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TITLE OF THE INVENTION

SOLE MASSAGE DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a foot massage device, and more particularly to a sole massage device in which a sole of a user is massaged to promote circulation of blood of the sole and to stimulate the peripheral nerve of the sole.

As well known, the artery, capillary and peripheral nerve are concentrated in the sole of the human body. If a leg is extremely tired, the circulation of the blood in the capillary becomes sluggish, causing the compression of the peripheral nerve. The recovery from the fatigue in the feet and legs delays, accordingly. The peripheral nerve of the sole is communicated with the brain through the nervous system. Therefore, it is said that the stimulation of the sole causes the brain to activate, and hence activation of the autonomic nerve can be expected.

In a folk medicine, a semicircular shaped tool on which a foot is mounted is used to dissipate the fatigue in feet and legs. In the field of the oriental medicine, the massage and the acupuncture are used from times of old to stimulate an acupoint at which the peripheral nerve is concentrated.

Recently, there have been developed various types of massage devices for promoting the circulation of the blood, and low frequency current devices for stimulating

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the peripheral nerve.

In the massage device, a plurality of pulsation rollers or pressure pads are provided for periodically pressing the sole so as to promote circulation of the blood.

In the low frequency current device, electrodes are adhered to acupoints at which the peripheral nerve is concentrated. A low frequency current is applied to the electrodes so as to relax muscles and tendons near the concentrated peripheral nerve.

However in such a massage device, the pressure of the roller or pad is too strong to provide a comfortable treatment and to recover from the fatigue. Furthermore, considerable electric power is consumed for driving heavy pulsation rollers or pressure pads. Therefore, the massage device is not suitable for easy use.

In the low frequency current device, the circulation of the blood is promoted by relaxing and tensing the muscle. Such a stimulation has not much effect on expanding the capillary in the sole.

There has been proposed a sole massage device having a plurality of impact massage heads for comfortably and rhythmically massaging a sole of a foot. The device comprises a plurality of impact rods each having a massage head, and a driving mechanism comprising a rod reciprocating system and a gear system.

However, when the impact rods are operated, the reciprocation system and the driving mechanism is

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considerably vibrated. The vibration is transmitted to a housing of the device, which causes noises and resonant sounds. Therefore such a massage device cannot be made into a high quality one.

SUMMARY OF THE INVENTION

A first object of the present invention is to provide a sole massage device by which a sole of a foot is comfortably and rhythmically massaged without pain, thereby effectively expanding the capillary and stimulating the peripheral nerve at the same time.

A second object of the present invention is to provide a sole massage device which does not cause noises during the operation without extremely pressing the foot.

A third object of the present invention is to provide a sole massage device which has a small power consumption, and does not consume useless power.

To the first object, according to the present invention, there is provided a sole massage device comprising a housing having an inclined surface and a pair of footrests, a plurality of impact rods disposed in perpendicular to the inclined surface and axially slidably mounted in the housing, an impact head secured to a top of each of the impact rods and disposed so that a part of the impact head is projected from the footrest, a reciprocating device for reciprocating the impact rods so as to impact a sole of a user mounted on the footrest, and a driving device for driving the

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reciprocating device.

To achieve the second object, a mass block is suspended in the housing by horizontal springs and vertical springs so as to be held in a plane substantially parallel to the inclined surface, the impact rod, reciprocating device, and driving device are provided in the mass block.

To the third object, there is provided a power switch, a foot sensor for detecting mounting of a foot, a timer responsive to closing of the power switch for producing a signal for a predetermined time, an AND gate responsive to an output signal of the foot sensor and to the signal of the timer for producing a signal for operating a driving motor.

In another aspect of the present invention, the massage device has further a gear box supported in the mass block with resilient means, the impact rod is slidably mounted in the gear box, the reciprocating device is mounted on the gear box, and the driving device is provided in the gear box.

The reciprocating device is arranged to cyclically project impact heads provided in one of the footrests.

These and other objects and features of the present invention will become more apparent from the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a front view showing a sole massage

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device of the present invention;

Fig. 2 is a block diagram showing a control circuit of the sole massage device ;

Fig. 3 is a sectional side view of the device taken along a line III-III of Fig. 1;

Fig. 4 is a sectional side view of the device taken along a line IV-IV of Fig. 1;

Fig. 5 is a plan view showing a main part of the device;

Fig. 6 is a sectional side view of the part shown in Fig. 5;

Fig. 7 is a sectional view showing a driving system in a mass block of the device;

Fig. 8 is a sectional view showing a gear box taken along a line VIII - VIII of Fig. 7; and

Fig. 9 is a plan view of the gear box as viewed from the underside thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1, a sole massage device of the present invention is put on a floor in use. The sole massage device comprises a hollow housing 3 having an upper housing 3U and a lower housing 3L, four cylindrical pedestals 1, each having a circular shape in plane and secured to the lower housing 3L, and a handle 3a for carrying the device. The lower housing 3L is secured to the upper housing 3U with screws 11 (Fig. 3). The pedestals 1 are provided for preventing the device from vibrating when using.

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The upper housing 3U has an inclined surface to form right and left footrests 3b on which rest right and left feet of the user sitting on a chair are mounted, and a central portion 3f between the footrests 3b. Anti-slip ribs 4 made of rubber are disposed on the footrests 3b so as to prevent the feet from slipping. Three massage impact heads 7 guided by a guide frame 67 are exposed from the footrests 3b. On the central portion 3f, a speed control dial 8, a power switch button 24, and a power indicator 27 are provided.

Referring to Figs. 4, 5 and 6, a metallic frame plate 29 is secured between the upper housing 3U and the lower housing 3L corresponding to each footrest 3b. The frame plate 29 has an opening 34 of an elliptic shape, as shown in Fig. 5.

In the device of the invention, both of the right and left portions in the housing 3 have the same structure which is arranged in symmetry. Thus, one of the portions will be described hereinafter.

An annular connecting frame 31 having an elliptic shape in plan view is secured to the periphery of the opening 34 of the frame plate 29. The connecting frame 31 has an annular base portion 31b and an upper flange 31c. Four connecting lugs 31a are formed on the upper flange 31c. A pair of lugs 31d are formed on the upper flange 31c at opposite sides on the major axis thereof, and a pair of lugs 31e are formed on the upper flange 31c at opposite sides on the minor axis thereof.

Each of the connecting lugs 31a is mounted on the

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periphery of the opening 34 through a damping member 30 made of rubber and secured thereto with a screw 32.

A pair of springs 35 are provided between the base portion 31b and hook portions 3d and 3e provided on the bottom of the lower housing 3L opposite to each other. Thus, the connecting frame 31 is urged in the lower direction of the housing 3. Consequently, even if the screw 32 is accidentally disengaged from the frame plate 29, the connecting frame 31 is prevented from separating from the plate 29.

A hollow heavy mass block 37 having a driving mechanism is mounted in the housing 3 through the connecting frame 31. The mass block 37 is made of aluminum molded by die casting, and comprises an upper block 37U and a lower block 37L. The upper block 37U and the lower block 37L are coupled through a shielding means, thereby preventing noises produced in the mass block from leaking.

As shown in Fig. 5, a bracket 45 is secured to each of the lugs 31d with screws 43. A pair of horizontal springs 39 are provided between pins 46 on the bracket 45 and screws 48 secured to an upper plate of the upper block 37U, arranged in cross. The mass block 37 is thus suspended by the horizontal springs 39 in the lower housing 3L such that an upper surface of the mass block 37 is parallel with the inclined footrests 3b of the housing 3.

As shown in Fig. 6, a bracket 51 is secured to the lugs 31e on each side with screws 50. A pair of

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vertical springs 39 are provided between screws 53 secured to the bracket 51 and screws 55 secured to a side plate of the lower block 37L, arranged in cross. The mass block 37 is thus vertically suspended in the lower housing 3L by the vertical springs 41.

Consequently, the mass block 37 is stably suspended in the housing 3 by the horizontal and vertical springs 39 and 41, keeping balance.

Referring to Fig. 7, the upper block 37U of the mass block 37 has three posts 37b (only one of them is viewed), three openings 37c (only one of them is viewed) and a base 37d formed on the upper plate thereof.

In the mass block 37, a gear box 69 having a rod reciprocating device and a driving device for the reciprocating device are mounted. The gear box 69 is made of plastic such as polyacetal resin and formed by injection molding and comprises an upper box 69U and a lower box 69L. The rod reciprocating system is a reduction gear system.

As shown in Fig. 7, the gear box 69 is mounted in the mass block 37 through a plurality of resilient damping members 71. The damping member 71 comprises a collar 71a, and upper and lower resilient dampers 71b and 71c integral with the collar at opposite sides thereof.

The lower block 37L has four posts 37a each of which has a hole 73. The lower box 69L has four posts 69a formed corresponding to the posts 37a, each having a hole 75 (Fig. 9). The lower damper 71c of the damping

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member 71 is engaged in the hole 73 and the upper damper 71b is fitted in hole 75.

