seated

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rider. This corresponds to the posture of the spinal column demanded

in back classes. The patient thus sits in the saddle with physiological, muscle-stabilized lordosis of the lumbar spinal column. The main points of loading when sitting are the ischial bones. When riding at a walking  
5 pace, the three-dimensional oscillating rhythm of the horse's back is transmitted to the patient.

The first component of movement is the pelvic movement, induced by the gait of the horse, in the frontal direction, with tilting and righting of the  
10 pelvis. The lower lumbar spine is in this way forced to constantly vary the adopted lordosis.

The second component of movement is a slight lateral flexion, dependent on the pace, which always affects the respective ischial tuberosity when the  
15 lumbar spine is situated at the maximum point of its lordotic curvature.

The third component of movement is an upward and downward movement of the upper body along a vertical axis which is tilted slightly forwards.

20 As regards the three abovementioned components of movement, it should be noted that the rider correctly seated in the saddle executes components of movement 1 (tilting of the pelvis about the transverse axis) and 3 (upward and downward movement along the  
25 vertical axis tilted slightly forwards), but stabilizes and thus checks the component of movement 2 (lateral flexion of the pelvis) by reflex righting and equilibrium reactions of the lumbar rotator muscles. It is this very stabilizing reaction that is used, when  
30 riding at a walking pace, for the purpose of training the deep-lying monosegmental rotators, without building up a rigid isometric tension field, similar to the whole-body tension after BRUNKOW. As with the "lift-free mobilization" by the method of KLEIN-VOGELBACH,  
35 there are no maximum excursive movements, but only small differentiated movements which, on lateral flexion of the

lower segments of the lumbar spinal column, decisively influence the restoration of the damaged nociceptive function.

5 The invention is based on the object of making available a device of the type specified at the outset, in which the multidimensional transmission of oscillation impulses provides complex training effects which are similar to those which occur in the various forms of riding therapy, but which go beyond these on  
10 account of the fact that the frequency and amplitude of the various components of movement can be freely controlled.

According to the invention, the object is achieved by means of the fact that the seat carrier is  
15 mounted so that it can move in a number of dimensions about at least one pivot point, and the device has drive means which are used to supply multidimensional movement impulses to the seat carrier. By alternate loading of the ischial bones of the person sitting on  
20 the seat device, these movements trigger a lateral flexion of the spinal column and additionally effect a change in the tilt of the pelvis, so that the stability and function of the spinal column muscles improve. A possible turning effects a rotation along the  
25 longitudinal axis of the spinal column. By means of a parabolic movement, the body of the test subject is accelerated below its centre of gravity.

It has proven advantageous if the spatial position [sic] of the pivot points for the movement  
30 impulses in different directions are not the same.

An optimum adaptation to different persons can be achieved if the drive means are designed in such a way that the seat carrier can execute movement impulses whose frequency and amplitude are adjustable.

35 A lateral flexion of the spinal column by alternating right/left loading of the ischial bones of the person sitting on the seat device



is triggered if the seat carrier is held so that it can tilt laterally about its longitudinal axis.

This movement additionally causes a change in the pelvic tilt of the person sitting on the seat device if the seat carrier is held so that it can tilt forwards.

Controllable rocking movements in the longitudinal direction can be achieved if the seat carrier can be swivelled about a pivot point forwards and upwards along a circular path, in which case the seat carrier remains horizontal.

Rotational impulses on the pelvis and the spinal column can be achieved if the seat carrier can be rotated about its vertical axis.

It has proven expedient for the device to have a seat device in the shape of a riding saddle which can execute tilting movements, adjustable in frequency and amplitude, about its longitudinal axis, so that an additional spreading of the legs takes place.

Rotations about the vertical axis of the seat carrier with a base and an upright for supporting the seat carrier can be executed if the drive means turn the upright about its vertical axis.

The device can be used daily if it is designed as an office chair, the seating surface of which being provided with drive means.

It has proven advantageous if the device has a base on which there is fixed an upright which bears a U-shaped fork, if a shaft bent at right angles is mounted rotatably between the ends of the fork, if an intermediate support is fixed rotatably

on the angled shaft-part, and if the seat carrier is arranged in the longitudinal direction of the intermediate support and also mounted so that it can rotate.

5           According to the invention, the device can have, as the seat carrier, a seat device in the shape of a riding saddle. This seat device can execute tilting movements, adjustable in frequency and amplitude, about its longitudinal axis (X-axis).

10           This seat device also executes tilting movements about its transverse axis (Y-axis), the excursion of these movements once again being adjustable in frequency and amplitude. In addition, the seat device executes rocking movements in the  
15 longitudinal direction, which movements once again can be modified in frequency and amplitude. Furthermore, the device can execute rotational movements about its vertical axis (Z-axis).

          The invention is explained in greater detail  
20 hereinbelow with reference to the illustrative embodiments which are represented in the drawing, in which:

          Figure 1 shows a simplified representation of the seat arrangement,

25           Figures 2 to 7 show sketches representing possible movements of the seat arrangement, and

          Figure 8 shows a perspective representation of a device according to the invention.

          In Figure 1, the seat device is shown in a  
30 simplified manner as a barrel 1, so that the directions of movement of the orthopaedic device according to the invention can be illustrated more clearly. For information purposes, the x-axis 2, the y-axis 3 and the z-axis 4 and two pivot points 5 and 6 have been  
35 plotted.

