

MASSAGING DEVICE**TECHNICAL FIELD**

[0001] Various embodiments relate generally to a massaging device.

5

BACKGROUND

[0002] With the current hectic lifestyle, most people spent longer hours at work. Thus, most people may suffer from body aches regardless whether their jobs are menial or desk-bound. Massaging devices provide a means for the people to relieve the body
10 aches and to energize fatigued body parts. Massaging actions performed by the massaging devices also help to improve blood and lymphatic circulation.

[0003] Some examples of the existing massaging devices are full body massaging devices, hand massaging devices, and foot massaging devices. The existing massaging devices generally have a pair of massaging arrangements for massaging a particular body
15 part. Each massaging arrangement typically includes rollers (as described for example in US Publication No. US 2005/0159688 A1), massage nodes (as described for example in US Patent No. US 6,733,466 B2), vibration elements (as described for example in US Patent No. US 3,220,405) and/or airbags to achieve massaging effects (as described for example in US Patent No. US 5,762,618).

20 [0004] Even though users in general are satisfied with the massaging effects of the existing massaging devices, there still remains a need to further improve the effectiveness of massages provided by the existing massaging devices.

SUMMARY

[0005] According to a first embodiment of the present invention, a massaging device is provided. The massaging device includes a first massaging arrangement and a second massaging arrangement, the first massaging arrangement and the second massaging arrangement being adapted to jointly massage the same body part; driving means connected to the first massaging arrangement and the second massaging arrangement, the driving means being configured to move the first massaging arrangement and the second massaging arrangement in essentially opposite directions with respect to each other. The first massaging arrangement and the second massaging arrangement being movable in essentially opposite directions with respect to each other can provide massaging actions in opposite directions to a body part. The inventors have found that the massaging actions in opposite directions can enhance blood circulation flow of the body part to be massaged, thus achieving a much more relaxing and a better massaging effect for the users.

[0006] According to a second embodiment of the present invention, a massaging device is provided. The massaging device includes a first massaging arrangement consisting of at least one airbag and a second massaging arrangement consisting of at least one airbag, the first massaging arrangement and the second massaging arrangement being adapted to jointly massage the same body part; a controller connected to the first massaging arrangement and the second massaging arrangement, the controller being configured to inflate the first massaging arrangement and the second massaging arrangement in such a manner that arterial blood circulation is enhanced by one of the first massaging arrangement and the second massaging arrangement and venial blood

circulation is enhanced by the other of the first massaging arrangement and the second massaging arrangement.

[0007] In the first embodiment of the massaging device, the first massaging arrangement and the second massaging arrangement can be moveable along a same plane in alignment with a portion of a body part to be massaged. The first massaging arrangement and the second massaging arrangement moveable along a same plane in alignment with a portion of a body part to be massaged can allow massages to be performed on a substantially planar surface area of the body part. The body part to be massaged can include the back, the abdomen, the waist and the neck, for example.

[0008] In the second embodiment of the massaging device, the airbags of the first massaging arrangement and the airbags of the second massaging arrangement can be arranged along a same plane in alignment with a portion of a body part to be massaged. The body part to be massaged can include the back, the abdomen, the waist and the neck, for example.

[0009] In an alternative embodiment of the first massaging device and the second massaging device, the first massaging arrangement and the second massaging arrangement are opposed to each other such that the first massaging arrangement and the second massaging arrangement engage a body part to be massaged. The first massaging arrangement and the second massaging arrangement being opposed to each other can allow massages to be performed on two opposite sides of the body part. Therefore, the first massaging arrangement and the second massaging arrangement are adapted to engage an extremity of the body. The extremity of the body can include a foot, a calf, a hand, an upper arm, a lower arm and thighs, for example.

[0010] In one embodiment of the first massaging device, the number of sets of a first kind of massage element of the first massaging arrangement and the number of sets of a second kind of massage element of the second massaging arrangement can be either the same or different. For example, the first massaging arrangement can have at least two sets
5 of a first kind of massage element and the second massaging arrangement can have at least one set of a second kind of massage element.

[0011] In one embodiment of the first massaging device, the first kind of massage element and the second kind of massage element can be either the same or different. Any kind of suitable massage elements can be used as the first kind of massage element and
10 the second kind of massage element. Some examples of the massage elements include a roller (as described for example in US Publication No. US 2005/0159688 A1), massage nodes (as described for example in US Patent No. US 6,733,466 B2), a vibration element (as described for example in US Patent No. US 3,220,405) and an airbag (as described for example in US Patent No. US 5,762,618).

[0012] In one embodiment of the first massaging device, any orientations of the various sets of the first kind of massage element of the first massaging arrangement and the various sets of the second kind of massage element of the second massaging arrangement are possible. For example, the at least one set of the second kind of massage element of the second massaging arrangement can be disposed between the at least two
20 sets of the first kind of massage element of the first massaging arrangement.

[0013] Any kind of driving means can be used to move the first massaging arrangement and the second massaging arrangement. For example, the driving means can include a gear mechanism attached to each of the first massaging arrangement and the

second massaging arrangement. Alternatively, the driving means can include a gear mechanism attached to both the first massaging arrangement and the second massaging arrangement.

[0014] The driving means can further include at least one motor connected to the gear mechanism. Any kind of suitable arrangements of the motor(s) and the gear mechanism can be used for the driving means. For example, more than one motor may be connected to the gear mechanism. Alternatively, a single motor may be connected to the gear mechanism.