The upper box 69U has four posts 69b each of which has a hole 77. The upper block 37U has four holes 79 formed on an inner wall of an upper plate thereof corresponding to the posts 69b. The lower damper 71c of the damping member 71 is engaged with the hole 77 and the upper damper 71b is engaged in the hole 79.

Thus, vibration of the gear box 69 is damped by the resilient damping members 71 and not transmitted to the mass block 37.

Three impact rods 5 (only one of them is viewed in Fig. 7) each of which has the massage impact head 7 are axially slidably mounted in the gear box 69. A cylindrical retainer 94 made of resin is engaged on each of the rods 5 adjacent the head 7 and upwardly projected from the upper block 37U passing through a hole 37C formed in the upper plate of the block 37U. The rods 5 are parallel with each other in the axial direction and disposed so as to be perpendicular to the inclined footrest 3b of the housing 3. In a retracted position, the massage impact head 7 is located near the upper block 37U.

Describing the reciprocating device and driving device for the impact rod 5, a direct current motor 10 is secured to the underside of the lower box 69L with screws 80. A drive pinion 81 secured to a drive shaft 10a (Fig. 8) of the motor 10 is engaged with an intermediate gear 83 which is rotatably mounted on an

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intermediate shaft 82 secured to the upper and lower boxes 69U and 69L. The intermediate gear 83 is engaged with a large diameter gear 85a of a first reduction gear 85 which is rotatably mounted on a first shaft 84 secured to the upper and lower boxes. A pinion 85b of the first reduction gear 85 is engaged with a second reduction gear 87 which is secured to a second shaft 86 rotatably supported on the lower box 69L through a bearing 88. An upper portion of the second shaft 86 is rotatably supported by a supporting disc 89 disposed between the upper and lower boxes 69U and 69L. Secured to a lower end portion of the second shaft 86 is a cylindrical cam 93.

Each impact rod 5 is slidably engaged in the retainer 94, and the impact head 7 is secured to the upper end 5a of the rod 5. A coil spring 96 is provided between a collar 95 secured to the rod 5 and a shoulder 69c of the upper box 69U so as to urge the rod 5 upwardly. On a lower end portion of the impact rod 5 slidably mounted is a cam follower 99. A buffer spring 100 is provided between a retainer 97 secured to the rod 5 and a shoulder of the cam follower 99, so that the cam follower 99 is yieldably engaged with an E-ring 98. Thus the cam follower 99 is resiliently engaged with the cam surface of the cylindrical cam 93 by the spring 96.

As shown in Fig. 9, the cylindrical cam 93 comprises a cam lobe portion 93a in the range of 240 degrees and a recessed cam portion 93b in 120 degrees. The three cam followers 99 slidably mounted on the

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respective impact rods 5 are yieldably engaged with cam surface of the cam 93 at equi-angular disposition at 120 degrees. A guide pin 102 projected on the lower box 69L is engaged with a recess 104 of a folk 99a of each cam follower 99, thereby preventing the cam follower 99 from rotating about the rod 5.

In place of the cylindrical cam, a driving system having another cam can be used.

A plastic disc 91 and a lubricating oil pad 90 are disposed in a recess 69d formed in the inner wall of the upper box 69U. The upper end of the second shaft 86 is slidably engaged with the disc 91.

Thus, when the reduction gear device and the cam mechanism are rotated by the motor, lubricating oil in the pad 90 is gradually fed to the parts for the lubricating thereof, thereby preventing the generations of noises.

As shown in Figs. 5 and 6, a supporting member 57 having a triangle shape in plan view is secured to the posts 37b of the upper block 37U by screws 58. The supporting member 57 has a base plate 57c, three cylindrical guides 57a integrally formed on the base plate, and a central hole 57d formed in the central portion adjacent to the cylindrical guides 57a.

Each of the guide portions 57a surrounds the impact head 7 for guiding the head in the axial direction.

In the central hole 57d, a lens-barrel 57b is inserted and secured to the supporting member 57 with a screw 58a. A condenser lens 61 is mounted in the lens-

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barrel 57b, protected by a protection glass 60 mounted on outer periphery of the hole 57d. At a lower portion of the supporting member 57, a terminal board 63 is mounted on the base 37d of the upper block 37U. A CCD element 62 as a foot sensor is mounted on the terminal board 63 corresponding to the lens-barrel 57b at a focused position of the lens 61.

As shown in Fig. 4, a guide frame 67 is secured to the footrest 3b of the upper housing 3U and abutted on the base plate 57c of the supporting member 57.

The cylindrical guide 57a of the supporting member 57 is guided by an inner periphery 65 of the guide frame 67 to be perpendicular to the footrest 3b. Thus, the position of the mass block 37 is ensured in the axial and horizontal directions.

When a foot is mounted on the footrest 3b, the foot sensor 62 detects that the light is blocked by the foot and the motor 10 is turned on, which will be described hereinafter.

Referring to Fig. 3, a transformer 13 is provided in the lower housing 3L for dropping a voltage of a commercial alternating source. The transformer 13 is secured to the bottom with a screw 16. The dropped voltage is rectified by a rectifier which is mounted on a main printed circuit board 15. The circuit board 15 having elements such as the rectifier is secured to posts formed on the bottom with screws 17.

A sub-circuit board 19 is secured to an inner portion of the upper housing 3U with screws 20,

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corresponding to the power button 24 provided on the central portion 3f of the upper housing 3U. A switch 21 of a power switch MS is mounted on the sub-circuit board 19. The switch 21 has a fixed contact 22 which is provided corresponding to a movable contact 25 connected to the power button 24. A return spring 23 is provided between the movable contact 25 and the sub-circuit board 19 so as to urge the movable contact 25 in an open state.

The sub-circuit board 19 is further provided with a power lamp R comprising a light emitting diode (LED) element. The power lamp R is provided corresponding to the power indicator 27 comprising a light transmittable member engaged in a hole 3c of the upper housing 3U.

The speed control dial 8 is connected to a shaft of a speed adjuster 9 secured to the upper housing 3U with a nut 9a. The reciprocating speed of the impact rod 5 is controlled by rotating the dial 8 with fingers of the foot.

Referring to Fig. 2, output signals of the power switch MS, foot sensor 62 and speed adjuster 9 are applied to a CPU. The CPU comprises a timer T and an AND gate. The timer T is set to produce a signal for a predetermined time (10 minutes).

When the power button 24 is pushed, the movable contact 25 engages with the fixed contact 22. Thus, the power switch MS is turned on, to produce a signal which is applied to the timer T to reset the timer. The timer T produces the signal for the predetermined time (10

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minutes), so that the LED element of the power lamp R is turned on. The signal of the timer T is further applied to an input of the AND gate. The other input of the AND gate is applied with a signal of the foot sensor 62. Thus an output signal of the AND gate is applied to the motor 10. An output of the speed controller 9 is applied to the motor 10. Thus, the motor 10 is operated at a speed dependent on the output signal of the speed adjuster.

When the power lamp R is turned on, the on-state is displayed by the indicator 27.

The operation of the device will be described hereinafter. The power button 24 is pushed to turn on the power switch MS. The timer T is reset for 10 minutes. The power indicator 27 emits the light to indicate a waiting state of the operation of the massage device to the user. The user sits down on a chair and his feet are mounted on the footrest 3b such that the arch of each sole is abutted on a set of impact heads 7. The foot sensor 62 detects the existence of the foot so that the motor 10 starts to operate. The motor 10 rotates the second shaft 86 through intermediate gear 83, first reduction gear 85, and second reduction gear 87. Thus, the cylindrical cam 93 is rotated in the direction shown by an arrow of Fig. 9. When the cam follower 99 of one of the impact rods 5 is mounted on the cam lobe portion 93a, the impact rod 5 is axially moved in the lower direction as shown in Fig. 7. The spring 96 is compressed and the impact head 7 and the

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retainer 94 are retracted. When the cam 93 is further rotated and the cam follower 99 falls on the recessed cam portion 93b, the impact rod 5 is abruptly moved in the upward direction by elastic force of the spring 96, whereby the sole of the foot is impacted by the massage impact head 7. Thus, three impact heads 7 cyclically hit the sole.

When the foot is removed from the footrest 3b during the operation, the foot sensor 62 detects the removable to stop the generation of the signal. Consequently, the motor 10 stops. Even if the foot is not removed from the footrest, if the set time of the timer T has passed, the motor also stops. Thus, the power waste is prevented.

The impact period of the impact heads 7 is controlled by the speed control dial 8.

In accordance with the present invention, each of the massage impact heads repeatedly impacts the sole of the foot with a light force. Thus, peripheral nerve in the sole is stimulated and capillary is expanded, thereby promoting the circulation of the blood. Consequently, the foot is effectively massaged.

If the foot has a damage such as tenosynovitis, the diseased part is loosened up by the massage impact heads with light force.

Furthermore, the mass block is suspended from the housing by springs and the gear box having the driving mechanism is suspended from the mass block by resilient damping members. Thus, noises and vibration of the gear

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box are not transmitted to the mass block, and vibration of the mass block is damped. Thus, the vibration of the housing and generation of noise are prevented. Consequently, a foot massage device having a high quality can be provided.

While the invention has been described in conjunction with preferred specific embodiment thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims.

