

DESCRIPTION

Title of Invention: MASSAGING APPARATUS IN CHAIR FORM

Technical Field

[0001] The present invention relates to a massaging apparatus in the form of chair having a retractable footrest section for massaging legs of a user sitting in the seat of the apparatus.

Background Art

[0002] A massaging apparatus as disclosed in Patent Literature 1 is known as a massaging apparatus in the form of chair having a footrest capable of providing massaging treatment to target areas in the legs of a user sitting in the seat of the apparatus.

The massaging apparatus disclosed in Patent Literature 1 is shaped like a bucket seat constructed of integrally-formed backrest and seat. The massaging apparatus includes a massaging system which is guided in vertical movement along a rack formed so as to extend all the way from the top to the bottom of the backrest. This allows massage treatment to be provided to a wide range of user's body, from the shoulder to the waist. Moreover, the massaging apparatus disclosed in Patent Literature 1 includes a footrest disposed at the front of its seat. When desired to massage user's legs, the footrest is

flipped up forward to a position at a height about on a level with the top of the seat for receiving user's legs ready to perform leg massage.

Prior Art Reference

Citation List

[0003] Patent Literature 1: Japanese Unexamined Patent Publication JP-A 2015-231408

Summary of Invention

Technical Problem

[0004] Unfortunately, the massaging apparatus disclosed in Patent Literature 1 may be unsatisfactory from the standpoint of user-friendliness. That is, during the quiescent (i.e., non-massaging) state, the footrest is left in place forward of the seat on a floor, for example. In this case, for example, when the user is sitting on or rising from the seat, the footrest on the floor may cause interference with user's leg. Furthermore, such a way of placement of the footrest adds extra space to the installation space for the massaging apparatus.

[0005] The present invention has been devised in view of the problems as discussed supra, and accordingly its object is to provide a space-saving and user-friendly massaging apparatus in chair form designed to ensure storage of a footrest section in a space below a seat section to keep out of the way of user's action to sit in

or leave the seat section.

Solution to Problem

[0006] In order to solve the described problems, the following technical means is adopted for the implementation of a massaging apparatus in chair form pursuant to the present invention.

That is, the massaging apparatus in chair form pursuant to the present invention comprises: a seat section for user seating; a backrest section, mounted at a rear of the seat section, for supporting user's back; and a footrest section which may be stored in a place below the seat section, and has a leg-receiving portion for massage treatment to user's leg. The seat section includes a footrest advancing-retracting mechanism for moving the footrest section back and forth between a withdrawn position corresponding to the place below the seat section and a projected position forward of the withdrawn position. The footrest advancing-retracting mechanism is designed to, when desired to move the footrest section to the projected position, move the footrest section forward to the projected position while performing a first stage of operation to allow the footrest section to change its posture to forward-facing posture where the leg-receiving portion faces forward and a second stage of operation to lift the footrest section and drive the footrest section to

move to the projected position while keeping its forward-facing posture.

[0007] In the present invention, it is preferable that the footrest section is provided at each side in a horizontal direction with a footrest support for supporting the footrest section for rotation about a horizontally directed axis, and a rocking arm for supporting the footrest support for rocking motion about a horizontally directed axis relative to a front part of the seat section, that the footrest advancing-retracting mechanism includes posture-changing means for enabling the footrest section to change its posture from upward-facing posture to forward-facing posture when the footrest section is subjected to the first stage of operation, and that the footrest advancing-retracting mechanism operates in a manner such that, when the footrest section undergoes a shift from the first stage of operation to the second stage of operation, changing of the posture of the footrest section by the posture-changing means is complete.

[0008] In the present invention, it is preferable that the posture-changing means comprises an inclined guide channel located toward the seat section and a guide pin which extends from the footrest section and moves along the guide channel with its protruding end engaged in the guide channel, and that the posture-changing means allows the

footrest section to change its posture from upward-facing posture to forward-facing posture in response to a movement of the guide pin in engagement with the inclined guide channel at the first stage of operation.

[0009] In the present invention, it is preferable that the footrest support is provided with a resilient member for exerting a resilient force tending to rotate the footrest section into position to allow the leg-receiving portion to face forward about a rotation shaft of the footrest section, and that the footrest section is rotated into position to allow the leg-receiving portion of the footrest section to face forward under a rotatably driving force exerted by the resilient member at the second stage of operation.

[0010] In the present invention, it is preferable that the footrest advancing-retracting mechanism is designed to, when desired to move the footrest section in the projected position back to the withdrawn position, rotate the footrest section into position to allow the leg-receiving portion of the footrest section to face upward and rearward against a resilient force exerted by the resilient member, and thereafter move the footrest section toward the withdrawn position.

In the present invention, it is preferable that there is provided posture-retaining means for enabling the

footrest section to retain upward-facing posture where the leg-receiving portion of the footrest section faces upward, as well as to retain forward-facing posture where the leg-receiving portion faces forward, by restraining rotation of the footrest section relative to the footrest support.

Advantageous Effects of the Invention

[0011] The present invention provides a space-saving and user-friendly massaging apparatus in chair form designed to ensure storage of a footrest section in a space below a seat section to keep out of the way of user's action to sit in and leave the seat section.

Brief Description of Drawings

[0012] [FIG. 1] is a perspective view of the massaging apparatus in chair form in accordance with an embodiment of the present invention.

[FIG. 2] is a perspective view of the footrest section set in a storage place (withdrawn position).

[FIG. 3A] is a left-hand side view of the footrest section shown in FIG. 2.

[FIG. 3B] is a right-hand side view of the footrest section shown in FIG. 2.

[FIG. 4] is a perspective view of the footrest section in action at the first stage of operation effected by the footrest advancing-retracting mechanism.