[0015] In one embodiment of the first massaging device, the gear mechanism includes a first rack member attached to the at least one set of the second kind of massage element of the second massaging arrangement, and a lead screw rotatably connected to the motor and the first rack member.

[0016] In one embodiment of the first massaging device, the gear mechanism further includes a second rack member attached to at least one set of the first kind of massage element of the first massaging arrangement, and a further second rack member attached to at least one further set of the first kind of massage element of the first massaging arrangement.

[0017] In one embodiment of the first massaging device, the first rack member is disposed between the second rack member and the further second rack member.

[0018] In one embodiment of the first massaging device, the gear mechanism further includes a pinion member disposed between and engaged with the first rack member and the second rack member, and a further pinion member disposed between and engaged with the first rack member and the further second rack member.

[0019] In one embodiment of the first massaging device, each rack member and each pinion member include a plurality of teeth and a plurality of grooves, and wherein each pinion member is engaged with the respective rack members such that the plurality of teeth of each pinion member are received in the plurality of corresponding grooves of the respective rack members.

[0020] In one embodiment of the first massaging device, the motor is configured to drive the lead screw of the gear mechanism such that the lead screw rotates in a clockwise direction and a counter clockwise direction alternately.

[0021] In one embodiment of the first massaging device, a rotation of the lead screw in the clockwise direction causes a linear movement of the first rack member in a first direction.

[0022] In one embodiment of the first massaging device, the linear movement of the first rack member in the first direction causes a rotation of the pinion member and the further pinion member in opposite rotational directions, resulting in a linear movement of the second rack member and the further second rack member in a second direction opposite to the first direction of the linear movement of the first rack member.

[0023] In one embodiment of the first massaging device, a rotation of the lead screw in the counter clockwise direction causes a linear movement of the first rack member in the second direction and a linear movement of the second rack member and the further second rack member in the first direction.

[0024] In one embodiment of the first massaging device, a frame to which the motor is secured and to which the pinion member and the further pinion member are rotatably mounted.

[0025] In one embodiment of the first massaging device, the frame includes slots for receiving a portion of the respective rack members and for allowing the linear movement of the respective rack members.

[0026] In one embodiment of the first massaging device, the frame further includes a
5 guide rail for each rack member along which the rack member is movable linearly.

[0027] In one embodiment of the first massaging device, the guide rail is received in a through-hole of the respective rack members.

[0028] In one embodiment of the first massaging device, the massaging device further includes mechanical means positioned to move at least one of the respective sets
10 of the first kind of massage element or the second kind of massage element towards respective portions of a body part to be massaged.

[0029] In one embodiment of the first massaging device, the mechanical means include inflatable airbags and/or cam motion means.

[0030] In one embodiment of the second massaging device, each of the first
15 massaging arrangement and the second massaging arrangement consists of at least two airbags arranged in a stack.

[0031] In one embodiment of the second massaging device, the controller includes actuation means for inflating and deflating the airbags of the first massaging arrangement and the second massaging arrangement.

20

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] In the drawings, like reference characters generally refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis

instead generally being placed upon illustrating the principles of the invention. In the following description, various embodiments of the invention are described with reference to the following drawings, in which:

[0033] Figure 1 shows a schematic block diagram of a massaging device according to one embodiment of the present invention.

[0034] Figures 2a to 2c show schematic block diagrams of exemplary arrangements of driving means usable in a massaging device according to one embodiment of the present invention.

[0035] Figures 3a to 3c show schematic block diagrams of exemplary arrangements of a first massaging arrangement and a second massaging arrangement usable in a massaging device according to one embodiment of the present invention.

[0036] Figures 4a and 4b show schematic three-dimensional views of a massaging device according to one embodiment of the present invention.

[0037] Figure 5 shows a schematic three-dimensional view of a first massaging arrangement and a second massaging arrangement usable in a massaging device according to one embodiment of the present invention.

[0038] Figure 6 shows a schematic three-dimensional view of driving means usable in a massaging device according to one embodiment of the present invention.

[0039] Figure 7 shows a schematic top view of a massaging device according to one embodiment of the present invention.

[0040] Figures 8a and 8b shows top views of positions of massage elements of a first massaging arrangement and a second massaging arrangement usable in a massaging device according to one embodiment of the present invention.

[0041] Figure 9 shows a schematic three-dimensional view of a portion of a second rack element having a support structure usable in a massaging device according to one embodiment of the present invention.

[0042] Figures 10a and 10b shows schematic three-dimensional views of positions of
5 message elements of a first massaging arrangement and a second massaging arrangement usable in a massaging device according to one embodiment of the present invention.

[0043] Figure 11 shows a schematic block diagram of another massaging device according to one embodiment of the present invention.

10

DETAILED DESCRIPTION

[0044] Embodiments of a massaging device will be described in detail below with reference to the accompanying figures. It will be appreciated that the embodiments described below can be modified in various aspects without changing the essence of the invention.

15

[0045] Figure 1 shows a schematic block diagram of a massaging device 100. The massaging device 100 has a first massaging arrangement 102 and a second massaging arrangement 104. The first massaging arrangement 102 and the second massaging arrangement 104 are adapted to jointly massage the same body part. The massaging device 100 also has driving means 106. The driving means 106 is connected to the first
20 massaging arrangement 102 and the second massaging arrangement 104. The driving means 106 is configured to move the first massaging arrangement 102 and the second massaging arrangement 104 in essentially opposite directions with respect to each other. The first massaging arrangement 102 and the second massaging arrangement 104 being

movable in essentially opposite directions with respect to each other may provide massaging actions in opposite directions which may enhance blood circulation flow of a body part being massaged.