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What is claimed is

1. A sole massage device comprising;

a housing having an inclined surface and a pair of footrests;

a plurality of impact rods disposed in perpendicular to the inclined surface and axially slidably mounted in the housing;

an impact head secured to a top of each of the impact rods and disposed so that a part of the impact head is projected from the footrest;

a reciprocating device for reciprocating the impact rods so that the impact head impacts a sole of a user mounted on the footrest; and

a driving device for driving the reciprocating device.

2. The device according to claim 1 wherein

the driving device comprises an electric motor and a reduction gear device for reducing rotational speed of a rotating output of the motor.

3. The device according to claim 1 wherein

the reciprocating device comprises a cam device.

4. The device according to claim 2 further comprising

a mass block suspended in the housing by horizontal springs and vertical springs so as to be held in a plane substantially parallel to the inclined surface,

the impact rod, reciprocating device, and driving device being provided in the mass block.

5. The device according to claim 2 further

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comprising

a power switch, a foot sensor for detecting mounting of a foot, a timer responsive to closing of the power switch for producing a signal for a predetermined time, an AND gate responsive to an output signal of the foot sensor and to the signal of the timer for producing a signal for operating the motor.

6. The device according to claim 3 wherein the cam device is arranged to cyclically project impact heads provided in one of the footrests.

7. The device according to claim 4 further comprising

a gear box supported in the mass block with resilient means, the impact rod is slidably mounted in the gear box, the reciprocating device and the motor are mounted on the gear box, and the reduction gear device is provided in the gear box.

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SOLE MASSAGE DEVICE

Abstract of the Disclosure

A housing having an inclined surface and a pair of footrests is provided for housing devices. A plurality of impact rods are disposed in perpendicular to the inclined surface and axially slidably mounted in the housing. An impact head is secured to a top of each of the impact rods. A reciprocating device is provided for reciprocating the impact rods so as to impact a sole of a user mounted on the footrest.

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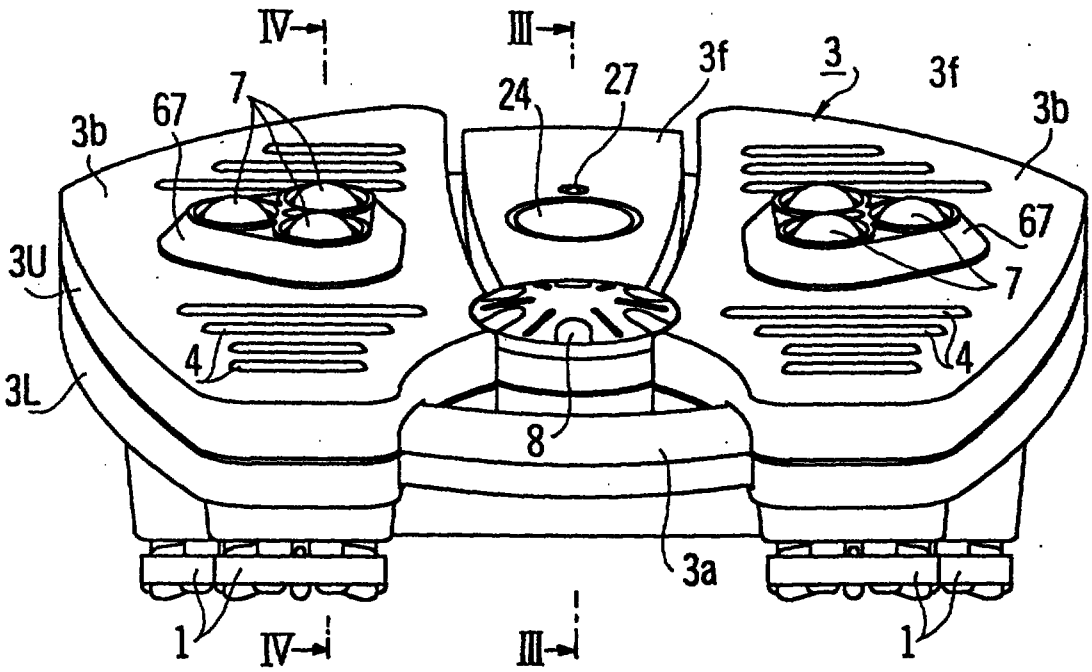


FIG. 1

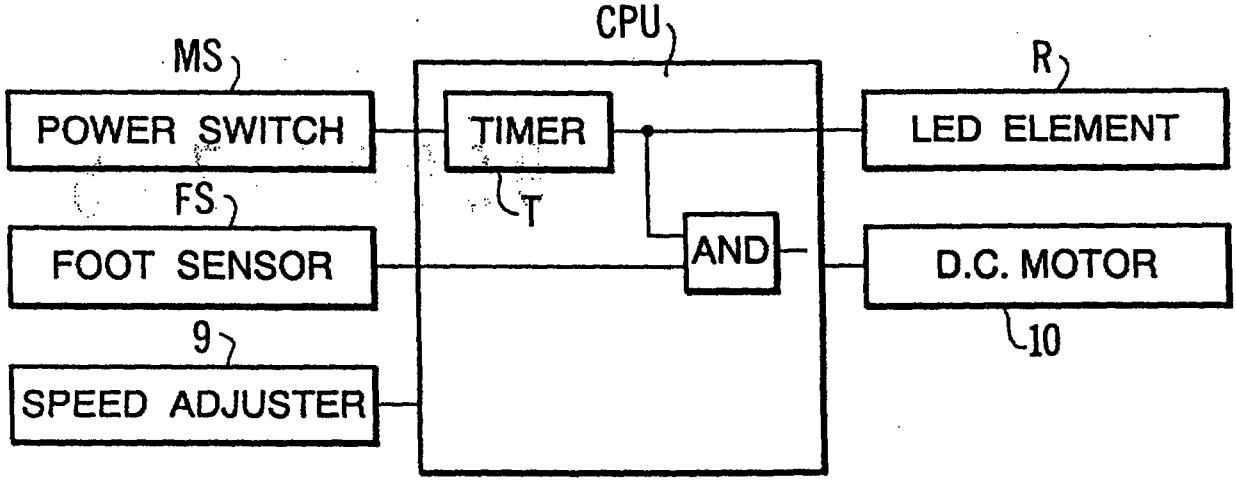


FIG. 2

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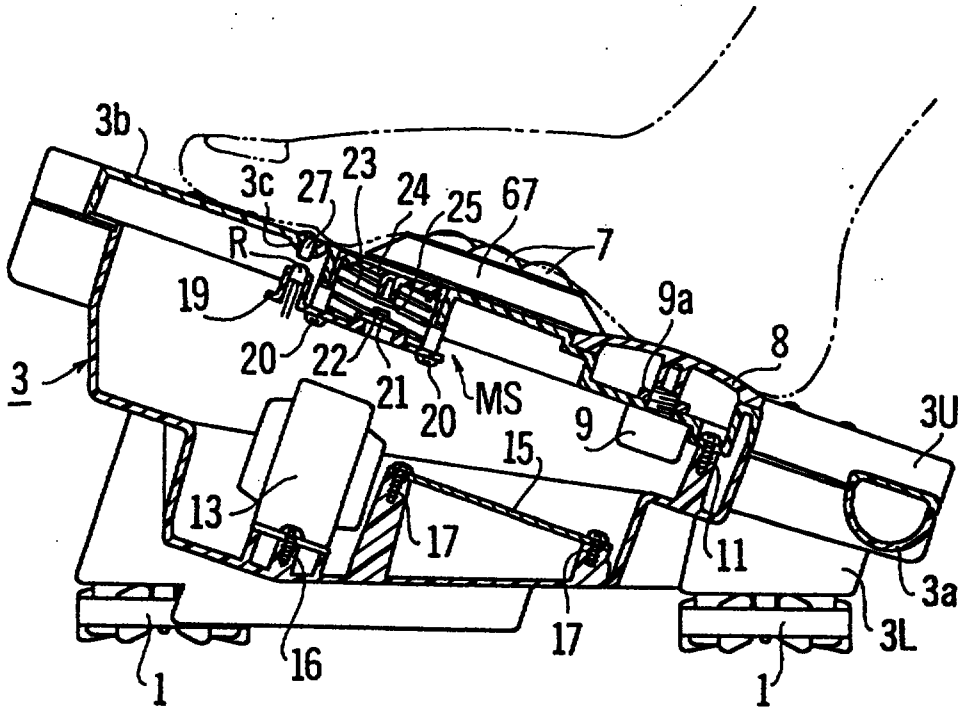