[FIG. 5A] is a left-hand side view of the footrest

section shown in FIG. 4.

[FIG. 5B] is a right-hand side view of the footrest section shown in FIG. 4.

[FIG. 6] is a perspective view of the footrest section undergoing a transition from the first stage of operation to the second stage of operation effected by the footrest advancing-retracting mechanism.

[FIG. 7A] is a left-hand side view of the footrest section shown in FIG. 6.

[FIG. 7B] is a right-hand side view of the footrest section shown in FIG. 6.

[FIG. 8] is a perspective view of the footrest section which has been rotated into position for taking forward-facing posture at the second stage of operation.

[FIG. 9A] is a left-hand side view of the footrest section shown in FIG. 8.

[FIG. 9B] is a right-hand side view of the footrest section shown in FIG. 8.

[FIG. 10] is a perspective view of the footrest section which has been moved forward to a fully advanced position at the second stage of operation.

[FIG. 11A] is a left-hand side view of the footrest section shown in FIG. 10.

[FIG. 11B] is a right-hand side view of the footrest section shown in FIG. 10.

[FIG. 12] is a perspective view of the footrest section which has been rotated into position to allow its leg-receiving portion to face upward and rearward during movement toward the storage place (withdrawn position).

[FIG. 13A] is a left-hand side view of the footrest section shown in FIG. 12.

[FIG. 13B] is a right-hand side view of the footrest section shown in FIG. 12.

[FIG. 14] is a perspective view of the footrest section moving toward the storage place (withdrawn position) with its guide pin received in the entrance of the guide channel.

[FIG. 15A] is a left-hand side view of the footrest section shown in FIG. 14.

[FIG. 15B] is a right-hand side view of the footrest section shown in FIG. 14.

[FIG. 16] is a perspective view of the footrest section which has been moved to the storage place (withdrawn position).

[FIG. 17A] is a left-hand side view of the footrest section shown in FIG. 16.

[FIG. 17B] is a right-hand side view of the footrest section shown in FIG. 16.

Description of Embodiments

[0013] An embodiment of a massaging apparatus 1 in

chair form pursuant to the present invention will now be described in detail with reference to drawings.

As shown in FIG. 1, the massaging apparatus 1 in chair form according to the embodiment comprises, in addition to an exterior covering body 2 shaped like a so-called bucket seat, a seat section 3, a backrest section 4, and a footrest section 5 that are each disposed within the exterior covering body 2. The seat section 3 is wide enough to support user's buttocks from below. The backrest section 4 is mounted at the rear of the seat section 3. The footrest section 5 is mounted at the front of the seat section 3.

[0014] The described seat section 3 is internally provided with a seat's built-in massaging mechanism, not shown, for massaging user's body in the buttocks-to-thigh range (massage target area, i.e. affected area). The backrest section 4 is also internally provided with a back-massaging mechanism, not shown, for massaging a target area in user's back in the shoulder-to-waist range resting on the backrest section 4. Each such massaging mechanism is free to move via a rail or the like to provide massage treatment to a plurality of massage target areas in the buttocks-to-thigh range, as well as in the shoulder-to-waist range, in a selective manner. Moreover, the footrest section 5 mounted at the front of the seat section 3 is

internally provided with a foot-massaging mechanism configured to receive user's legs and perform massage on the legs received therein.

[0015] The following describes the seat section 3, the backrest section 4, and the footrest section 5 constituting the massaging apparatus 1 in chair form according to the embodiment.

In the following description of the massaging apparatus 1 in chair form, referring to FIG. 1, a top-bottom direction corresponding to the direction of height of the backrest section 4 in upstanding condition is defined as a vertical direction, a right-left direction indicated by the arrow is defined as a horizontal direction (width direction), and a forward-backward direction indicated by the arrow is defined as a front-rear direction based on the view of a user sitting in the massaging apparatus 1 in chair form.

[0016] As shown in FIG. 1, the seat section 3 includes a seat support frame 6 in the form of a platform constructed of an assembly of rectangular bar members. Inside the seat support frame 6, there is provided the seat's built-in massaging mechanism mounted for movement in the front-rear direction to massage a target area in the buttocks of the user sitting in the seat section 3. This allows massage over a wide range extending from the

buttocks to the thigh of the user. Moreover, although not shown in the drawings, a cushion member for user seating is disposed on the described seat support frame 6. The seat support frame 6 is covered with a casing or a sheet to prevent an entry of external foreign matter, etc.

[0017] As shown in FIG. 1, the backrest section 4 mounted at the rear of the seat section 3 has the form of a flat plate having a certain thickness for comfortable resting of user's back. The backrest section 4 is internally provided with the vertically movable back-massaging mechanism for performing kneading massage, tapping massage, or grabbing massage on massage target areas. This allows massage over a wide range extending from the shoulder to the back, and from there to the waist of the user. Like the seat section 3, the backrest section 4 includes an internal back support frame 7 constructed of an assembly of rectangular bar members.

[0018] In the described massaging apparatus 1 in chair form, the backrest section 4 is provided at each side in the horizontal direction with an upper arm-massaging portion 8. The upper arm-massaging portion 8, which is configured to protrude forward from each end of the backrest section 4 in the horizontal direction, performs pressing massage on user's upper arm with an air bag. Moreover, the bucket seat-shaped exterior covering body 2

of the massaging apparatus 1 in chair form is provided with lower arm-massaging portions 9, each disposed on that part of the inner periphery of the exterior covering body 2 slightly above the seat section 3, for receiving therein user's right and left lower arms for arm massage treatment.