[0046] The driving means 106 includes a gear mechanism 108 attached to each of the first massaging arrangement 102 and the second massaging arrangement 104. The driving means 106 also includes at least one (joint) motor 110 connected to the gear mechanism 108.

[0047] In a first alternative of the driving means 106, as shown in Figure 2a, the driving means 106 has a gear mechanism 108a attached to the first massaging arrangement 102 and a gear mechanism 108b attached to the second massaging arrangement 104. In this embodiment, the driving means 106 has two motors 110a, 110b. Each motor 110a, 110b is connected to the respective gear mechanism 108.

[0048] In a second alternative of the driving means 106, as shown in Figure 2b, the driving means 106 has a gear mechanism 108a attached to the first massaging arrangement 102, a gear mechanism 108b attached to the second massaging arrangement 104, and one motor 110 connected to the two gear mechanism 108a, 108b.

[0049] In a third alternative of the driving means 106, as shown in Figure 2c, the driving means 106 has a gear mechanism 108 attached to both the first massaging arrangement 102 and the second massaging arrangement 104. The driving means 106 has a motor 110 connected to the gear mechanism 108. Two or more motors 110 may be connected to the gear mechanism 108 in other embodiments.

[0050] The above described configurations of the driving means 106 are some possible but not limiting examples of the driving means 106. Different configurations of the driving means 106 can be used in other embodiments.

[0051] Figures 3a to 3c show schematic block diagrams of exemplary arrangements of the first massaging arrangement 102 and the second massaging arrangement 104. In one embodiment, as shown in Figure 3a, the first massaging arrangement 102 and the second massaging arrangement 104 are arranged such that the first massaging arrangement 102 and the second massaging arrangement 104 are moveable along a same plane in alignment with a portion of a body part 302 to be massaged. The body part 302 to be massaged is typically but is not limited to a “planar” body part such as the back, the abdomen, the waist and the neck of the body.

[0052] In another embodiment, as shown in Figure 3b, the first massaging arrangement 102 and the second massaging arrangement 104 are opposed to each other such that the first massaging arrangement 102 and the second massaging arrangement 104 engage a body part 304 to be massaged. The first massaging arrangement 102 and the second massaging arrangement 104 are adapted to engage an extremity of the body. The extremity of the body includes a foot, a calf, a hand, an upper arm, a lower arm and thighs.

[0053] Further, the first massaging arrangement 102 may include at least two sets of a first kind of massage element. The second massaging arrangement 104 may include at least one set of a second kind of massage element. The at least one set of the second kind of massage element of the second massaging arrangement 102 is disposed between the at least two sets of the first kind of massage element of the first massaging arrangement

104. For illustration purposes, Figure 3c shows the first massaging arrangement 102 having two sets 306a, 306b of the first kind of massage element and the second massaging arrangement 104 having one set 308 of a second kind of massage element. The one set 308 of the second kind of massage element of the second massaging arrangement 104 is disposed between the two sets 306a, 306b of the first kind of massage element of the first massaging arrangement 102. Since the first massaging arrangement 102 and the second massaging arrangement 104 are movable in essentially opposite directions with respect to each other, the two sets 306a, 306b of the first kind of massage element of the first massaging arrangement 102 and the one set 308 of the second kind of massage element of the second massaging arrangement 104 are also movable in essentially opposite directions. The two sets 306a, 306b of the first kind of massage element of the first massaging arrangement 102 are movable in a same direction. The two sets 306a, 306b of the first kind of massage element of the first massaging arrangement 102 and the one set 308 of the second kind of massage element of the second massaging arrangement 104 being movable in essentially opposite directions with respect to one another may provide massaging actions in opposite directions which may enhance blood circulation flow of a body part being massaged.

[0054] Various suitable massage elements can be used as the first kind of massage element and the second kind of massage element. The first kind of massage element and the second kind of massage element include but are not limited to a roller (as described for example in US Publication No. US 2005/0159688 A1), massage nodes (as described for example in US Patent No. US 6,733,466 B2), a vibration element (as described for example in US Patent No. US 3,220,405) or an airbag (as described for example in US

Patent No. US 5,762,618). Therefore, a set of a first kind of massage element may include but is not limited to more than one roller, more than one vibration element, a combination of a roller, a vibration element and an airbag, a combination of a roller and an airbag, a combination of a vibration element and an airbag, and a combination of a roller and a vibration element. Similarly, a set of a second kind of massage element may include but is not limited to more than one roller, more than one vibration element, a combination of a roller, a vibration element and an airbag, a combination of a roller and an airbag, a combination of a vibration element and an airbag, and a combination of a roller and a vibration element.

[0055] In one embodiment, the first kind of massage element and the second kind of massage element are same. Alternatively, the first kind of massage element and the second kind of massage element are different. Thus, the first massaging arrangement 102 and the second massaging arrangement 104 may also have the same or different combinations of massage elements (e.g. rollers, massage nodes, vibration elements, airbags).