FIG. 3

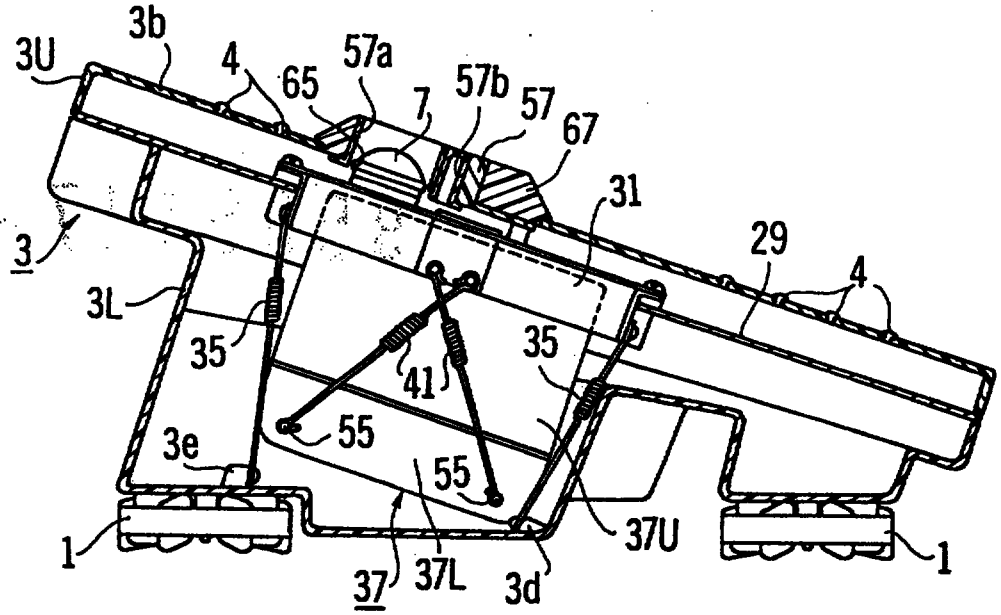


FIG. 4

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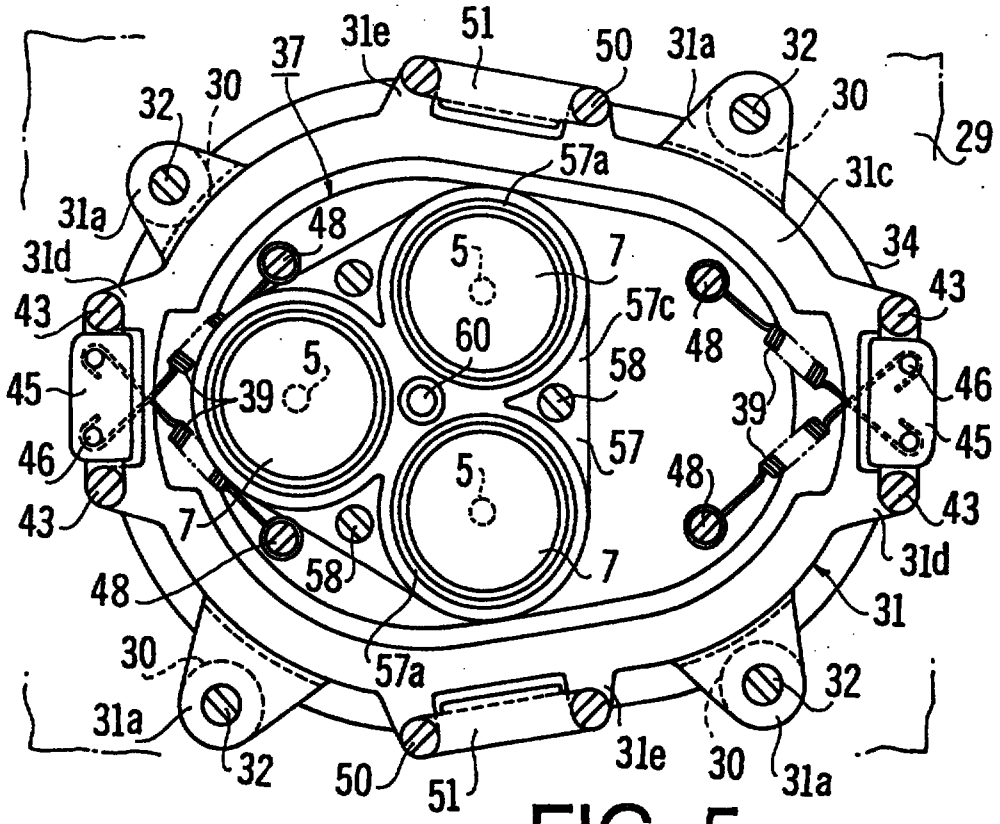