[0019] The footrest section 5 is capable of massaging a target area in user's leg with the built-in foot-massaging mechanism. When not in use for massage treatment to the target area in user's leg, the footrest section 5 can be set in a storage place below the seat section 3 (withdrawn position) without fail so as not to protrude outward. This allows the massaging apparatus 1 in chair form to be neat and elegant in appearance during storage of the footrest section, and thus affords a higher level of sophistication in design. On the other hand, when in use for massage treatment to the target area in user's leg, the footrest section 5 can be moved forward and upward from the withdrawn position to an upper advanced or projected position forward of the withdrawn position. The projected position is located forwardly and slightly upwardly of the withdrawn position. That is, the projected position is at a height ideally suited to providing massage treatment to a target area in the leg of the user sitting in the seat with his or her legs stretched out.

[0020] The footrest section 5 advanced to the

projected position can be returned to the withdrawn position. That is, the footrest section 5 is capable of moving back and forth between the withdrawn position and the projected position. The movement of the footrest section 5 from the withdrawn position to the projected position, as well as its movement from the projected position to the withdrawn position, is accomplished by a footrest advancing-retracting mechanism 10 which will hereafter be described.

[0021] The described footrest section 5 includes a leg-receiving portion 11 configured to receive user's leg therein. The leg-receiving portion 11 has the form of a recess opening into the exterior of the footrest section 5 (the front and upper sides of the exterior of the footrest section 5 with forward-facing posture) for insertion of user's leg. There are provided two leg-receiving portions 11 formed in the right-hand part and the left-hand part, respectively, of the footrest section 5.

[0022] Moreover, the footrest section 5 is internally provided with two massagers that serve as a foot-massaging mechanism, namely an upper foot massager 12 and a lower foot massager 13 situated below the upper foot massager 12. The upper foot massager 12 and the lower foot massager 13 each comprise paired massaging plates, horizontally arranged so as to hold user's leg in between, for massaging

the target area in user's leg received in the leg-receiving portion 11. The massaging plates can be horizontally rocked on an individual basis under a rotatably driving force produced by a motor, not shown, disposed in each of the upper foot massager 12 and the lower foot massager 13.

[0023] Moreover, each side face of the footrest section 5 in the horizontal direction is externally provided with: a rotation shaft 14 extending outward from the side face in the horizontal direction; a footrest support 15 for rotatably supporting the rotation shaft 14; and a rocking arm 16 for supporting the footrest support 15 for rocking motion about a horizontally directed axis relative to the upper front part of the seat support frame 6.

The described footrest supports 15 lie one on each side of the footrest section 5 in the horizontal direction. Each footrest support 15 has the form of an oval plate as seen in side view. In what follows, the left-hand footrest support 15L will be described with reference to FIG. 3A, and the right-hand footrest support 15R will be described with reference to FIG. 3B.

[0024] As shown in FIG. 3A, the left side of the footrest section 5 is provided with the left-hand footrest support 15L by which the footrest section 5 is rotatably supported at its left-hand part. In FIG. 3A, there is

shown the upward-facing footrest section 5 in the withdrawn position. With an upward-facing posture, the left-hand footrest support 15 in the form of a platy member has an oval form with longitudinal axis oriented in the vertical direction as compared with the horizontal direction as seen in side view. On the other hand, with forward-facing posture, the left-hand footrest support 15L has an oval form with longitudinal axis oriented in the front-rear direction as seen in side view. Moreover, the left-hand footrest support 15L is formed with substantially the same vertical dimension as the upward-facing footrest section 5.

[0025] The left-hand footrest support 15L is provided at its lower central part with a horizontally piercing insertion hole 17L. The insertion hole 17L receives the rotation shaft 14 of the footrest section 5 therethrough. Insertion of the rotation shaft 14 into the insertion hole 17L allows the footrest section 5 to rotate about a horizontally directed axis relative to the left-hand footrest support 15L.

[0026] Moreover, in the footrest section 5, a transmission wheel 18 is disposed on that part of the rotation shaft 14 near the mouth of the insertion hole 17L, in other words, that part of the rotation shaft 14 near the surface of the left-hand footrest support 15L. The transmission wheel 18, built as an annular member whose

diameter is greater than the shaft diameter of the rotation shaft 14, is mounted for unitary rotation with the rotation shaft 14. As will hereafter be described, a resilient force exerted by a resilient member 19 is inputted to the transmission wheel 18 in the direction of the normal to the transmission wheel 18. This imparts a moment (torque) to the rotation shaft 14 for rotation in a direction to tilt the footrest section 5 forward (in a counterclockwise direction as seen from the left).

[0027] The transmission wheel 18 is provided at its outer edge with a positioning projection 20 protruding in a direction away from the axis of the rotation shaft 14. Moreover, the left-hand footrest support 15L is provided at its surface (leftward-facing surface) with a footrest rotation-restraining portion 21 positioned so that it can abut on the positioning projection 20 of the transmission wheel 18 when the footrest section 5 is rotated into position for taking forward-facing posture. That is, upon rotating the footrest section 5 into position for taking forward-facing posture, the positioning projection 20 of the transmission wheel 18 abuts on the footrest rotation-restraining portion 21 of the left-hand footrest support 15L thereby restraining the footrest section 5 from rotating forward to an excessive degree.

[0028] The described resilient member 19 is capable of

imparting a force (resilient force) to the transmission wheel 18 in the direction of the normal to the transmission wheel 18. In this embodiment, the resilient member 19 is constructed of a pneumatic cylinder that exerts a force when restored to normal from its contracted position, and inputs the resulting restoring force to the transmission wheel 18 in the normal direction. The resilient member 19 (pneumatic cylinder) has its front end attached to the transmission wheel 18 of the left-hand footrest support 15L, and its base end secured to the upper central part of the left-hand footrest support 15L. Thus, the described moment is constantly applied to the rotation shaft 14 relative to the footrest support 15 (the footrest section 5).