[0056] Figure 4a shows a schematic three-dimensional front view of the massaging device 100. The massaging device is implemented in the form of a leg massaging device 400. The leg massaging device 400 has a first massaging arrangement 402 and a second massaging arrangement 404. The original positions of the first massaging arrangement 402 and the second massaging arrangement 404 before the operation of the leg massaging device 400 are shown in Figure 4a. The first massaging arrangement 402 is at a bottom position while the second massaging arrangement 404 is at a top position before the leg massaging device 400 starts operating. The first massaging arrangement 402 and the

second massaging arrangement 404 are adapted to jointly massage the same body part. As shown in Figure 4b, the first massaging arrangement 402 and the second massaging arrangement 404 are arranged such that the first massaging arrangement 402 and the second massaging arrangement 404 massage the calf portions of the legs. In other
5 embodiments, the first massaging arrangement 402 and the second massaging arrangement 404 can be arranged to massage different portions of the legs.

[0057] Figure 5 shows a schematic three-dimensional view of the first massaging arrangement 402 and a second massaging arrangement 404. In this embodiment, the first massaging arrangement 402 has two sets 406a, 406b of a first kind of massage element
10 408. The first kind of massage element 408 is a roller. Each set 406a, 406b of the first kind of massage element 408 includes two rollers 408. In other embodiments, other suitable massage elements can be used as the first kind of massage element 408. Some examples of the first kind of massage element 408 may include but are not limited to massage nodes, a vibration element or an airbag. Each set 406a, 406b of the first kind of
15 massage element 408 may include but is not limited to two or more vibration elements, a combination of a roller and a vibration element, a combination of a roller and an airbag, and a combination of a vibration element and an airbag.

[0058] The second massaging arrangement 404 has one set 410 of a second kind of massage element 412. The second kind of massage element 412 is a roller. The set 410 of
20 the second kind of massage element 412 includes two rollers 412. In other embodiments, other suitable massage elements can be used as the second kind of massage element 412. Some examples of the second kind of massage element 412 may include but are not limited to massage nodes, a vibration element or an airbag. The set 410 of the second

kind of massage element 412 may include but is not limited to two or more vibration elements, a combination of a roller and a vibration element, a combination of a roller and an airbag, and a combination of a vibration element and an airbag.

[0059] The set 410 of the second kind of massage element 412 of the second
5 massaging arrangement 404 is disposed between the two sets 406a, 406b of the first kind of massage element 408 of the first massaging arrangement 402. In other embodiments, the first massaging arrangement 402 and the second massaging arrangement 404 may have different number of sets of the first kind of massage element and the second kind of massage element respectively.

10 [0060] In this embodiment, the first kind of massage element and the second kind of massage element are the same. The first kind of massage element and the second kind of massage element may be different in other embodiments. For example, the first kind of massage element is a roller and the second kind of massage element is a vibration element. Further, in this embodiment, the first massaging arrangement 402 and the
15 second massaging arrangement 404 have the same combination of massage elements, i.e. two rollers. In other embodiments, the first massaging arrangement 402 and the second massaging arrangement 404 may have different combinations of massage elements. For example, the first massaging arrangement 402 may have sets of two rollers and the second massaging arrangement 404 may have sets of a roller and a vibration element.

20 [0061] Figure 6 shows a schematic three-dimensional back view of the leg massaging device 400. The leg massaging device 400 has a driving means 502 and the driving means 502 has a gear mechanism 504 and at least one motor 506 (e.g. one motor 506) connected to the gear mechanism 504. The gear mechanism 504 is attached to each of the

first massaging arrangement 102 and the second massaging arrangement 104 (details of which will be described later). The gear mechanism 504 has a first rack member 508 and a lead screw 510 rotatably connected to the motor 506 and the first rack member 508. The gear mechanism 504 further includes a second rack member 512a and a further
5 second rack member 512b. The first rack member 508 is disposed between the second rack member 512a and the further second rack member 512b.

[0062] The gear mechanism 504 also includes a pinion member 514a and a further pinion member 514b. The pinion member 514a is disposed between and engaged with the first rack member 508 and the second rack member 512a. The further pinion member
10 514b is disposed between and engaged with the first rack member 508 and the further second rack member 512b.

[0063] The first rack member 508 has a plurality of teeth 516 and a plurality of grooves 518 at two sides 520, 522 of the first rack member 508. The second rack member 512a has a plurality of teeth 524 and a plurality of grooves 526 at one side 528 of the
15 second rack member 512a. Similarly, the further second rack member 512b has a plurality of teeth 530 and a plurality of grooves 532 at one side 534 of further second rack member 512b. The pinion member 514a has a plurality of teeth 536 and a plurality of grooves 538 around a circumference of the pinion member 514a. Similarly, the further pinion member 514b has a plurality of teeth 540 and a plurality of grooves 542 around a
20 circumference of the further pinion member 514b.

[0064] The pinion member 514a is engaged with the first rack member 508 and the second rack member 512a such that the plurality of teeth 536 of the pinion member 514a is received in the corresponding grooves 518 of the first rack member 508 at the side 520

of the first rack member 508 and in the corresponding grooves 526 of the second rack member 512a. The plurality of teeth 516 of the first rack member 508 at the side 520 of the first rack member 508 and the plurality of teeth 524 of the second rack member 512a are received in the corresponding grooves 538 of the pinion member 514a.

5 [0065] Similarly, the further pinion member 514b is engaged with the first rack member 508 and the further second rack member 512b such that the plurality of teeth 540 of the further pinion member 514b is received in the corresponding grooves 518 of the first rack member 508 at the side 522 of the first rack member 508 and in the corresponding grooves 532 of the further second rack member 512b. The plurality of
10 teeth 516 of the first rack member 508 at the side 522 of the first rack member 508 and the plurality of teeth 530 of the further second rack member 512b are received in the corresponding grooves 542 of the pinion member 514a.