FIG. 5

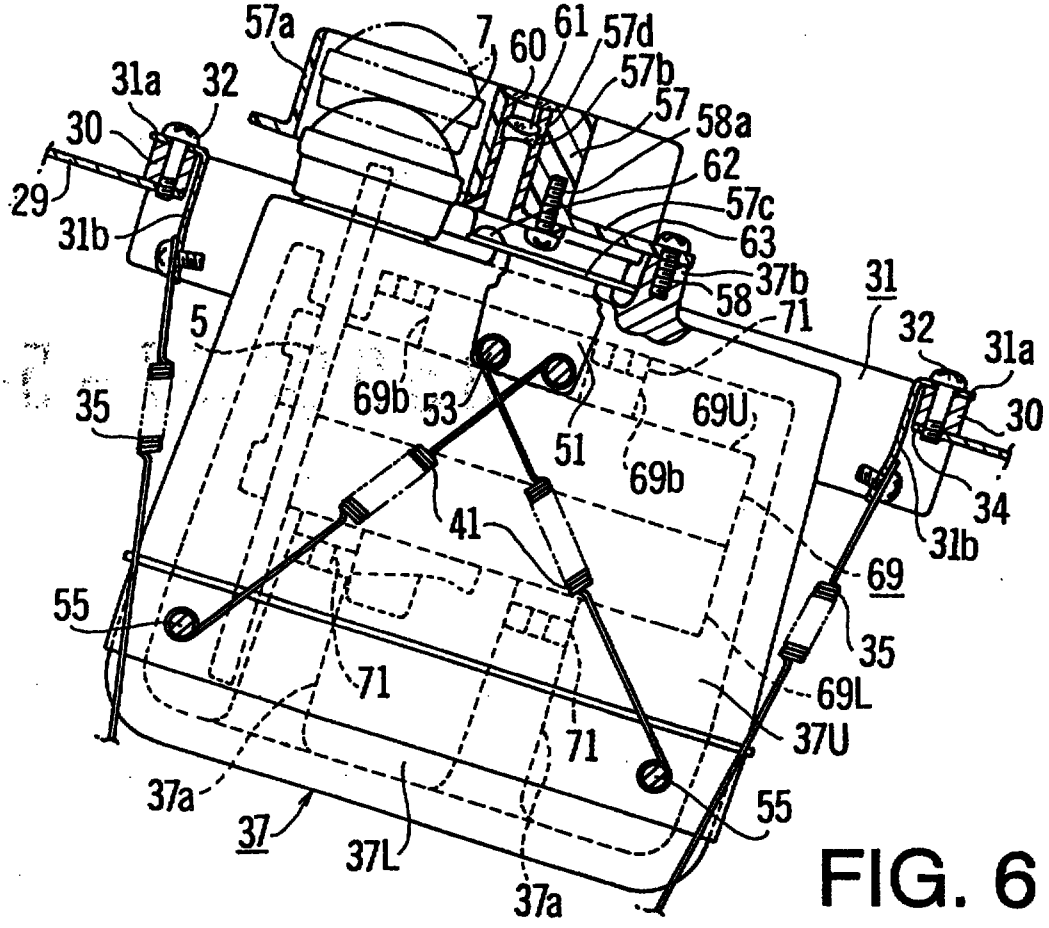


FIG. 6

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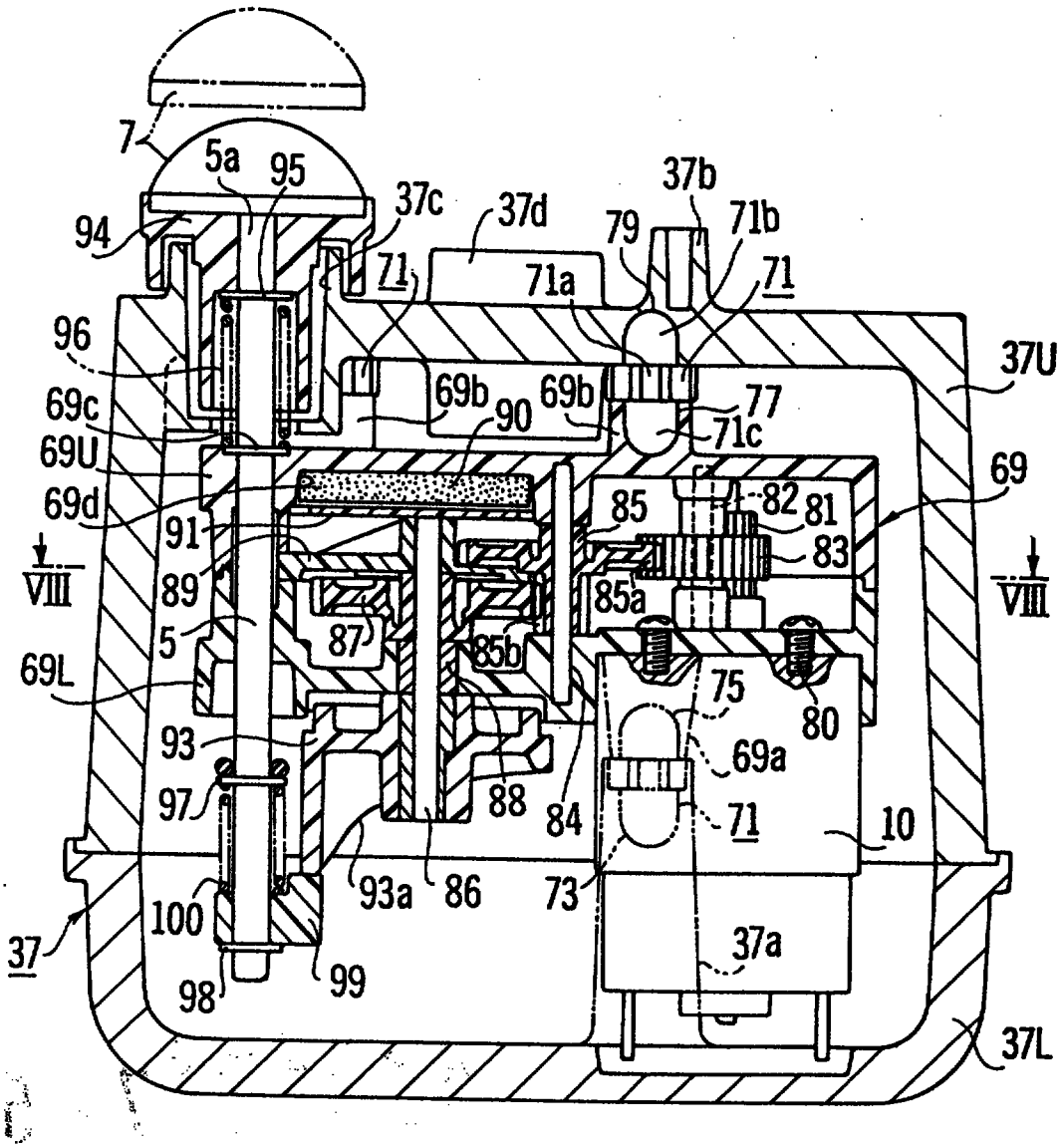


FIG. 7

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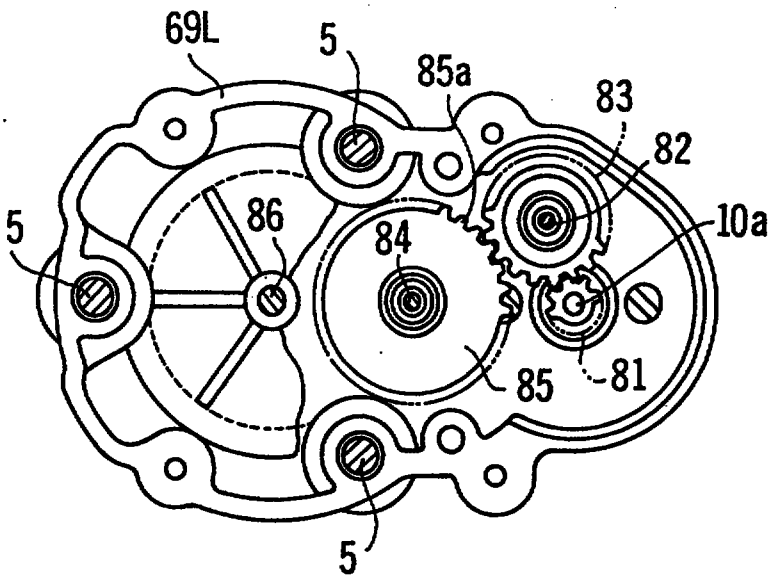


FIG. 8

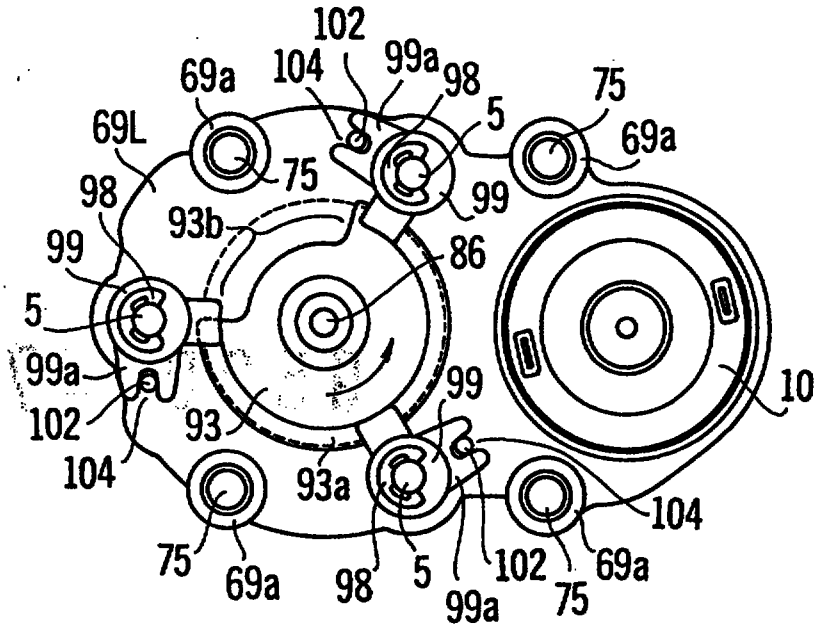


FIG. 9

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TITLE OF THE INVENTION

SOLE MASSAGE DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a foot massage device, and more particularly to a sole massage device in which a sole of a user is massaged to promote circulation of blood of the sole and to stimulate the peripheral nerve of the sole.

As well known, the artery, capillary and peripheral nerve are concentrated in the sole of the human body. If a leg is extremely tired, the circulation of the blood in the capillary becomes sluggish, causing the compression of the peripheral nerve. The recovery from the fatigue in the feet and legs delays, accordingly. The peripheral nerve of the sole is communicated with the brain through the nervous system. Therefore, it is said that the stimulation of the sole causes the brain to activate, and hence activation of the autonomic nerve can be expected.

In a folk medicine, a semicircular shaped tool on which a foot is mounted is used to dissipate the fatigue in feet and legs. In the field of the oriental medicine, the massage and the acupuncture are used from times of old to stimulate an acupoint at which the peripheral nerve is concentrated.

Recently, there have been developed various types of massage devices for promoting the circulation of the blood, and low frequency current devices for stimulating

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the peripheral nerve.

In the massage device, a plurality of pulsation rollers or pressure pads are provided for periodically pressing the sole so as to promote circulation of the blood.

In the low frequency current device, electrodes are adhered to acupoints at which the peripheral nerve is concentrated. A low frequency current is applied to the electrodes so as to relax muscles and tendons near the concentrated peripheral nerve.

However in such a massage device, the pressure of the roller or pad is too strong to provide a comfortable treatment and to recover from the fatigue. Furthermore, considerable electric power is consumed for driving heavy pulsation rollers or pressure pads. Therefore, the massage device is not suitable for easy use.

In the low frequency current device, the circulation of the blood is promoted by relaxing and tensing the muscle. Such a stimulation has not much effect on expanding the capillary in the sole.

There has been proposed a sole massage device having a plurality of impact massage heads for comfortably and rhythmically massaging a sole of a foot. The device comprises a plurality of impact rods each having a massage head, and a driving mechanism comprising a rod reciprocating system and a gear system.

However, when the impact rods are operated, the reciprocation system and the driving mechanism is

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considerably vibrated. The vibration is transmitted to a housing of the device, which causes noises and resonant sounds. Therefore such a massage device cannot be made into a high quality one.

SUMMARY OF THE INVENTION

A first object of the present invention is to provide a sole massage device by which a sole of a foot is comfortably and rhythmically massaged without pain, thereby effectively expanding the capillary and stimulating the peripheral nerve at the same time.

A second object of the present invention is to provide a sole massage device which does not cause noises during the operation without extremely pressing the foot.

A third object of the present invention is to provide a sole massage device which has a small power consumption, and does not consume useless power.

To the first object, according to the present invention, there is provided a sole massage device comprising a housing having an inclined surface and a pair of footrests, a plurality of impact rods disposed in perpendicular to the inclined surface and axially slidably mounted in the housing, an impact head secured to a top of each of the impact rods and disposed so that a part of the impact head is projected from the footrest, a reciprocating device for reciprocating the impact rods so as to impact a sole of a user mounted on the footrest, and a driving device for driving the

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reciprocating device.

To achieve the second object, a mass block is suspended in the housing by horizontal springs and vertical springs so as to be held in a plane substantially parallel to the inclined surface, the impact rod, reciprocating device, and driving device are provided in the mass block.

To the third object, there is provided a power switch, a foot sensor for detecting mounting of a foot, a timer responsive to closing of the power switch for producing a signal for a predetermined time, an AND gate responsive to an output signal of the foot sensor and to the signal of the timer for producing a signal for operating a driving motor.

In another aspect of the present invention, the massage device has further a gear box supported in the mass block with resilient means, the impact rod is slidably mounted in the gear box, the reciprocating device is mounted on the gear box, and the driving device is provided in the gear box.