[0029] Other force-applying means than the pneumatic cylinder may be used for the resilient member 19 of the present invention. For example, use can be made of a coil spring or an electric actuator.

Moreover, as seen from FIG. 3A showing the upward-facing footrest section, the left-hand footrest support 15L is provided at its upper central part with the rocking arm 16 for supporting the footrest support 15 for rocking motion about a horizontally directed axis relative to the upper front part of the seat support frame 6. More specifically, the rocking arm 16 has the form of a band

plate bent backward at a point intermediate its ends in the vertical direction. The rocking arm 16 has an approximately ninety degree bend, and thus has a substantially L-shaped form.

[0030] One end of the rocking arm 16 is coupled for rocking motion about a horizontally directed axis relatively to the upper front part of the seat support frame 6. Moreover, the other end of the rocking arm 16 is secured to the upper central part of the left-hand footrest support 15L. That is, the left-hand footrest support 15L and the footrest section 5 are rockably coupled relatively to the upper front part of the seat support frame 6 via the described rocking arm 16. This allows the footrest section 5 set in the withdrawn position below the seat section 3 to rock forward and upward into flipped-up position.

[0031] The right-hand footrest support 15R is structurally similar to the described left-hand footrest support 15L. That is, the right-hand footrest support 15R and the left-hand footrest support 15L are identical in the appearance and shape of the footrest support 15, in the manner in which the footrest support 15 supports the footrest section 5, and in the rockable coupling of the footrest support 15 relatively to the seat support frame 6 via the rocking arm 16. The right-hand footrest support 15R differs from the left-hand footrest support 15L in its

having posture-retaining means 22 which will hereafter be described.

[0032] As shown in FIG. 3B, the posture-retaining means 22 is disposed on the outer side face of the right-hand footrest support 15R for retaining the posture of the footrest section 5 by restraining the footrest section 5 from rotating relative to the footrest support 15R. More specifically, the posture-retaining means 22 comprises: a member for engagement 23, being called merely "engaged member 23", formed integral with the rotation shaft 14 of the footrest section 5; an engaging member 24 which engages the engaged member 23; and a lever member 25 for engaging and disengaging the engaging member 24 and the engaged member 23 (for selection between engagement and disengagement of the engaging member 24).

[0033] The described engaged member 23 is shaped as an annular member mounted in coaxial relation to the rotation shaft 14. The engaged member 23 is secured to that part of the rotation shaft 14 near the mouth of an insertion hole 17R of the right-hand footrest support 15R for unitary rotation with the rotation shaft 14. The engaged member 23 is provided at its outer edge with two circumferentially spaced-apart positioning recesses 26 for positioning purposes.

The engaging member 24 includes an engagement piece

27 located centrally of the right-hand footrest support 15. The engagement piece 27 is engaged in the described positioning recess 26 of the engaged member 23. More specifically, the engaging member 24 comprises: the engagement piece 27 engageable in the positioning recess 26 in the vertical direction; a coupling rod 28 for moving the engagement piece 27 in the vertical direction; and a guide portion 29 for guiding the coupling rod 28 in vertical movement.

[0034] That is, the engagement piece 27, which is a small piece attached to the lower end of the coupling rod 28, restrains rotation of the engaged member 23 when brought into engagement with the positioning recess 26. The coupling rod 28 is a vertically elongated rodlike member bent in cranked form at a point intermediate its ends in the vertical direction. The guide portion 29, built as a tubular member configured to receive the coupling rod 28 therethrough, is attached to the right-hand footrest support 15R for insertion of the coupling rod 28 in the vertical direction.

[0035] The lever member 25, comprising a lever 41 which is switchable between upper and lower vertical positions, is secured to the upper central part of the right-hand footrest support 15R. The lever 41 of the lever member 25 is coupled to the upper end of the coupling rod

28. On switching the lever 41 to its upper position, the engagement piece 27 moves upward via the coupling rod 28 so as to be lifted out of engagement with the positioning recess 26. On the other hand, on switching the lever 41 to its lower position, the engagement piece 27 moves downward via the coupling rod 28 so as to be engaged in the positioning recess 26. That is, the lever member 25 controls the engagement and disengagement of the engagement piece 27 with respect to the positioning recess 26. This allows selection between the mode of permitting rotation of the footrest section 5 relative to the footrest support 15 and the mode of restraining rotation of the footrest section 5 relative to the footrest support 15.

[0036] That is, one of the two positioning recesses 26, namely the positioning recess 26a, is formed at a location of the outer periphery of the engaged member 23 where the recess 26a fits the engagement piece 27 when the footrest section 5 takes upward-facing posture. Moreover, the other positioning recess 26b is formed at a location of the outer periphery of the engaged member 23 where the recess 26b fits the engagement piece 27 when the footrest section 5 takes forward-facing posture. Thus, the described posture-retaining means 22 enables the footrest section 5 to retain its upward-facing posture where the leg-receiving portion 11 faces upward, as well as to retain

its forward-facing posture where the leg-receiving portion 11 faces forward.

[0037] The massaging apparatus 1 in chair form pursuant to the present invention is characterized by having the described footrest advancing-retracting mechanism 10 for moving the footrest section 5 back and forth between the withdrawn position and the projected position.

At the withdrawn position, the footrest section 5 has upward-facing posture where the leg-receiving portion 11 faces upward. On the other hand, at the projected position, the footrest section 5 has forward-facing posture where the leg-receiving portion 11 faces forward. That is, the footrest advancing-retracting mechanism 10 serves not only to move the footrest section 5 back and forth between the withdrawn position and the projected position but also to enable the footrest section 5 to change its posture between upward-facing posture and forward-facing posture. This permits both of positional change and postural change.