[0066] The leg massaging device 400 includes a frame 544. The motor 506 is secured to the frame 544. The pinion member 514a and the further pinion member 514b are
15 rotatably mounted to the frame 544. The frame 544 has slots 545 for receiving a portion of each of the first rack member 508, the second rack member 512a and the further second rack member 512b and for allowing the movement of the first rack member 508, the second rack member 512a and the further second rack member 512b during the operation of the leg massaging device 400.

20 [0067] The frame 544 has a guide rail 546 (see Figure 5) for the first rack member 508, a guide rail 548 (see Figure 5) for the second rack member 512a and a guide rail 550 (see Figure 7) for the further second rack member 512b. The guide rail 546 is received in a through-hole 552 (see Figure 5) of the first rack member 508, the guide rail 548 is

received in a through-hole 554 (see Figure 5) of the second rack member 512a, and the guide rail 550 is received in a through-hole (not shown) of the further second rack member 512b respectively. The first rack member 508, the second rack member 512a and the further second rack member 512b are movable linearly along the respective guide rail 546.

[0068] In one embodiment, the leg massaging device 400 includes mechanical means (not shown). The mechanical means are positioned to move the two sets 406a, 406b of the first kind of massage element 408 (i.e. the rollers 408) of the first massaging arrangement 402 and the set 410 of the second kind of massage element 412 (i.e. the two rollers 412) of the second massaging arrangement 404 towards respective portions of a body part (e.g. legs in this embodiment) to be massaged. The mechanical means may include but is not limited to inflatable airbags and cam motion means.

[0069] Figure 7 shows a schematic top view of the leg massaging device 400. The first rack member 508 is attached to the set 410 of the second kind of massage element 412 (i.e. the two rollers 412) of the second massaging arrangement 404. The second rack member 512a is attached to the set 406a of the first kind of massage element 408 (i.e. the two rollers 408) of the first massaging arrangement 402. The further second rack member 512b is attached to the set 406b of the first kind of massage element 408 (i.e. the two rollers 408) of the first massaging arrangement 402.

[0070] In more details, the rollers 408 of the first massaging arrangement 402 are attached to support structures 602, 604 of the second rack member 512a and support structures 606, 608 of the further second rack member 512b respectively, and the rollers 412 of the second massaging arrangement 404 are attached to support structures 610, 612

of the first rack 508. Thus, the gear mechanism 504 is connected to the first massaging arrangement 402 and the second massaging arrangement 404 via the first rack member 508, the second rack member 512a and the further second rack member 512b.

[0071] The support structure 602 of the second rack member 512a and the support structure 606 of the further second rack member 512a, which are further away from the driving means 502, are pivotally attached to the second rack member 512a and the further second rack member 512a respectively. Therefore, the support structure 602 and the support structure 606 can move pivotably about respective pivot points 614, 616.

[0072] Details of the operation of the leg massaging device 400 are described in the following.

[0073] As shown in Figure 8a, when the leg massaging device 400 starts operating, the support structure 602 of the second rack member 512a moves away from the original position (as shown in Figure 7) and moves pivotably about the pivot point 614 in a direction as indicated by arrow 902. The support structure 606 of the second rack member 512b moves away from the original position (as shown in Figure 7) and moves pivotably about the pivot point 616 in a direction as indicated by arrow 904. The movement of the support structures 602, 606 is actuated by the mechanical means (e.g. inflatable airbags and/or cam motion means). For example, inflatable airbags may be disposed in the support structures 602, 606. When the airbags are inflated, the support structures 602, 606 thus move in the respective directions as indicated by arrows 902, 904.

[0074] Therefore, the rollers 408 attached to the support structures 602, 606 thus move towards the respective portions of the body part (e.g. tibialis anterior muscles of the

legs) to be massaged. The rollers 408 attached to the support structures 602, 606 may exert a sufficient amount of pressure on e.g. tibialis anterior muscles of the legs to provide a comfortable and effective massage. As such, the rollers 408 of the first massaging arrangement 402 and the rollers 412 of the second massaging arrangement 404 may wrap around respective portions of the body part (e.g. legs) to be massaged.

[0075] The support structures 602, 606 can be further moved towards the respective portions of the body indicated by respective arrows 906, 910, and the other support structures 604, 608, 610, 612 can also be moved towards the respective portions of the body to be massaged in directions indicated by respective arrows 908, 912, 914, 916.

Similarly, the movement of the support structures 602, 604, 606, 608, 610, 612 is actuated by the mechanical means (e.g. inflatable airbags and/or cam motion means). For example, airbags may be disposed in the support structures 602, 604, 606, 608, 610, 612. When the airbags are inflated, the support structures 602, 604, 606, 608, 610, 612 thus move in the respective directions as indicated by arrows 906, 908, 910, 912, 914, 916.

[0076] The respective rollers 408, 412 attached to the support structures 602, 604, 606, 608, 610, 612 may move towards the respective portions of the body to be massaged and may apply pressure on the respective portions of the body part to be massaged. For example, the rollers 408 attached to the support structures 602, 606 may apply pressure on e.g. the tibialis anterior muscles of the legs, the rollers 408 attached to the support structures 604, 608 may apply pressure on e.g. the gastrocnemius muscles/calf muscles of the legs, and the rollers 412 attached to the support structures 610, 612 may apply pressure on e.g. the gastrocnemius muscles/calf muscles of the legs.