The reciprocating device is arranged to cyclically project impact heads provided in one of the footrests.

These and other objects and features of the present invention will become more apparent from the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a front view showing a sole massage

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Date : 04 OCT 1995

device of the present invention;

Fig. 2 is a block diagram showing a control circuit of the sole massage device ;

Fig. 3 is a sectional side view of the device taken along a line III-III of Fig. 1;

Fig. 4 is a sectional side view of the device taken along a line IV-IV of Fig. 1;

Fig. 5 is a plan view showing a main part of the device;

Fig. 6 is a sectional side view of the part shown in Fig. 5;

Fig. 7 is a sectional view showing a driving system in a mass block of the device;

Fig. 8 is a sectional view showing a gear box taken along a line VIII - VIII of Fig. 7; and

Fig. 9 is a plan view of the gear box as viewed from the underside thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1, a sole massage device of the present invention is put on a floor in use. The sole massage device comprises a hollow housing 3 having an upper housing 3U and a lower housing 3L, four cylindrical pedestals 1, each having a circular shape in plane and secured to the lower housing 3L, and a handle 3a for carrying the device. The lower housing 3L is secured to the upper housing 3U with screws 11 (Fig. 3). The pedestals 1 are provided for preventing the device from vibrating when using.

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The upper housing 3U has an inclined surface to form right and left footrests 3b on which rest right and left feet of the user sitting on a chair are mounted, and a central portion 3f between the footrests 3b. Anti-slip ribs 4 made of rubber are disposed on the footrests 3b so as to prevent the feet from slipping. Three massage impact heads 7 guided by a guide frame 67 are exposed from the footrests 3b. On the central portion 3f, a speed control dial 8, a power switch button 24, and a power indicator 27 are provided.

Referring to Figs. 4, 5 and 6, a metallic frame plate 29 is secured between the upper housing 3U and the lower housing 3L corresponding to each footrest 3b. The frame plate 29 has an opening 34 of an elliptic shape, as shown in Fig. 5.

In the device of the invention, both of the right and left portions in the housing 3 have the same structure which is arranged in symmetry. Thus, one of the portions will be described hereinafter.

An annular connecting frame 31 having an elliptic shape in plan view is secured to the periphery of the opening 34 of the frame plate 29. The connecting frame 31 has an annular base portion 31b and an upper flange 31c. Four connecting lugs 31a are formed on the upper flange 31c. A pair of lugs 31d are formed on the upper flange 31c at opposite sides on the major axis thereof, and a pair of lugs 31e are formed on the upper flange 31c at opposite sides on the minor axis thereof.

Each of the connecting lugs 31a is mounted on the

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periphery of the opening 34 through a damping member 30 made of rubber and secured thereto with a screw 32.

A pair of springs 35 are provided between the base portion 31b and hook portions 3d and 3e provided on the bottom of the lower housing 3L opposite to each other. Thus, the connecting frame 31 is urged in the lower direction of the housing 3. Consequently, even if the screw 32 is accidentally disengaged from the frame plate 29, the connecting frame 31 is prevented from separating from the plate 29.

A hollow heavy mass block 37 having a driving mechanism is mounted in the housing 3 through the connecting frame 31. The mass block 37 is made of aluminum molded by die casting, and comprises an upper block 37U and a lower block 37L. The upper block 37U and the lower block 37L are coupled through a shielding means, thereby preventing noises produced in the mass block from leaking.

As shown in Fig. 5, a bracket 45 is secured to each of the lugs 31d with screws 43. A pair of horizontal springs 39 are provided between pins 46 on the bracket 45 and screws 48 secured to an upper plate of the upper block 37U, arranged in cross. The mass block 37 is thus suspended by the horizontal springs 39 in the lower housing 3L such that an upper surface of the mass block 37 is parallel with the inclined footrests 3b of the housing 3.

As shown in Fig. 6, a bracket 51 is secured to the lugs 31e on each side with screws 50. A pair of

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vertical springs 39 are provided between screws 53 secured to the bracket 51 and screws 55 secured to a side plate of the lower block 37L, arranged in cross. The mass block 37 is thus vertically suspended in the lower housing 3L by the vertical springs 41.

Consequently, the mass block 37 is stably suspended in the housing 3 by the horizontal and vertical springs 39 and 41, keeping balance.

Referring to Fig. 7, the upper block 37U of the mass block 37 has three posts 37b (only one of them is viewed), three openings 37c (only one of them is viewed) and a base 37d formed on the upper plate thereof.

In the mass block 37, a gear box 69 having a rod reciprocating device and a driving device for the reciprocating device are mounted. The gear box 69 is made of plastic such as polyacetal resin and formed by injection molding and comprises an upper box 69U and a lower box 69L. The rod reciprocating system is a reduction gear system.

As shown in Fig. 7, the gear box 69 is mounted in the mass block 37 through a plurality of resilient damping members 71. The damping member 71 comprises a collar 71a, and upper and lower resilient dampers 71b and 71c integral with the collar at opposite sides thereof.

The lower block 37L has four posts 37a each of which has a hole 73. The lower box 69L has four posts 69a formed corresponding to the posts 37a, each having a hole 75 (Fig. 9). The lower damper 71c of the damping

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member 71 is engaged in the hole 73 and the upper damper 71b is fitted in hole 75.

The upper box 69U has four posts 69b each of which has a hole 77. The upper block 37U has four holes 79 formed on an inner wall of an upper plate thereof corresponding to the posts 69b. The lower damper 71c of the damping member 71 is engaged with the hole 77 and the upper damper 71b is engaged in the hole 79.

Thus, vibration of the gear box 69 is damped by the resilient damping members 71 and not transmitted to the mass block 37.

Three impact rods 5 (only one of them is viewed in Fig. 7) each of which has the massage impact head 7 are axially slidably mounted in the gear box 69. A cylindrical retainer 94 made of resin is engaged on each of the rods 5 adjacent the head 7 and upwardly projected from the upper block 37U passing through a hole 37C formed in the upper plate of the block 37U. The rods 5 are parallel with each other in the axial direction and disposed so as to be perpendicular to the inclined footrest 3b of the housing 3. In a retracted position, the massage impact head 7 is located near the upper block 37U.

Describing the reciprocating device and driving device for the impact rod 5, a direct current motor 10 is secured to the underside of the lower box 69L with screws 80. A drive pinion 81 secured to a drive shaft 10a (Fig. 8) of the motor 10 is engaged with an intermediate gear 83 which is rotatably mounted on an

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intermediate shaft 82 secured to the upper and lower boxes 69U and 69L. The intermediate gear 83 is engaged with a large diameter gear 85a of a first reduction gear 85 which is rotatably mounted on a first shaft 84 secured to the upper and lower boxes. A pinion 85b of the first reduction gear 85 is engaged with a second reduction gear 87 which is secured to a second shaft 86 rotatably supported on the lower box 69L through a bearing 88. An upper portion of the second shaft 86 is rotatably supported by a supporting disc 89 disposed between the upper and lower boxes 69U and 69L. Secured to a lower end portion of the second shaft 86 is a cylindrical cam 93.

Each impact rod 5 is slidably engaged in the retainer 94, and the impact head 7 is secured to the upper end 5a of the rod 5. A coil spring 96 is provided between a collar 95 secured to the rod 5 and a shoulder 69c of the upper box 69U so as to urge the rod 5 upwardly. On a lower end portion of the impact rod 5 slidably mounted is a cam follower 99. A buffer spring 100 is provided between a retainer 97 secured to the rod 5 and a shoulder of the cam follower 99, so that the cam follower 99 is yieldably engaged with an E-ring 98. Thus the cam follower 99 is resiliently engaged with the cam surface of the cylindrical cam 93 by the spring 96.

As shown in Fig. 9, the cylindrical cam 93 comprises a cam lobe portion 93a in the range of 240 degrees and a recessed cam portion 93b in 120 degrees. The three cam followers 99 slidably mounted on the

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respective impact rods 5 are yieldably engaged with cam surface of the cam 93 at equi-angular disposition at 120 degrees. A guide pin 102 projected on the lower box 69L is engaged with a recess 104 of a folk 99a of each cam follower 99, thereby preventing the cam follower 99 from rotating about the rod 5.

In place of the cylindrical cam, a driving system having another cam can be used.

A plastic disc 91 and a lubricating oil pad 90 are disposed in a recess 69d formed in the inner wall of the upper box 69U. The upper end of the second shaft 86 is slidably engaged with the disc 91.

Thus, when the reduction gear device and the cam mechanism are rotated by the motor, lubricating oil in the pad 90 is gradually fed to the parts for the lubricating thereof, thereby preventing the generations of noises.

As shown in Figs. 5 and 6, a supporting member 57 having a triangle shape in plan view is secured to the posts 37b of the upper block 37U by screws 58. The supporting member 57 has a base plate 57c, three cylindrical guides 57a integrally formed on the base plate, and a central hole 57d formed in the central portion adjacent to the cylindrical guides 57a.

Each of the guide portions 57a surrounds the impact head 7 for guiding the head in the axial direction.