[0038] The footrest advancing-retracting mechanism 10 performs two-step process to accomplish positional and postural changes of the footrest section 5. More specifically, the footrest section 5 is subjected to two different stages of operation, namely the first stage and the second stage, during its movement from the withdrawn

position to the projected position. At the first stage of operation, the upward-facing footrest section 5 gradually stands up in response to the forward rocking motion of the footrest support 15. At the second stage subsequent to the first stage of operation, the footrest section 5 is moved to the projected position while being driven to face forward. In other words, the first stage is intended to change both the position and the posture of the footrest section 5, and the second stage is intended to change the position of the footrest section 5.

[0039] As a reason for moving the footrest section 5 from the withdrawn position to the projected position through such a two-step process, if the upward-facing footrest section 5 is driven to change its posture when it is still in the withdrawn position, for example, the footrest section 5 may cause interference with the seat support frame 6 and consequently fail to change its posture properly.

In this regard, the footrest advancing-retracting mechanism 10 of the present invention drives the footrest section 5 set in the storage place to move forward for a positional change from the withdrawn position to the projected position while gradually changing its posture from upward-facing posture to forward-facing posture at the first stage of operation. This allows the footrest section

5 to change its posture with little interference with the seat support frame 6. On completion of the change of the posture of the footrest section 5 to forward-facing posture, the footrest advancing-retracting mechanism 10 of the present invention drives the footrest section 5 to move to the projected position while keeping its forward-facing posture at the second stage of operation. Such a construction eliminates the need to leave extra space between the footrest section 5 and the seat support frame 6, effects smooth changing of the posture of the footrest section 5, and permits downsizing of the seat support frame 6 in conformance with the size of the footrest section 5. This allows the implementation of the space-saving and user-friendly massaging apparatus 1 in chair form which fits in confined areas.

[0040] The described footrest advancing-retracting mechanism 10 comprises: a shaft 30 extending in the front-rear direction, the forward end of which is pivotally supported on the rocking arm 16 (the lower end of the rocking arm 16); an actuator 31 for pushing and pulling the rear end of the shaft 30 in the front-rear direction; and posture-changing means 32 for allowing the footrest section 5 to change its posture from upward-facing posture to forward-facing posture when the footrest section 5 is subjected to the first stage of operation. The footrest

advancing-retracting mechanism 10 operates in a manner such that, when the footrest section 5 undergoes a shift from the first stage of operation to the second stage of operation, the changing of the posture of the footrest section 5 by the posture-changing means 32 is complete, and, the now forward-facing footrest section 5 moves toward the projected position while keeping its forward-facing posture at the second stage of operation.

[0041] The following details the footrest advancing-retracting mechanism 10 embodying a striking feature of the present invention.

The described actuator 31, which is a member disposed on the lower rear part of the seat support frame 6, produces a driving force for advancing and retracting movement of the footrest section 5. In this embodiment, the actuator 31 is built as an electric actuator 31 composed of a drive shaft 31a extending forward at a slight upward incline and a slider 33 free to slide along the drive shaft 31a. The slider 33 slidable in the front-rear direction has coupled to it the rear end of the shaft 30 for rocking motion about a horizontally directed axis as will hereafter be described.

[0042] The shaft 30, comprising an elongated rodlike member extending at an upward incline from the lower rear to the upper front of the apparatus, provides connection

between the described actuator 31 and the rocking arm 16. More specifically, the rear end of the shaft 30 is coupled to the slider 33 of the actuator 31 for rocking motion about a horizontally directed axis. Moreover, the forward end of the shaft 30 is coupled to an intermediate point on the rocking arm 16 in the vertical direction for rocking motion about a horizontally directed axis.

[0043] Between the slider 33 of the actuator 31 and the seat support frame 6 (the lower central part of the seat support frame 6), there is disposed a short frame 34 having a length which is about one-quarter to one-third the length of the described shaft 30. The short frame 34 is coupled to both of the slider 33 and the seat support frame 6 for rocking motion about a horizontally directed axis. That is, the short frame 34 provides connection between the two members, namely the slider 33 and the seat support frame 6. As the described slider 33 is moved forward along the drive shaft 31a of the actuator 31, due to the short frame 34 defining the spaced interval between the slider 33 and the seat support frame 6, the degree of inclination of the drive shaft 31a is increased to such an extent that its forward end is lifted above the level of its rear end. In consequence, the slider 33 of the actuator 31 moves forward and upward thereby causing the rear end of the actuator 31 to move forward and upward. That is, the described three

members, namely the shaft 30, the short frame 34, and the rocking arm 16 constitute a so-called parallel linkage mechanism. This allows the footrest support 15 mounted at the front end of the rocking arm 16 to rock forward and upward into flipped-up position in response to the movement of the slider 33 in the front-rear direction.

[0044] On actuation of the actuator 31 in the described manner the rocking arm 16 is rocked forward into flipped-up position thereby causing the footrest support 15 mounted at the other end of the rocking arm 16 to rock forward and upward about the upper front part of the seat support frame 6.

Thus, at the first stage of operation, the footrest section 5 undergoes a significant postural change, i.e. a change from upward-facing posture to forward-facing posture, relative to the forwardly and upwardly rocking footrest support 15. The significant change in the posture of the footrest section 5 can be accomplished by virtue of the posture-changing means 32 for changing the posture of the footrest section 5 at the first stage of operation.

[0045] The following describes the first and second stages of operation by the footrest advancing-retracting mechanism 10, and the posture-changing means 32 that serves to effect the operation.

