Massage Mat Structure

Technical Field

The present utility model relates to a massage mat structure, which belongs to the technical field of massage devices.

Background

The massage chair in cinemas is a facility that combines movie watching and relaxation to provide the audience with a more comfortable movie-watching experience. These massage chairs typically have multiple massage functions to help relieve the fatigue and stress of the audience while watching a movie.

Massage chairs are often equipped with back massage mats to massage the audience's back. However, if the audience does not need a massage, the back massage mat may cause discomfort to the audience's back when not in use. Therefore, in the prior art, the present utility model (Chinese Patent Publication Number: CN218571799U) discloses a back massage mat with a stopping position for use in cinemas, which enables the massage assembly to move along a track when in use and withdraw from the back area when not needed, to avoid pressing against the users' back, enhance comfort, and improve user experience.

Such travelable back massage mats are often paired with corresponding conductive rails to achieve an electrical connection between the external controller and the back massage mat. The present utility model (Chinese Patent Publication Number: CN215081807U) discloses a flexible sliding controller and a back massage mat, including flexible conductive rails, sliding conductive components, and a mat body installed on the flexible conductive rails. When the mat body slides along the flexible conductive rails, the metal probes in the sliding conductive components can slide in contact with conductive strips embedded in the flexible conductive rails, so that the circuit board is electrically connected with the conductive strips to facilitate subsequent signal control and power supply operations.

To control the movement direction of such travelable back massage mats, a dedicated massage assembly board generally needs to be installed in a dedicated massage assembly board within the back massage mats. Afterward, corresponding instructions are sent to the

massage assembly board, and the drive mechanism, which is installed in the back massage mat and used to drive the sliding of the back massage mat, changes its working state as per the instructions, to enable the back massage mat to slide in the desired direction. For example, in the technical solution of the present utility model, a back massage mat with stopping positions for use in cinemas controls the forward and reverse rotation of the driving motor through the massage assembly board, thereby changing the movement direction of the massage assembly. In the flexible sliding controller and the back massage mat, instructions are sent via a mobile phone or controller, and transmitted to the MCU through the conductive strip. According to the instructions, the MCU then controls the massage assembly to perform specific actions, such as sliding along the flexible conductive rail to a corresponding position.

However, in the above-mentioned solution, when the metal probes slide in contact with the embedded conductive strips, the contact area is relatively small, which can lead to unstable contact and further result in a disconnection of the power supply to the back massage mat. Additionally, as the back massage mat needs a dedicated massage assembly board to control the forward and reverse rotation of the driving motor, when the power to the back massage mat is disconnected, the power to the dedicated massage assembly board installed on the mat will also be disconnected. This can cause the loss of massage data on the dedicated massage assembly board, affecting subsequent massage operations.

Summary

To solve the above problems in the prior art, the present utility model provides a massage mat structure.

The technical solution of the present utility model is as follows: A massage mat structure comprises two rack rails and a massage assembly which is provided with a driving mechanism meshed to both rack rails; a placement groove is cut on both two rack rails and provided with a conductive wire; the massage assembly is provided with an elastic metal pressing sheets that are in contact with both conductive wires; one side of each elastic metal pressing sheet extends into the corresponding placement groove, the other side of each elastic metal pressing sheet is in close contact with the conductive wires when compressed; the elastic metal pressing sheet is also electrically connected to the driving mechanism; the massage mat structure also comprises a controller which is arranged outside the massage mat

structure; the controller is electrically connected to both conductive wires; the controller, the two conductive wires, the elastic metal pressing sheet electrically connected to the conductive wires, and the driving mechanism form a circuit; and the driving mechanism performs reciprocating motion between the two rack rails based on the current direction change in the two conductive wires, without a need to add an assembly board to the massage assembly.

Preferably, the elastic metal pressing sheet is arranged in a U-shaped form, with its bottom surface extending into the placement groove; a raised arc-shaped portion is arranged on the bottom surface of the elastic metal pressing sheet and presses onto the conductive wires; and the elastic metal pressing sheet is compressed when the arc-shaped portion presses onto the conductive wires.

Preferably, the controller comprises at least one external control circuit board which is electrically connected to the conductive wires and an external power supply.

Preferably, the massage assembly is equipped with two connection blocks which correspond one to one to the two rack rails; both of the connection blocks are arranged in a C-shaped form, with their top connected to the top surface of the massage assembly; the rack rails protrude out of the middle of corresponding connection blocks; the upper wall at the bottom of both connection block is in contact with the bottom surface of the corresponding rack rail; and the inner side wall in the middle of both connection block is in contact with the side wall of the corresponding rack rail.