In the central hole 57d, a lens-barrel 57b is inserted and secured to the supporting member 57 with a screw 58a. A condenser lens 61 is mounted in the lens-

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barrel 57b, protected by a protection glass 60 mounted on outer periphery of the hole 57d. At a lower portion of the supporting member 57, a terminal board 63 is mounted on the base 37d of the upper block 37U. A CCD element 62 as a foot sensor is mounted on the terminal board 63 corresponding to the lens-barrel 57b at a focused position of the lens 61.

As shown in Fig. 4, a guide frame 67 is secured to the footrest 3b of the upper housing 3U and abutted on the base plate 57c of the supporting member 57.

The cylindrical guide 57a of the supporting member 57 is guided by an inner periphery 65 of the guide frame 67 to be perpendicular to the footrest 3b. Thus, the position of the mass block 37 is ensured in the axial and horizontal directions.

When a foot is mounted on the footrest 3b, the foot sensor 62 detects that the light is blocked by the foot and the motor 10 is turned on, which will be described hereinafter.

Referring to Fig. 3, a transformer 13 is provided in the lower housing 3L for dropping a voltage of a commercial alternating source. The transformer 13 is secured to the bottom with a screw 16. The dropped voltage is rectified by a rectifier which is mounted on a main printed circuit board 15. The circuit board 15 having elements such as the rectifier is secured to posts formed on the bottom with screws 17.

A sub-circuit board 19 is secured to an inner portion of the upper housing 3U with screws 20,

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corresponding to the power button 24 provided on the central portion 3f of the upper housing 3U. A switch 21 of a power switch MS is mounted on the sub-circuit board 19. The switch 21 has a fixed contact 22 which is provided corresponding to a movable contact 25 connected to the power button 24. A return spring 23 is provided between the movable contact 25 and the sub-circuit board 19 so as to urge the movable contact 25 in an open state.

The sub-circuit board 19 is further provided with a power lamp R comprising a light emitting diode (LED) element. The power lamp R is provided corresponding to the power indicator 27 comprising a light transmittable member engaged in a hole 3c of the upper housing 3U.

The speed control dial 8 is connected to a shaft of a speed adjuster 9 secured to the upper housing 3U with a nut 9a. The reciprocating speed of the impact rod 5 is controlled by rotating the dial 8 with fingers of the foot.

Referring to Fig. 2, output signals of the power switch MS, foot sensor 62 and speed adjuster 9 are applied to a CPU. The CPU comprises a timer T and an AND gate. The timer T is set to produce a signal for a predetermined time (10 minutes).

When the power button 24 is pushed, the movable contact 25 engages with the fixed contact 22. Thus, the power switch MS is turned on, to produce a signal which is applied to the timer T to reset the timer. The timer T produces the signal for the predetermined time (10

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minutes), so that the LED element of the power lamp R is turned on. The signal of the timer T is further applied to an input of the AND gate. The other input of the AND gate is applied with a signal of the foot sensor 62. Thus an output signal of the AND gate is applied to the motor 10. An output of the speed controller 9 is applied to the motor 10. Thus, the motor 10 is operated at a speed dependent on the output signal of the speed adjuster.

When the power lamp R is turned on, the on-state is displayed by the indicator 27.

The operation of the device will be described hereinafter. The power button 24 is pushed to turn on the power switch MS. The timer T is reset for 10 minutes. The power indicator 27 emits the light to indicate a waiting state of the operation of the massage device to the user. The user sits down on a chair and his feet are mounted on the footrest 3b such that the arch of each sole is abutted on a set of impact heads 7. The foot sensor 62 detects the existence of the foot so that the motor 10 starts to operate. The motor 10 rotates the second shaft 86 through intermediate gear 83, first reduction gear 85, and second reduction gear 87. Thus, the cylindrical cam 93 is rotated in the direction shown by an arrow of Fig. 9. When the cam follower 99 of one of the impact rods 5 is mounted on the cam lobe portion 93a, the impact rod 5 is axially moved in the lower direction as shown in Fig. 7. The spring 96 is compressed and the impact head 7 and the

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retainer 94 are retracted. When the cam 93 is further rotated and the cam follower 99 falls on the recessed cam portion 93b, the impact rod 5 is abruptly moved in the upward direction by elastic force of the spring 96, whereby the sole of the foot is impacted by the massage impact head 7. Thus, three impact heads 7 cyclically hit the sole.

When the foot is removed from the footrest 3b during the operation, the foot sensor 62 detects the removable to stop the generation of the signal. Consequently, the motor 10 stops. Even if the foot is not removed from the footrest, if the set time of the timer T has passed, the motor also stops. Thus, the power waste is prevented.

The impact period of the impact heads 7 is controlled by the speed control dial 8.

In accordance with the present invention, each of the massage impact heads repeatedly impacts the sole of the foot with a light force. Thus, peripheral nerve in the sole is stimulated and capillary is expanded, thereby promoting the circulation of the blood. Consequently, the foot is effectively massaged.

If the foot has a damage such as tenosynovitis, the diseased part is loosened up by the massage impact heads with light force.

Furthermore, the mass block is suspended from the housing by springs and the gear box having the driving mechanism is suspended from the mass block by resilient damping members. Thus, noises and vibration of the gear

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box are not transmitted to the mass block, and vibration of the mass block is damped. Thus, the vibration of the housing and generation of noise are prevented. Consequently, a foot massage device having a high quality can be provided.

While the invention has been described in conjunction with preferred specific embodiment thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims.

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What is claimed is

1. A sole massage device comprising;

a housing having an inclined surface and a pair of footrests;

a plurality of impact rods disposed in perpendicular to the inclined surface and axially slidably mounted in the housing;

an impact head secured to a top of each of the impact rods and disposed so that a part of the impact head is projected from the footrest;

a reciprocating device for reciprocating the impact rods so that the impact head impacts a sole of a user mounted on the footrest; and

a driving device for driving the reciprocating device.

2. The device according to claim 1 wherein

the driving device comprises an electric motor and a reduction gear device for reducing rotational speed of a rotating output of the motor.

3. The device according to claim 1 wherein

the reciprocating device comprises a cam device.

4. The device according to claim 2 further comprising

a mass block suspended in the housing by horizontal springs and vertical springs so as to be held in a plane substantially parallel to the inclined surface,

the impact rod, reciprocating device, and driving device being provided in the mass block.

5. The device according to claim 2 further

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comprising

a power switch, a foot sensor for detecting mounting of a foot, a timer responsive to closing of the power switch for producing a signal for a predetermined time, an AND gate responsive to an output signal of the foot sensor and to the signal of the timer for producing a signal for operating the motor.

6. The device according to claim 3 wherein

the cam device is arranged to cyclically project impact heads provided in one of the footrests.

7. The device according to claim 4 further comprising

a gear box supported in the mass block with resilient means, the impact rod is slidably mounted in the gear box, the reciprocating device and the motor are mounted on the gear box, and the reduction gear device is provided in the gear box.

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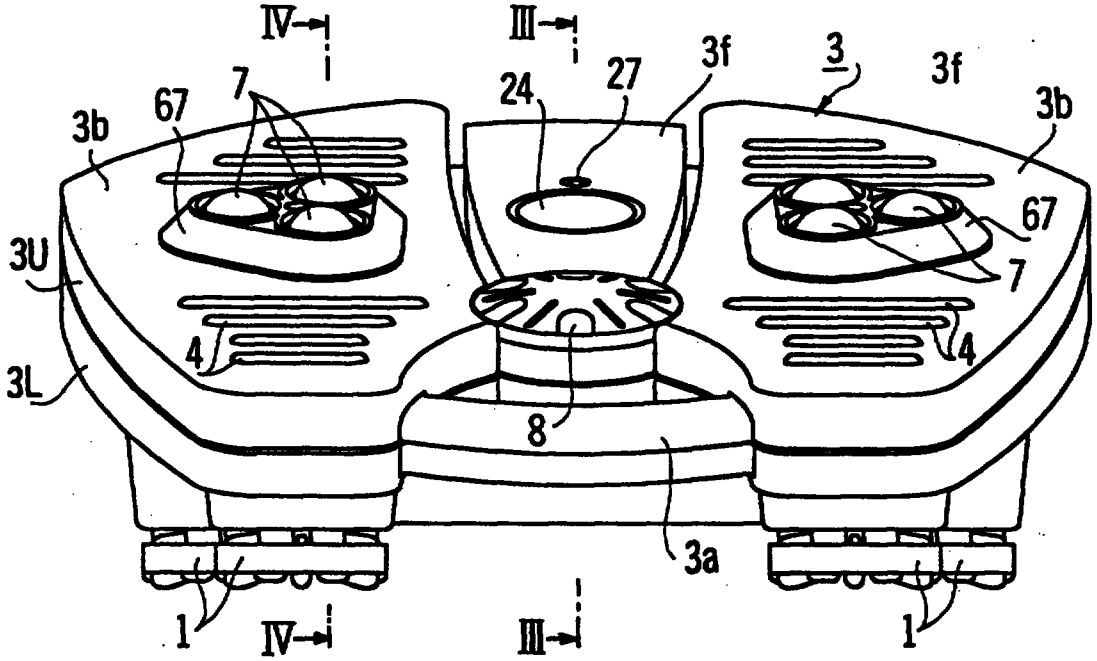