[0077] Figure 9 shows a schematic three-dimensional view of a portion of the second rack member 512a having the support structure 604. The roller 408 is attached to the support structure 604. The mechanical means (e.g. inflatable airbags and/or cam motion means) (not shown) may be positioned in the support structure 604. When the mechanical means (e.g. inflatable airbags) or cam motion means is actuated, the support structure 604 may move away from the position as shown in Figure 8a to the position as shown in Figure 8b to move the respective roller 408 towards the respective portions of the body part to be massaged. The same applies for the other support structures 602, 606, 608, 610, 612.

[0078] Referring back to Figure 8b, the support structures 602, 604, 606, 608, 610, 612 may move back to the respective positions as shown in Figure 8a in directions indicated by respective arrows 907, 909, 911, 913, 915, 917.

[0079] Once the rollers 408, 412 are in the respective positions as shown in Figure 8a, the motor 506 drives the lead screw 510. At the start of the operation of the leg massaging device 400, the rollers 408 of the first massaging arrangement 402 attached to the second rack member 512a and the further second rack member 512b are at a bottom position while the rollers 412 of the second massaging arrangement 404 attached to the first rack member 508 are at a top position (see Figure 10a). The lead screw 510 is driven by the motor 506 to rotate in a clockwise direction. The first rack member 508 together with the second massaging arrangement 404 thus moves downwards from the top position in a direction indicated by arrow 1002. The first rack member 508 moves downwards along the guide rail 546. The downwards movement of the first rack member 508 causes the pinion member 514a to rotate in a counter clockwise direction and the

further pinion member 514b to rotate in a clockwise direction. The second rack member 514a, the further second rack member 514b and the first massaging arrangement 402 thus move upwards from the bottom position in a direction indicated by arrows 1004. The second rack member 514a and the further second rack member 514b move upwards along
5 the respective guide rails 548, 550.

[0080] The first rack member 508 and the second massaging arrangement 404 moves downwards until they reach the bottom position, and the second rack member 514a, the further second rack member 514b and the first massaging arrangement 402 move upwards until they reach the top position, as shown in Figure 10b. The motor 508 then
10 drives the lead screw 510 such that the lead screw 510 rotates in a counter clockwise direction. A rotation of the lead screw 510 in the counter clockwise direction causes the first rack member 508 and the second massaging arrangement 404 to move upwards from the bottom position in a direction indicated by arrow 1006. The first rack member 508 moves upwards along the guide rail 546. The upwards movement of the first rack
15 member 508 and the second massaging arrangement 404 causes the pinion member 514a to rotate in a clockwise direction and the further pinion member 514b to rotate in a counter clockwise direction. The second rack member 514a, the further second rack member 514b and the first massaging arrangement 402 then move downwards from the top position in a direction indicated by arrows 1008. The second rack member 514a and
20 the further second rack member 514b move downwards along the respective guide rails 548, 550.

[0081] Limit switches (not shown) are disposed at the respective top and bottom positions of the first rack member 508, the second rack member 514a and the further

second rack member 514b. The limit switches can determine if the first rack member 508, the second rack member 514a and the further second rack member 514b have reached the respective top/bottom positions. Based on this information from the limit switches, the motor 506 can determine the time to start driving the lead screw 510 in a different rotational direction (i.e. from clockwise to counter clockwise and vice versa) to move the first rack member 508 (i.e. from top to bottom and vice versa), and to move the second rack member 514a and the further second rack member 514b (i.e. from top to bottom and vice versa). Further, the limit switches can also prevent the first rack member 508, the second rack member 514a and the further second rack member 514b from travelling beyond the respective top/bottom positions and thus prevent possible damages to the leg massaging device 400. In addition, an optical encoder (not shown) can be attached to the motor 506 and can be used to determine a travelling speed and a position of the first rack member 508 at any point of time during one cycle of leg massage.

[0082] One cycle of leg massage is completed when the first rack member 508 and the second massaging arrangement 404 return to the original top position, and the second rack member 514a, the further second rack member 514b and the first massaging arrangement 402 return to the original bottom position. The cycle then repeats again.

[0083] During each cycle of leg massage, the rollers 408 attached to the second rack member 512a massage the right side of the right calf as the second rack member 512a moves up and down along the guide rail 548. The rollers 412 attached to the first rack member 508 massage the left side of the right calf and the right side of the left calf as the first rack member 508 moves up and down along the guide rail 546. The rollers 408

attached to the further second rack member 512b massage the left side of the left calf as the further second rack member 512b moves up and down along the guide rail 550.

[0084] In more details, the roller 408 attached to the support structure 602 of the second rack member 512a and the roller 408 attached to the support structure 606 of the further second rack member 512b massage the tibialis anterior muscles of the legs. The roller 408 attached to the support structure 604 of the second rack member 512a and the roller 408 attached to the support structure 608 of the further second rack member 512b massage the gastrocnemius muscles/calf muscles of the legs. The rollers 412 attached to the support structures 610, 612 of the first rack member 508 massage the gastrocnemius muscles/calf muscles of the legs.

[0085] At the same time, during each cycle of leg massage, the respective support structures 602, 604, 606, 608, 610, 612 may move towards and move away from the respective portions of the legs at different timing. The rollers 408, 412 of the respective support structures 602, 604, 606, 608, 610, 612 may exert different amount of pressure on the respective portions of the legs when the respective support structures 602, 604, 606, 608, 610, 612 move towards the respective portions of the legs at the different timing.