Preferably, the driving mechanism comprises a double-ended motor and two driving gear sets that correspond one to one with the two rack rails; the double-ended motor is embedded on the top surface of the massage assembly, and installed between the two driving gear sets; both elastic metal pressing sheet are electrically connected to the power terminal of the double-ended motor; one end of both driving gear sets is meshed to the corresponding driving part of the double-ended motor, and the other end of both driving gear sets is meshed to the rack rail on the corresponding side.

Preferably, first sliding blocks are arranged in pairs at positions close to the edges on both sides at the bottom of the massage assembly, with two first sliding blocks in each pair; the two first sliding blocks on the same side are slidably connected and arranged in the placement grooves on the corresponding side; and the side walls of the two first sliding

blocks on the same side, facing away from each other, are in contact with the two side walls of the placement grooves on the corresponding side.

Preferably, auxiliary grooves are cut on both of the rack rails, and second sliding blocks are arranged in positions close to the edges on both sides at the bottom of the massage assembly. The second sliding blocks on each side are slidably arranged into auxiliary grooves (9) on the corresponding side.

Preferably, both the rack rails and the massage assembly (2) are provided with positioning components for determining the position of the massage assembly (2) on the rack rails (1).

Preferably, the positioning components include Hall sensors, which are arranged at the ends of the two sides of each rack rail; the Hall sensors at both sides are electrically connected to the controller; the massage mechanism is equipped with magnets distributed front to back, and the magnets on both sides are arranged close to the rack rail.

The present utility model has the following beneficial effects:

The present utility model, by setting up structures such as the placement grooves, the conductive wires, the elastic metal pressing sheet, and the controller, allows the elastic metal pressing sheet to elastically deform and press against the conductive wires in real time, ensuring sufficient contact area between the elastic metal pressing sheets and the conductive wires and preventing the occurrence of a power supply disconnection to the massage assembly. Meanwhile, the controller, based on the setting of the two conductive wires and the two elastic metal pressing sheets, can form a circuit with the driving mechanism, and supplies power to the driving mechanism, and the driving mechanism. According to the changes in the current flow direction on the two conductive wires, the driving mechanism can reciprocate between the two rack rails and drive the massage assembly to move accordingly, thus controlling the movement direction of the massage assembly without adding a dedicated massage assembly board on the massage assembly. This solution simplifies the structure of the massage assembly, and without the addition of a dedicated massage assembly board, avoids the risk of losing massage data in case the power supply to the massage assembly is disconnected. Compared to the prior art, the present utility model offers the advantages of stable and reliable contact, no loss of massage data, and proper functioning of subsequent massage operations.

Brief Description of the Drawings

Fig. 1 is an axonometric view of the present utility model;

Fig. 2 is a top view of the present utility model;

Fig. 3 is a front view of the present utility model;

Fig. 4 is an enlarged view of the Marked Area A in Fig. 3;

Fig. 5 is a partial sectional view of the present utility model.

The reference signs indicated in drawings are:

1. Rack Rail; 2. Massage Assembly; 3. Driving Mechanism; 31. Double-ended Motor; 32. Driving Gear Set; 4. Placement Groove; 5. Conductive Wire; 6. Elastic Metal Pressing Sheet; 61. Arc-shaped Portion; 7. Connection Block; 8. First Sliding Block; 9. Auxiliary Groove; 10. Second Sliding Block; 11. Hall Sensor; 12. Magnet; a. Connecting Strip.

Detailed Description of the Embodiments

The following provides a detailed description of the present utility model in conjunction with the accompanying drawings and specific embodiments.

Embodiment: Please refer to Figs. 1–5. This embodiment provides a back massage mat structure comprising two rack rails 1 and a massage assembly 2. The two rack rails 1 are symmetrically arranged, and the massage assembly 2 is positioned between the two rack rails 1. A driving mechanism 3 is arranged on the massage assembly 2, and the driving mechanism 3 is meshed to both rack rails 1. The corresponding side ends of the two rack rails 1, through the setting of a connecting strip a, are connected to form an integral structure, facilitating subsequent installation. A placement groove 4 is cut on the top surface of both two rack rails 1, with its direction aligning with the length direction of the rack rails 1. A conductive wire 5 is arranged in each placement groove 4, with its arrangement direction aligning with the length direction of the corresponding placement groove 4. The specific shape of the conductive wire 5 can be selected according to actual needs. For example, the conductive wires can be cylindrical for ease of processing, or flat for more stable contact.