The tilting movement is explained with reference to Figures 2 and 3. The device is shown in a side view. The x-axis 2 and thus the barrel 1 can be tilted forwards and backwards about the lower pivot point 5.

The device is shown in a front view in Figures 4 and 5. The y-axis 3 and thus the barrel 1 can be tilted laterally about the upper pivot point 6.

The device is once again shown in a side view in Figures 6 and 7. A circular excursion takes place about the upper pivot point 6, as the device is moved in the direction of the x-axis 2, in which case it remains on the horizontal. In this way, the body 1 is given an additional movement in the direction of the z-axis 4.

According to the invention, the device can also be turned additionally about the z axis 4.

Figure 8 shows a device for generating a controlled pattern of movement, with a base 10 on which there is fixed an upright 11 which bears a U-shaped fork 12. A shaft 13 bent at right angles is mounted rotatably between the ends of the fork. An intermediate support 15 is mounted on the angled shaft part 14, on which intermediate support 15 a seat carrier 16 is arranged in the longitudinal direction and is also mounted so that it can rotate.

By means of the rotatable attachment of the seat carrier 16 on the intermediate support 15, the latter can be swivelled laterally about the x-axis 2, as was shown with reference to Figures 4 and 5, so that the y-axis 3 and thus the seat carrier 16 is tilted laterally in the direction of the double arrow 17 by drive means.

By turning the intermediate support 15 on the shaft part 14 by drive means, the x-axis 2 is tilted according to the double arrow 18 and in accordance with Figures 2 and 3.

The circular excursion of the seat carrier 16, and thus of the device, as described with reference to Figures 6 and 7, is achieved by pivoting the extended lever 19 of the angled shaft 13 in the direction of the double arrow 20. The drive means for swivelling the seat carrier 16 can engage on this lever 19.

Moreover, the fork 12 can be turned about its vertical axis, in the direction of the double arrow 21, by means of drive means arranged in the base 10 or upright 11.

The device shown in Figure 8 is expediently covered with a lining (not shown) which lies tightly on the seat carrier 16 so that the movement impulses are transmitted to it. It can be provided with a seat device in the shape of a riding saddle.

A foot holder can be arranged rigidly on the base 10 of the device, which, for example, allows a person sitting on a saddle secured to the seat carrier 16 to place his feet thereon and so additionally achieve a change in the position of flexion of the hips. This foot holder rests in relation to the floor. However, it can also be suspended in such a way as to move freely.

For all these movements, which effect only a small excursion in the directions illustrated, drive means (not shown) are provided. According to the invention, the movement impulses can be triggered by electric motors, electromagnets, hydraulic devices or the like. They can comprise a steady or impulse-type movement.

The device described above is mounted so as to be freely movable in all directions, namely so that it can tilt laterally about the X-axis and Y-axis, on a device that can travel in a circle along the X-axis, by means of which the seat carrier 16 and

the device supporting it can additionally be moved upwards along the Z-axis, and can be rotated about the Z-axis. All these movements are effected by a drive which can be adjusted in frequency and amplitude.

- 5           Such a device can be used in many ways for therapeutic treatment in medical practices, rehabilitation clinics or the like. Also, chairs and other seating arrangements can be equipped with it so that, for example, when doing writing work, while
- 10 sitting on an office chair equipped according to the invention, the back muscles can be exercised without interrupting work.

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Patent Claims

1. Device for training the back muscles with a seat carrier (16), characterized in that the seat carrier (16) is mounted so that it can move in a number of dimensions about at least one pivot point (5, 6), and the device has drive means which are used to supply multidimensional movement impulses to the seat carrier (16).
2. Device according to Claim 1, characterized in that the spatial position [sic] of the pivot points (5, 6) for the movement impulses in different directions are not the same.
3. Device according to Claim 1 or 2, characterized in that the drive means are designed in such a way that the seat carrier (16) can execute movement impulses whose frequency and amplitude are adjustable.
4. Device according to one of Claims 1 to 3, characterized in that the seat carrier (16) is held so that it can tilt laterally about its longitudinal axis (2).
5. Device according to one of Claims 1 to 4, characterized in that the seat carrier (16) is held so that it can tilt forwards.
6. Device according to one of Claims 1 to 5, characterized in that the seat carrier (16) can be swivelled about a pivot point (6) forwards and upwards along a circular path, in which case the seat carrier (16) remains horizontal.



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7. Device according to one of Claims 1 to 6, characterized in that the seat carrier (16) can be rotated about its vertical axis (4).

8. Device according to one of Claims 1 to 7,  
5 characterized in that the seat carrier is a seat device (16) in the shape of a riding saddle.

9. Device according to Claim 8, characterized in that the seat device (16) in the shape of a riding saddle can execute tilting movements, adjustable in  
10 frequency and amplitude, about its longitudinal axis.

10. Device according to one of Claims 1 to 9, with a base (10) and an upright (11) for supporting the seat carrier (16), characterized in that the drive means turn the upright (11) about its vertical axis (4).

15 11. Device according to one of Claims 1 to 10, characterized in that the device is an office chair, the seating surface of which is provided with drive means.

12. Device according to one of Claims 1 to 11,  
20 characterized in that it has a base (10) on which there is fixed an upright (11) which bears a U-shaped fork (12), in that a shaft (13) bent at right angles is mounted rotatably between the ends of the fork (12), in that an intermediate support (15) is fixed rotatably on  
25 the angled shaft part (14), and in that the seat carrier (16) is arranged in the longitudinal direction of the intermediate support (15) and is also mounted so that it can rotate.