[0086] The sequence of the support structures 602, 604, 606, 608, 610, 612 being moved towards and being moved away from the respective portions of the legs may not be fixed, i.e. may vary in one cycle of leg massage. For example, the support structures 602, 604 may move towards the respective portions of the legs together at time T_1 in one cycle of leg massage, and the support structures 602, 606 may move towards the respective portions of the legs together at time T_2 in the same cycle of leg massage. The sequence of the support structures 602, 604, 606, 608, 610, 612 being moved towards and

being moved away from the respective portions of the legs may also be different for every cycle of leg massage. For example, the support structures 602, 604 may move towards the respective portions of the legs in one cycle of leg massage, and the support structures 602, 606 may move towards the respective portions of the legs together in
5 another cycle of leg massage. Alternatively, the sequence of the support structures 602, 604, 606, 608, 610, 612 being moved towards and being moved away from the respective portions of the legs may be preprogrammed, and may be carried out according to a massage program selected by a user.

[0087] Further, during each cycle of leg massage, the rollers 412 attached to the first
10 rack member 508 and the rollers 408 attached to the second rack member 512a and the further second rack member 512b move in essentially opposite directions. The movement of rollers 412 attached to the first rack member 508 and the rollers 408 attached to the second rack member 512a and the further second rack member 512b being movable in essentially opposite directions may provide the massaging actions in opposite directions.
15 The massaging actions in opposite directions may enhance blood circulation flow through the arteries (oxygenated blood) to the body part being massaged and back from the body part being massaged to the heart through the veins (deoxygenated blood).

[0088] Figure 11 shows a schematic block diagram of another massaging device 1100. The massaging device 1100 has a first massaging arrangement 1102 and a second
20 massaging arrangement 1104. The first massaging arrangement 1102 consists of at least one airbag 1108 and the second massaging arrangement 1104 consists of at least one airbag 1108. The first massaging arrangement 1102 and the second massaging arrangement 1104 are adapted to jointly massage the same body part. The massaging

device 1100 also has a controller 1106. The controller 1106 is connected to the first massaging arrangement 1102 and the second massaging arrangement 1104. The controller 1106 is configured to inflate the first massaging arrangement 1102 and the second massaging arrangement 1104 in such a manner that arterial blood circulation is enhanced by one of the first massaging arrangement 102 and the second massaging arrangement 104 and venial blood circulation is enhanced by the other of the first massaging arrangement 102 and the second massaging arrangement 104. That means if the arterial blood circulation is enhanced by the first massaging arrangement 102, the venial blood circulation is enhanced by the second massaging arrangement 104, and vice versa.

[0089] In one embodiment, the first massaging arrangement 1102 of the massaging device 1100 may have at least two inflatable airbags 1108 arranged in a stack. Similarly, the second massaging arrangement 1104 of the massaging device 1100 may have at least two inflatable airbags 1108 arranged in a stack. The controller 1106 may include actuation means 1107 for inflating and deflating the airbags 1108 of the first massaging arrangement 1102 and the second massaging arrangement 1104.

[0090] The actuation means 1107 may inflate and deflate the airbags 1108 of the first massaging arrangement 1102 in a sequence from top to bottom and from bottom to top alternately, and may inflate and deflate the airbags 1108 of the second massaging arrangement 1104 in a sequence from bottom to top and from top to bottom alternately. In short, when the actuation means 1107 inflates and deflates the airbags 1108 of the first massaging arrangement 1102 in a sequence from top to bottom as indicated by arrow 1110, the actuation means 1107 inflates and deflates the airbags 1108 of the second

massaging arrangement 1104 in a sequence from bottom to top as indicated by arrow 1112. When the actuation means 1107 inflates and deflates the airbags 1108 of the first massaging arrangement 1102 in a sequence from bottom to top as indicated by arrow 1114, the actuation means 1107 inflates and deflates the airbags 1108 of the second massaging arrangement 1104 in a sequence from top to bottom as indicated by arrow 1116.

[0091] In a first alternative of the massaging device 1100, the airbags 1108 of the first massaging arrangement 1102 and the airbags 1108 of the second massaging arrangement 1104 are arranged along a same plane in alignment with a portion of a body part to be massaged. The body part to be massaged may be but is not limited to a “planar” body part such as the back, the abdomen, the waist and the neck of the body.

[0092] In a second alternative of the massaging device 1100, the first massaging arrangement 1102 and the second massaging arrangement 1104 are opposed to each other such that the first massaging arrangement 1102 and the second massaging arrangement 1104 engage a body part to be massaged. The first massaging arrangement 1102 and the second massaging arrangement 1104 are adapted to engage an extremity of the body. The extremity of the body includes a foot, a calf, a hand, an upper arm, a lower arm and thighs.

[0093] While embodiments of the invention have been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. The scope of the invention is thus indicated by the appended claims and all changes

which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

What is claimed is:

- 5 1. A massaging device, comprising:
a first massaging arrangement and a second massaging arrangement, the first
massaging arrangement and the second massaging arrangement being adapted to jointly
massage the same body part;
driving means connected to the first massaging arrangement and the second
10 massaging arrangement, the driving means being configured to move the first massaging
arrangement and the second massaging arrangement in essentially opposite directions
with respect to each other.
2. The massaging device of claim 1,
15 wherein the first massaging arrangement and the second massaging arrangement
are moveable along a same plane in alignment with a portion of a body part to be
massaged.
3. The massaging device of claim 2,
20 wherein the body part to be massaged is the back or the abdomen of the body.
4. The massaging device of claim 1,

wherein the first massaging arrangement and the second massaging arrangement are opposed to each other such that the first massaging arrangement and the second massaging arrangement engage a body part to be massaged.