The massage assembly 2 is provided with elastic metal pressing sheets 6 that are in contact with both the two conductive wires 5. The elastic metal pressing sheets 6 are made of elastic metal material. In this embodiment, the elastic metal pressing sheets 6 are conductive elastic sheets made of copper. The elastic metal pressing sheets 6 are arranged in

a U-shape from, and can be mounted with screws or fasteners or common structural limiting methods when installed on the massage assembly 2. The specific mounting method can be chosen based on actual needs without limitation. In this embodiment, the elastic metal pressing sheets 6 are arranged on the massage assembly 2 with screws. The bottom surfaces of the two elastic metal pressing sheets 6 extend into the corresponding placement grooves 4 and are in close contact with the conductive wires 5 when compressed. Each bottom surface of the elastic metal pressing sheets 6 is provided with a raised arc-shaped portion 61. The number of arc-shaped portions 61 on the elastic metal pressing sheets 6 can be determined according to actual needs. In this embodiment, two arc-shaped parts 61 are arranged on the bottom surface of each elastic metal pressing sheet 6, and each of the arc-shaped parts presses tightly against the corresponding conductive wire 5. The elastic metal pressing sheets 6 are compressed when the arc-shaped portions 61 press onto the conductive wires 5, and can elastically deform and press the arc-shaped parts 61 against the conductive wires 5 in real time, ensuring sufficient contact area between the elastic metal pressing sheets and the conductive wires 5 and preventing the occurrence of a power supply disconnection to the massage assembly 2. Meanwhile, the two elastic metal pressing sheets 6 are electrically connected to the driving mechanism 3.

The back massage mat structure also comprises a controller, which is arranged outside the back massage mat structure, e.g., in an external massage chair. The controller comprises at least one external control circuit board, which is electrically connected to the two conductive wires 5 and the external power supply, and works with the two conductive wires 5, two elastic metal pressing sheets 6 electrically connected to the conductive wires 5, and the driving mechanism 3 to form a circuit. The controller is used to control the current from the external power supply and provides the necessary current for the operation of the driving mechanism 3. According to the changes in the current flow direction on the two conductive wires 5, the driving mechanism 3 can reciprocate between the two rack rails 1 and drive the massage assembly 2 to move accordingly between the two rack rails 1, without adding a dedicated massage assembly board on the massage assembly 2. The control circuit board, when used in practice, can realize the control of the current direction only, or integrate the current control and the communication control, according to actual needs.

Through the above arrangement, no special massage assembly board and

corresponding communication lines are required for the massage assembly 2, so that the whole massage assembly 2 can be made smaller, more convenient and more stable, which reduces the production cost of massage assembly 2, eliminates the need to develop a set of control programs, lowers development difficulty, and improves the maintainability. In this case, only two conductive wires 5 are required. As the conductive wires 5 are used for power transmission, there is a possibility of contact loss (the contact point and the conductive wires 5 may be disconnected for a short or long period without contact or electrical connection). Any disconnection of any one of the conductive wires 5 will result in abnormal operation of the product. Assuming the contact loss probability of each conductive wire 5 is 10%, the probability of the product operating normally (without contact loss in all three wires) in the prior art, as described in the present utility model (Chinese Patent Publication Number: CN215081807U), is estimated to be $(1\text{-}10\%)^{3}=72.9\%$. A contact loss (if any), even if quickly restored, will still lead to a reboot of the MCU program on the massage assembly board, which affects the normal operation of the product (e.g., prematurely ending the massage). However, as only two conductive wires 5 are required for the massage mat structure provided in this embodiment, the same contact loss probability is assumed to of 10% due to a reduction in the number of conductive wires, the probability of the product operating normally (without contact loss in both wires) in this embodiment is estimated to be $(1 - 10\%)^{2} = 81\%$, improving the stability of the product. Moreover, if there is a short-term contact loss, there is no need to set up a dedicated massage assembly board on the massage mechanism 2, and it will not cause any significant impact on actual massage functions. As long as the contact is restored, the driving mechanism 3 can resume normal operation immediately.

In this embodiment, the driving mechanism 3 comprises a double-ended motor (31 and two driving gear sets 32 that correspond one to one with the two rack rails 1; the double-ended motor 31 is embedded on the top surface of the massage assembly 2, and installed between the two driving gear sets 32; both elastic metal pressing sheet 6 are electrically connected to the power terminal of the double-ended motor 31 so that when current flows through the two conductive wires 5, the current can pass through the elastic metal pressing sheet 6 and reach the double-ended motor 31 to provide the required working current for the double-ended motor 31; one end of both driving gear sets 32 is meshed to the corresponding

driving part of the double-ended motor 31, and the other end of both driving gear sets 32 is meshed to the rack rail 1 on the corresponding side.