The posture-changing means 32 drives the footrest

section 5 to change its posture from upward-facing posture to forward-facing posture during execution of the first stage of operation by the footrest advancing-retracting mechanism 10. More specifically, the posture-changing means 32 comprises a guide channel 35 located toward the seat section 3, and a guide pin 36 extending horizontally outwardly from the footrest section 5. The guide pin 36 is allowed to move along the guide channel 35 with its protruding end engaged in the guide channel 35. That is, the posture-changing means 32 enables the footrest section 5 to change its posture by effecting engagement of the guide pin 36 in the guide channel 35 at the first stage of operation.

[0046] The described guide channel 35, which fits the guide pin 36 of the footrest section 5, is formed in a guide plate 37 attached to the seat support frame 6. More specifically, the guide plate 37 is disposed at an intermediate part of the seat support frame 6 in the front-rear direction, as well as in the vertical direction. The guide plate 37 is provided at each outer side in the direction of seat width (horizontal direction) with a stiffening rib for strength to carry a load applied from the footrest section 5. In the drawing having a number with the letter "B" added as a suffix, there is shown the guide plate 37 with its stiffening rib omitted to

facilitate the understanding of the positional relationship between the guide pin 36 and the guide channel 35.

[0047] The guide channel 35 for guiding the guide pin 36 of the footrest section 5 is formed in the inner side face of the described guide plate 37 facing inward in the direction of seat width (horizontal direction). To be more precise, the guide channel 35 is formed in each of the right-hand inner side face of the left-hand guide plate 37 and the left-hand inner side face of the right-hand guide plate 37.

The described guide channel 35 is formed so as to extend at an upward incline from the lower rear to the upper front of the guide plate 37. With the upwardly inclined guide channel 35 extending forward, the guide pin 36 moves from a lower position to an upper position while traveling forward along the guide channel 35 thereby causing the footrest section 5 in lying posture (withdrawn posture) to upstand and take upright posture (forward-facing posture).

[0048] The guide channel 35 is wider at the rear end than at the forward end. In the guide channel 35, the rear-end part of larger channel width includes an upwardly recessed area for temporary retention of the guide pin 36, whereas the forward-end part is barely wide enough to permit smooth passage of the guide pin 36 in a direction

substantially parallel to the shaft 30 in the footrest section 5 in the withdrawn position. Moreover, the guide channel 35 is provided at its forward-end part with a downwardly opening admission slot 38 for admitting the guide pin 36 into the channel. The admission slot 38 has an opening of a width about 4 to 5 times the outside diameter of the guide pin 36. This facilitates admission of the guide pin 36 into the channel. In the admission slot 38, there is disposed a nonreturn member 39 to prevent the guide pin 36 from falling out of the channel through the admission slot 38.

[0049] The nonreturn member 39 has the form of a plate shaped in an inverted delta as seen in side view. The upper side of the nonreturn member 39 is dimensioned to close the described admission slot 38. Moreover, the nonreturn member 39 is provided at its lower end (corresponding to the downward-pointing vertex of the inverted delta defining the shape of the nonreturn member) with a rotation shaft 40 for nonreturn member, being called merely "nonreturn-member rotation shaft 40", having a horizontally directed axis. This allows the upper end of the nonreturn member 39 to rock about the axis of the nonreturn-member rotation shaft 40. The described nonreturn member 39, while constituting no obstruction to smooth passage of the guide pin 36 into the channel from

the admission slot 38, inhibits the guide pin 36 from readily falling out of the channel from the admission slot 38. This makes it possible to restrain the guide pin 36 from falling out of the channel from the admission slot 38 (from returning opposite to the direction of advancing movement of the footrest section 5).

[0050] For the case of the footrest section 5 having forward-facing posture (as shown in FIGs. 8, 9A, and 9B), the described guide pin 36 is situated at the upper rear part of the footrest section 5. The guide pin 36 has the form of a projection extending outward in the direction of width of the seat section 3 (extending horizontally outwardly) from the side face of the footrest section 5, the protruding end of which is dimensioned to fit within the guide channel 35. That is, the guide pin 36 is allowed to move along the guide channel 35 with its protruding end engaged in the guide channel 35.

[0051] With the described posture-changing means 32 composed of the guide channel 35 and the guide pin 36, when the guide pin 36 lies within the guide channel 35, in other words, during the advancing movement of the footrest section 5 at the first stage of operation, the guide pin 36 moves upward in the guide channel 35-laying direction thereby causing the footrest section 5 to change its posture from upward-facing posture to forward-facing

posture. After the guide pin 36 moves out of the guide channel 35, at the second stage of operation, the footrest section 5 moves toward the projected position while keeping its forward-facing posture. That is, the described posture-changing means 32 makes it possible to complete the changing of the posture of the footrest section 5 from upward-facing posture to forward-facing posture in the middle of moving the footrest section 5 from the withdrawn position to the projected position.

[0052] The following describes how the described first and second stages of operation is to be effected in more detail.

The described first stage of operation is the particular stage at which the guide pin 36 is moved in engagement with the guide channel 35 of the guide plate 37 in the channel-laying direction, that is; the posture-changing means 32 changes the posture of the footrest section 5 from upward-facing posture to forward-facing posture during the movement of the footrest section 5.

[0053] The described first stage of operation proceeds as follows with sequential reference to FIGs. 2 through 7B. As shown in FIGs. 2, 3A, and 3B, at the beginning of the first stage of operation, the guide pin 36 of the footrest section 5 is situated toward the rear end of the guide channel 35 of the guide plate 37 while being received in

the described pocket area. At this time, the guide pin 36 is located slightly above the floor, and the footrest section 5 has lying posture with its side bearing the guide pin 36 lowered. As used herein the lying posture exactly corresponds to the upward-facing posture of the footrest section 5 where the leg-receiving portion 11 faces upward.