5 5. The massaging device of claim 4,

wherein the first massaging arrangement and the second massaging arrangement are adapted to engage an extremity of the body.

6. The massaging device of any one of claims 1 to 5,

10 wherein the first massaging arrangement comprises at least two sets of a first kind of massage element and the second massaging arrangement comprises at least one set of a second kind of massage element.

7. The massaging device of claim 6,

15 wherein the first kind of massage element and the second kind of massage element are same or different.

8. The massaging device of claims 6 or 7,

20 wherein the first kind of massage element and the second kind of massage element comprise any one of the group consisting of a roller, massage nodes, a vibration element or an airbag.

9. The massaging device of any one of claims 6 to 8,

wherein the at least one set of the second kind of massage element of the second massaging arrangement is disposed between the at least two sets of the first kind of massage element of the first massaging arrangement.

5 10. The massaging device of any one of claims 1 to 9,

wherein the driving means comprises a gear mechanism attached to each of the first massaging arrangement and the second massaging arrangement.

11. The massaging device of claim 10,

10 wherein the driving means further comprises at least one motor connected to the gear mechanism.

12. The massaging device of claims 10 or 11,

15 wherein the gear mechanism comprises a first rack member attached to the at least one set of the second kind of massage element of the second massaging arrangement, and a lead screw rotatably connected to the motor and the first rack member.

13. The massaging device of claim 12,

20 wherein the gear mechanism further comprises a second rack member attached to at least one set of the first kind of massage element of the first massaging arrangement, and a further second rack member attached to at least one further set of the first kind of massage element of the first massaging arrangement.

14. The massaging device of claims 12 or 13,
wherein the first rack member is disposed between the second rack member and
the further second rack member.

5 15. The massaging device of claims 13 or 14.
wherein the gear mechanism further comprises a pinion member disposed
between and engaged with the first rack member and the second rack member, and a
further pinion member disposed between and engaged with the first rack member and the
further second rack member.

10

16. The massaging device of claim 15,
wherein each rack member and each pinion member comprise a plurality of teeth
and a plurality of grooves, and wherein each pinion member is engaged with the
respective rack members such that the plurality of teeth of each pinion member are
15 received in the plurality of corresponding grooves of the respective rack members.

17. The massaging device of any one of claims 12 to 16,
wherein the motor is configured to drive the lead screw of the gear mechanism
such that the lead screw rotates in a clockwise direction and a counter clockwise direction
20 alternately.

18. The massaging device of claim 17,

wherein a rotation of the lead screw in the clockwise direction causes a linear movement of the first rack member in a first direction.

19. The massaging device of claim 18,

5 wherein the linear movement of the first rack member in the first direction causes a rotation of the pinion member and the further pinion member in opposite rotational directions, resulting in a linear movement of the second rack member and the further second rack member in a second direction opposite to the first direction of the linear movement of the first rack member.

10

20. The massaging device of claim 19,

wherein a rotation of the lead screw in the counter clockwise direction causes a linear movement of the first rack member in the second direction and a linear movement of the second rack member and the further second rack member in the first direction.

15

21. The massaging device of any one of claims 12 to 20,

further comprising a frame to which the motor is secured and to which the pinion member and the further pinion member are rotatably mounted.

20 22. The massaging device of claim 21,

wherein the frame comprises slots for receiving a portion of the respective rack members and for allowing the linear movement of the respective rack members.

23. The massaging device of claims 21 or 22,
wherein the frame further comprises a guide rail for each rack member along
which the rack member is movable linearly.

5 24. The massaging device of claim 23,
wherein the guide rail is received in a through-hole of the respective rack
members.

25. The massaging device of any one of claims 6 to 24,
10 further comprising mechanical means positioned to move at least one of the
respective sets of the first kind of massage element or the second kind of massage
element towards respective portions of a body part to be massaged.

26. The massaging device of claim 25,
15 wherein the mechanical means comprise inflatable airbags and/or cam motion
means.

27. A massaging device, comprising:
a first massaging arrangement consisting of at least one airbag and a second
20 massaging arrangement consisting of at least one airbag, the first massaging arrangement
and the second massaging arrangement being adapted to jointly massage the same body
part;

a controller connected to the first massaging arrangement and the second massaging arrangement, the controller being configured to inflate the first massaging arrangement and the second massaging arrangement in such a manner that arterial blood circulation is enhanced by one of the first massaging arrangement and the second massaging arrangement and venial blood circulation is enhanced by the other of the first massaging arrangement and the second massaging arrangement.

28. The massaging device of claim 27,

wherein each of the first massaging arrangement and the second massaging arrangement consists of at least two airbags arranged in a stack.

29. The massaging device of claims 27 or 28,

wherein the controller comprises actuation means for inflating and deflating the airbags of the first massaging arrangement and the second massaging arrangement.

30. The massaging device of any one of claims 27 to 29,

wherein the airbags of the first massaging arrangement and the airbags of the second massaging arrangement are arranged along a same plane in alignment with a portion of a body part to be massaged.

31. The massaging device of claim 30,

wherein the body part to be massaged is the back or the abdomen of the body.

32. The massaging device of any one of claims 27 to 29,
wherein the first massaging arrangement and the second massaging arrangement
are opposed to each other such that the first massaging arrangement and the second
massaging arrangement engage a body part to be massaged.

5

33. The massaging device of claim 32,
wherein the first massaging arrangement and the second massaging arrangement
are adapted to engage an extremity of the body.