With the above arrangement, when the position of the massage assembly 2 needs to be adjusted, the controller is activated to start work. Through its electrical connection to the external power supply, the controller can output current to the two conductive wires 5, which work with the two elastic metal pressing sheets 6 to form a circuit between the controller and the double-ended motor 31. The double-ended motor 31 can perform corresponding forward and reverse rotation based on the direction of current on the two conductive wires 5, thus driving the two drive gear sets 32 to work. The two drive gear sets 32, through their engagement with the two rack rails 1, can move the massage assembly 2 along the two rack rails 1, thereby achieving the adjustment of the position of the massage assembly 2.

When the direction of the current on the two conductive wires 5 changes, and the rotation direction of the double-ended motor 31 will change to adjust the movement direction of the massage assembly 2 on the two rack rails 1. Compared to the prior art, there is no need to add a special massage assembly board on the massage assembly 2, and the controller can change the direction of the output current to adjust the rotation direction of the output end of the double-ended motor 31, and further control the movement direction of the driving mechanism 3 and the massage assembly 2, so that even if the power supply to the massage assembly 2 is disconnected, there will be no loss of relevant massage data because there is no special massage assembly board set up on the massage assembly 2.

The left and right sides of the massage assembly 2 are equipped with two connection blocks 7 which correspond one to one with one of the two rack rails 1. Both of the connection blocks 7 are arranged in a C-shaped form, with their top connected to the top surface of the massage assembly 2; the rack rails 1 protrude out of the middle of corresponding connection blocks 7; the upper wall at the bottom of both connection block 7 is in contact with the bottom surface of the corresponding rack rail 1; and the inner side wall in the middle of both connection block 7 is in contact with the side wall of the corresponding rack rail 1. Through the arrangement, the massage assembly 2 can be firmly mounted on the two rack rails 1 with the help of the two connection blocks 7, ensuring that it is difficult for the massage assembly 2 to fall off when moving along the two rack rails 1.

In this embodiment, to ensure the stability of the movement of the massage assembly

2 on the two rack rails 1, first sliding blocks 8 are arranged in pairs at positions close to the edges on both sides at the bottom of the massage assembly 2, with two first sliding blocks 8 in each pair; the two first sliding blocks 8 on the same side are slidably connected and arranged in the placement grooves 4 on the corresponding side; and the side walls of the two first sliding blocks 8 on the same side, facing away from each other, are in contact with the two side walls of the placement grooves 4 on the corresponding side. Meanwhile, auxiliary grooves (9) are cut on both of the rack rails 1, and second sliding blocks 10 are arranged in positions close to the edges on both sides at the bottom of the massage assembly 2. The second sliding blocks 10 on each side are slidably arranged into auxiliary grooves 9 on the corresponding side.

With the above arrangement, when the massage assembly 2 moves along the two rack rails 1, the first sliding blocks 8 can slide within the placement slots 4, and the second sliding blocks 10 can slide within the auxiliary slots 9. The cooperation between the first sliding blocks 8 and the placement slots 4, as well as the cooperation between the second sliding blocks 10 and the auxiliary slots 9, can ensure that the massage assembly 2 is unlikely to deviate laterally during its movement, thus preventing the massage assembly 2 from falling off during the movement.

In order to control the position of the massage assembly 2 on the two rack rails 1, positioning components are provided on both the rack rails 1 and the massage assembly 2 to determine the position of the massage assembly 2 on the rack rails 1. In this embodiment, the positioning components include Hall sensors 11, which are arranged at the two ends of one of the rack rails 1. The two Hall sensors 11 are electrically connected to the controller which provides the required current for the operation of the Hall sensors 11. The massage assembly 2 is provided with magnets 12 which are distributed front to back and positioned close to the corresponding rack rails 1. The two Hall sensors 11 can detect the magnetic field strength generated by the magnets 12 on the corresponding side to determine the position of the massage assembly 2, facilitating the position adjustment of the massage assembly 2 during the subsequent massage process. Additionally, a threshold can be set for the Hall sensors 11. When the Hall sensors 11 detect that the magnetic field strength exceeds the set threshold, the Hall sensors 11 can send an electrical signal to the controller. After receiving this signal, the controller can reverse the direction of the output current, thereby changing

the movement direction of the massage assembly 2. This solution limits the movement of the massage assembly 2 along the rack rails 1, thus preventing the massage assembly 2 from falling off the rack rails 1.

The above are only embodiments of the present utility model and do not limit the patent scope of the present utility model. Any equivalent structures or equivalent process changes made according to the descriptions and drawings of the present utility model, or direct or indirect application in other related technical fields, are similarly included within the patent protection scope of the present utility model.