[0054] As shown in FIGs. 4, 5A, and 5B, on actuation of the actuator 31 the shaft 30 coupled to the slider 33 is forced to move forward thereby causing the rocking arm 16 coupled to the forward end of the shaft 30 to rock forward. To be more precise, as the rocking shaft 30 is rocked forward about the upper front part of the seat support frame 6, the footrest support 15 secured to the lower end of the rocking shaft 30 is rocked forward into flipped-up position. In sync with the forward movement of the footrest support 15, the footrest section 5 moves forward thereby causing the guide pin 36 of the footrest section 5 to move forward along the guide channel 35 and then reach an intermediate point on the guide channel 35 in the front-rear direction. At this time, the guide pin 36 rises to a level above the position where it is located slightly above the floor as described above, and the footrest section 5 in the withdrawn position lifts itself correspondingly.

[0055] As shown in FIGs. 6, 7A, and 7B, on further actuation of the actuator 31 the shaft 30 coupled to the

slider 33 is forced to move further forward thereby causing the rocking arm 16 coupled to the forward end of the shaft 30 to rock further forward. In response to the resulting forward movement of the footrest support 15, the footrest section 5 moves further forward thereby causing the guide pin 36 of the footrest section 5 to move to the channel exit of the guide channel 35.

[0056] Thus, the guide pin 36 has been moved to an uppermost position farthest away from the floor, and, the footrest section 5 has been driven to upstand and take upright posture (forward-facing posture). Upon rotating the footrest section 5 into position for taking forward-facing posture, the positioning projection 20 of the transmission wheel 18 abuts on the footrest rotation-restraining portion 21 of the left-hand footrest support 15L thereby restraining the footrest section 5 against further unnecessary forward rotation.

[0057] Even with a slight adjustment of the actuator 31 into extended position, the guide pin 36 moves out of the guide channel 35 thereby permitting rotation of the footrest section 5 about the rotation shaft 14. At this time, the resilient force of the resilient member 19 is exerted on the rotation shaft 14 of the footrest section 5 via the transmission wheel 18 in the normal direction. Thus, the footrest section 5 rotates about the rotation

shaft 14 under the urge of the resilient member 19, and consequently changes its posture completely from upward-facing posture where the leg-receiving portion 11 faces upward to forward-facing posture where the leg-receiving portion 11 faces forward.

[0058] Moreover, at this second stage of operation, the resilient force of the resilient member 19 is constantly applied to the transmission wheel 18. This allows the footrest section 5 to move while keeping its forward-facing posture.

On completion of the changing of the posture of the footrest section 5 to forward-facing posture, in other words, immediately after a shift from the first stage of operation to the second stage of operation, the footrest section 5 is in such a condition as shown in FIGs. 8, 9A, and 9B.

As shown in FIGs. 8, 9A, and 9B, at the second stage of operation by the footrest advancing-retracting mechanism 10, on completion of the changing of the posture of the footrest section 5 by the posture-retaining means 22, the rocking arm 16 rocks forward thereby causing the forward-facing footrest section 5 to move upward and forward, while keeping its forward-facing posture, to a position at a height about on a level with the seat of the seat section 3.

[0059] As shown in FIGs. 10, 11A, and 11B, after advancing forwardly and upwardly to the position at a height about on a level with the seat of the seat section 3, the footrest section 5 is locked in the projected position by pushing downward on the lever 41 of the posture-retaining means 22. In this condition, the leg-receiving portions 11 face forward for receiving user's legs, and the user is thus able to have massage treatment while sitting in the seat section 3 with his or her legs stretched out forward.

[0060] The footrest advancing-retracting mechanism 10 operates to move the footrest section 5 from the withdrawn position to the projected position in the manner thus far described.

On the other hand, as shown in FIGs. 12, 13A, and 13B, when desired to move (retract) the footrest section 5 in the projected position to the withdrawn position, the first step is to push upward on the lever 41 of the posture-retaining means 22 to release the footrest section 5 locked in place by the posture-retaining means 22. In this condition, the urge of the resilient member 19 is acting on the transmission wheel 18 in the normal direction, and the footrest section 5 is thus subjected to the resulting resilient force tending to rotate the footrest section 5 into position for taking forward-facing

posture.

[0061] The user then operates the footrest section 5 manually by himself or herself in a manner such that the footrest section 5 rotates into position for taking upward-facing posture against the urgency. When the footrest section 5 attains upward-facing posture, the user pushes downward on the lever 41 of the posture-retaining means 22 to lock the upward-facing footrest section 5 in position. On completion of the attainment of upward-facing posture, the footrest section 5 is in such a condition as shown in FIGs. 12, 13A, and 13B.

[0062] As shown in FIGs. 14, 15A, and 15B, after the footrest section 5 attains upward-facing posture as described above, the actuator 31 is adjusted into contracted position in the direction of retraction to rock the rocking arm 16 backward. This allows the footrest support 15 and the footrest section 5 to move backward, and eventually the guide pin 36 of the footrest section 5 is situated in the admission slot 38 of the guide plate 37.

[0063] Moreover, as shown in FIGs. 16, 17A, and 17B, with additional adjustment of the actuator 31 into further contracted position in the direction of retraction, the rocking arm 16 rocks backward thereby causing the footrest support 15 and the footrest section 5 to move backward. In consequence, the guide pin 36 of the footrest section 5 is

admitted into the guide channel 35 through the admission slot 38 of the guide plate 37. Note that the nonreturn member 39 disposed in the admission slot 38 has its upper end made rockable about the axis of the nonreturn-member rotation shaft 40. Thus, at this time, the guide pin 36 finds its way into the guide channel 35 while rocking so as to push the nonreturn member 39 back. In this way, the footrest section 5 is moved from the projected position to the withdrawn position by the footrest advancing-retracting mechanism 10.

[0064] The footrest advancing-retracting mechanism 10 operates to move the footrest section 5 from the projected position to the withdrawn position in the manner thus far described (retracting operation).

The described footrest advancing-retracting mechanism 10 allows the footrest section 5 to stay in the storage place while keeping its upward-facing posture where the leg-receiving portion 11 faces upward, and thus ensures storage of the footrest section 5 in a space below the seat section 3 to keep out of the way of user's action to sit in and leave the seat.

[0065] Moreover, in moving the footrest section 5 from the withdrawn position to the projected position, the posture of the footrest section 5 is automatically switched from upward-facing posture to forward-facing posture. This

saves the user from having to do posture-changing operation as a preparation to have leg massage.

Thus, the massaging apparatus 1 in chair form benefits from the effects such as space-saving design and user-friendly comfort achieved by the footrest advancing-retracting mechanism 10 incorporated therein.

[0066] It should be understood that the embodiments as disclosed herein are each considered in all respects as illustrative only and not restrictive. In particular, for such matters as not explicitly specified in the disclosure of the embodiment, for example, for working and operating conditions, various parameters, and the dimensions, weights, and volumes of structural components, use has been made of credible values that do not depart from practical ranges adopted in the light of the common knowledge of those skilled in the art.

Reference Signs List

[0067]

- | | |
|---|-----------------------------------|
| 1 | Massaging apparatus in chair form |
| 2 | Exterior covering body |
| 3 | Seat section |
| 4 | backrest section |
| 5 | Footrest section |
| 6 | Seat support frame |
| 7 | Back support frame |

- 8 Upper arm-massaging portion
- 9 Lower arm-massaging portion
- 10 Footrest advancing-retracting mechanism
- 11 Leg-receiving portion
- 12 Upper foot massager
- 13 Lower foot massager
- 14 Rotation shaft
- 15 Footrest support
- 15L Left-hand footrest support
- 15R Right-hand footrest support
- 16 Rocking arm
- 17L Insertion hole of Left-hand footrest support
- 17R Insertion hole of Right-hand footrest support
- 18 Transmission wheel
- 19 Resilient member
- 20 Positioning projection
- 21 Footrest rotation-restraining portion
- 22 Posture-retaining means
- 23 Engaged member
- 24 Engaging member
- 25 Lever member
- 26 Positioning recess
- 26a Positioning recess for upward-facing posture
- 26b Positioning recess for forward-facing posture
- 27 Engagement piece

28	Coupling rod
29	Guide portion
30	Shaft
31	Actuator
31a	Drive shaft of Actuator
32	Posture-changing means
33	Slider
34	Short frame
35	Guide channel
36	Guide pin
37	Guide plate
38	Admission slot
39	Nonreturn member
40	Nonreturn-member rotation shaft
41	Lever

CLAIMS

1. A massaging apparatus in chair form, comprising:
 - a seat section for user seating;
 - a backrest section, mounted at a rear of the seat section, for supporting user's back; and
 - a footrest section which may be stored in a place below the seat section, and has a leg-receiving portion provided for massage treatment to user's leg,

the seat section including a footrest advancing-retracting mechanism for moving the footrest section back and forth between a withdrawn position corresponding to the place below the seat section and a projected position forward of the withdrawn position,

the footrest advancing-retracting mechanism being designed to, when desired to move the footrest section to the projected position, move the footrest section forward to the projected position while performing a first stage of operation to allow the footrest section to change its posture to forward-facing posture where the leg-receiving portion faces forward and a second stage of operation to lift the footrest section and drives the footrest section to move to the projected position while keeping its forward-facing posture.

2. The massaging apparatus in chair form according to claim 1,

wherein the footrest section is provided at each side in a horizontal direction with a footrest support for supporting the footrest section for rotation about a horizontally directed axis, and a rocking arm for supporting the footrest support for rocking motion about a horizontally directed axis relative to a front part of the seat section,

wherein the footrest advancing-retracting mechanism includes posture-changing means for enabling the footrest section to change its posture from upward-facing posture to forward-facing posture when the footrest section is subjected to the first stage of operation,

and wherein the footrest advancing-retracting mechanism operates in a manner such that, when the footrest section undergoes a shift from the first stage of operation to the second stage of operation, changing of the posture of the footrest section by the posture-changing means is complete.

3. The massaging apparatus in chair form according to claim 2,

wherein the posture-changing means comprises an inclined guide channel located toward the seat section, and

a guide pin which extends from the footrest section and moves along the guide channel with its protruding end engaged in the guide channel,

and wherein the posture-changing means allows the footrest section to change its posture from upward-facing posture to forward-facing posture in response to a movement of the guide pin in engagement with the inclined guide channel at the first stage of operation.

4. The massaging apparatus in chair form according to claim 3,

wherein the footrest support is provided with a resilient member for exerting a resilient force tending to rotate the footrest section into position to allow the leg-receiving portion to face forward about a rotation shaft of the footrest section,

and wherein the footrest section is rotated into position to allow the leg-receiving portion of the footrest section to face forward under a rotatably driving force exerted by the resilient member at the second stage of operation.

5. The massaging apparatus in chair form according to claim 4,

wherein the footrest advancing-retracting mechanism

is designed to, when desired to move the footrest section in the projected position back to the withdrawn position, rotate the footrest section into position to allow the leg-receiving portion of the footrest section to face upward and rearward against a resilient force exerted by the resilient member, and thereafter move the footrest section toward the withdrawn position.

6. The massaging apparatus in chair form according to any one of claims 2 to 5, further comprising:

posture-retaining means for enabling the footrest section to retain upward-facing posture where the leg-receiving portion of the footrest section faces upward, as well as to retain forward-facing posture where the leg-receiving portion faces forward, by restraining rotation of the footrest section relative to the footrest support.