FIG. 1

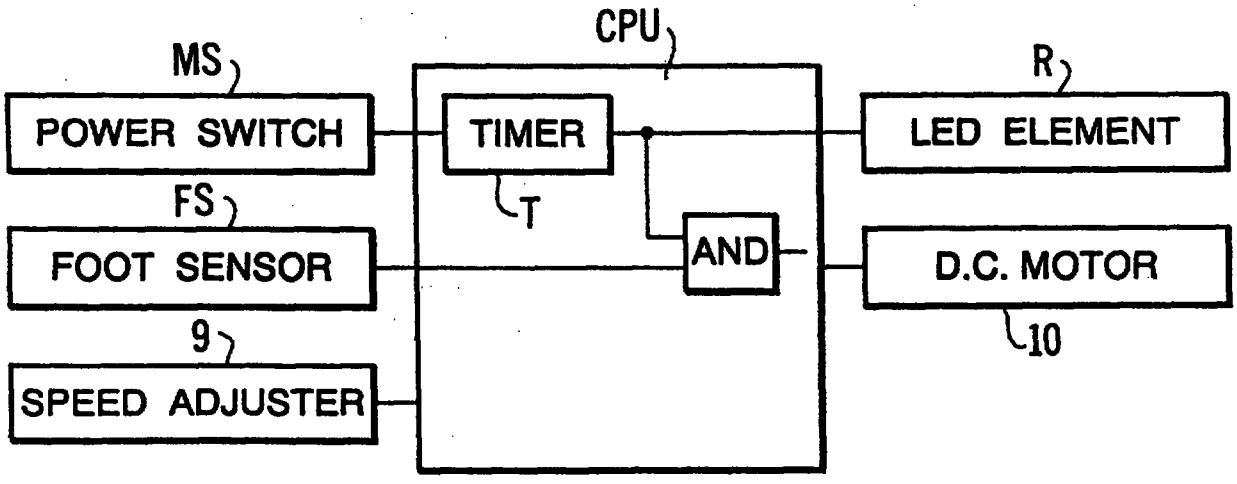


FIG. 2

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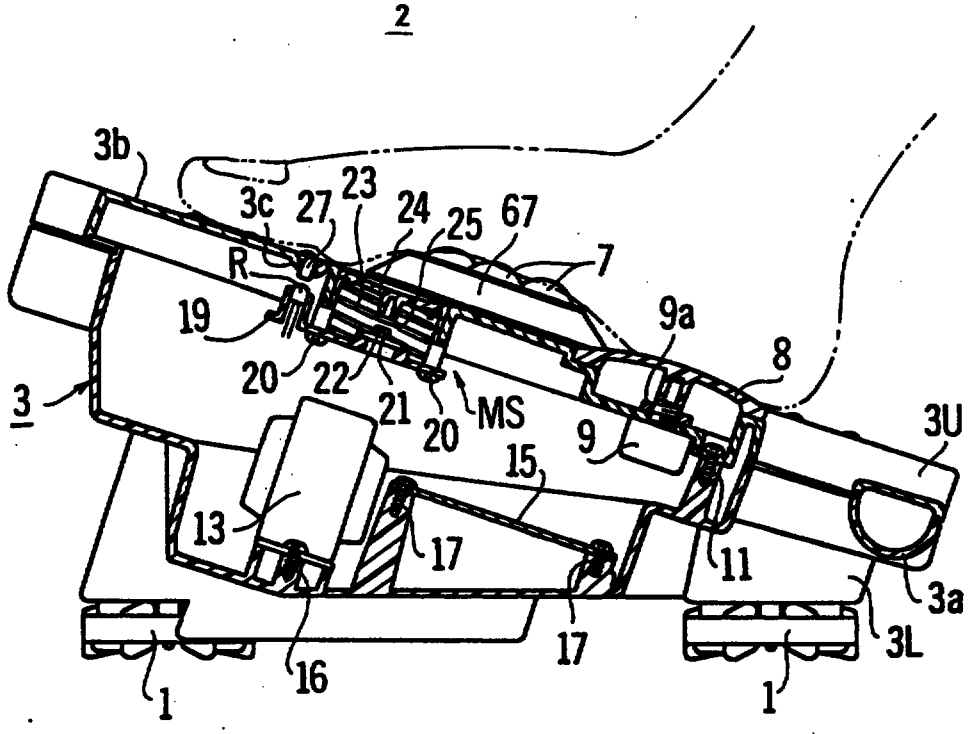


FIG. 3

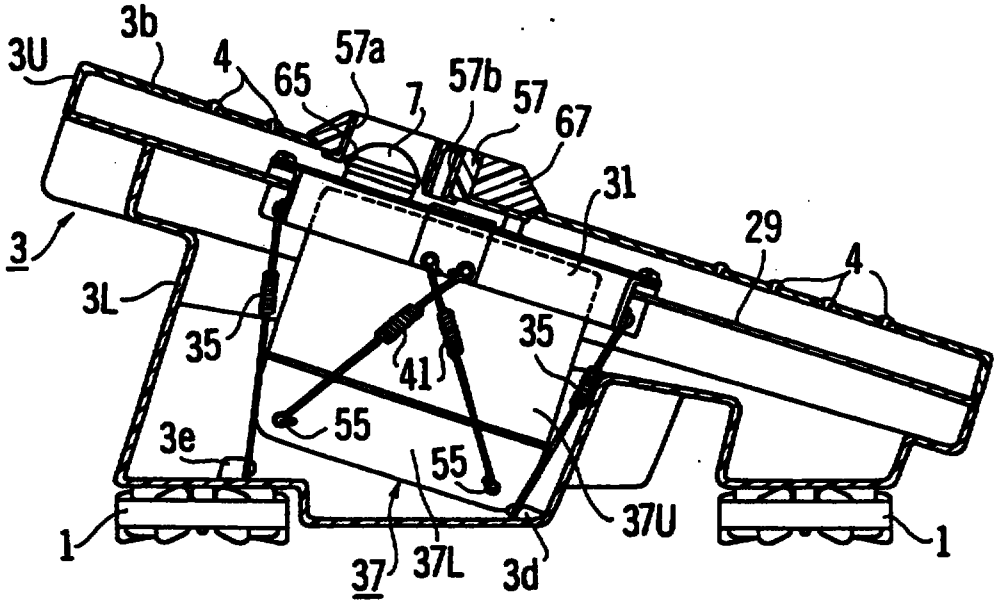


FIG. 4

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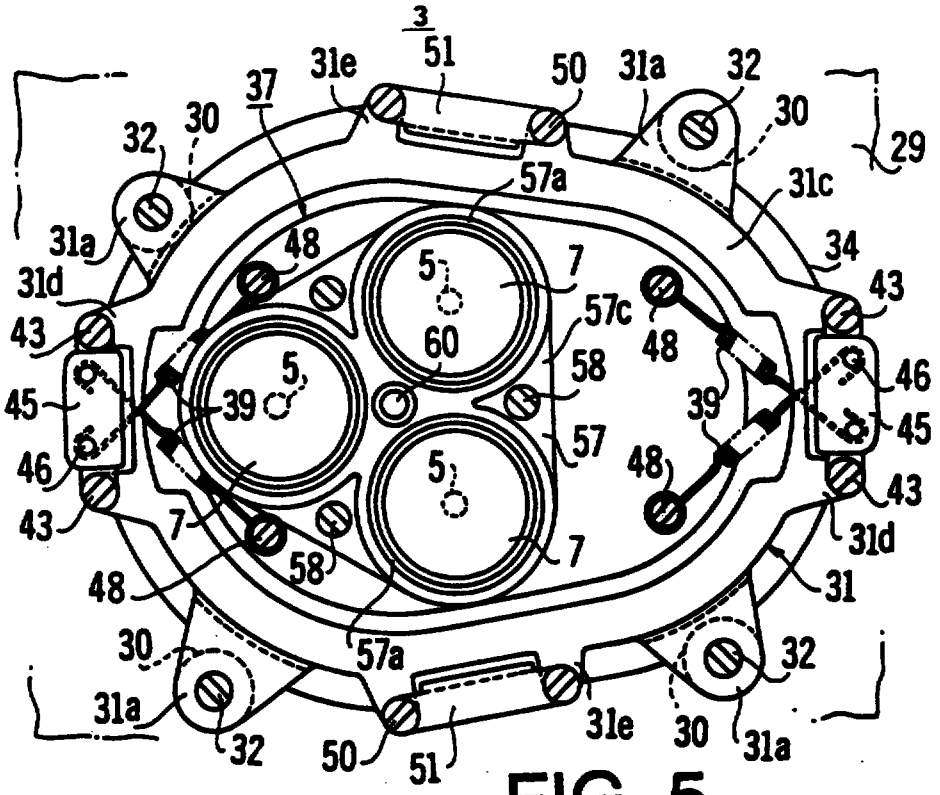


FIG. 5

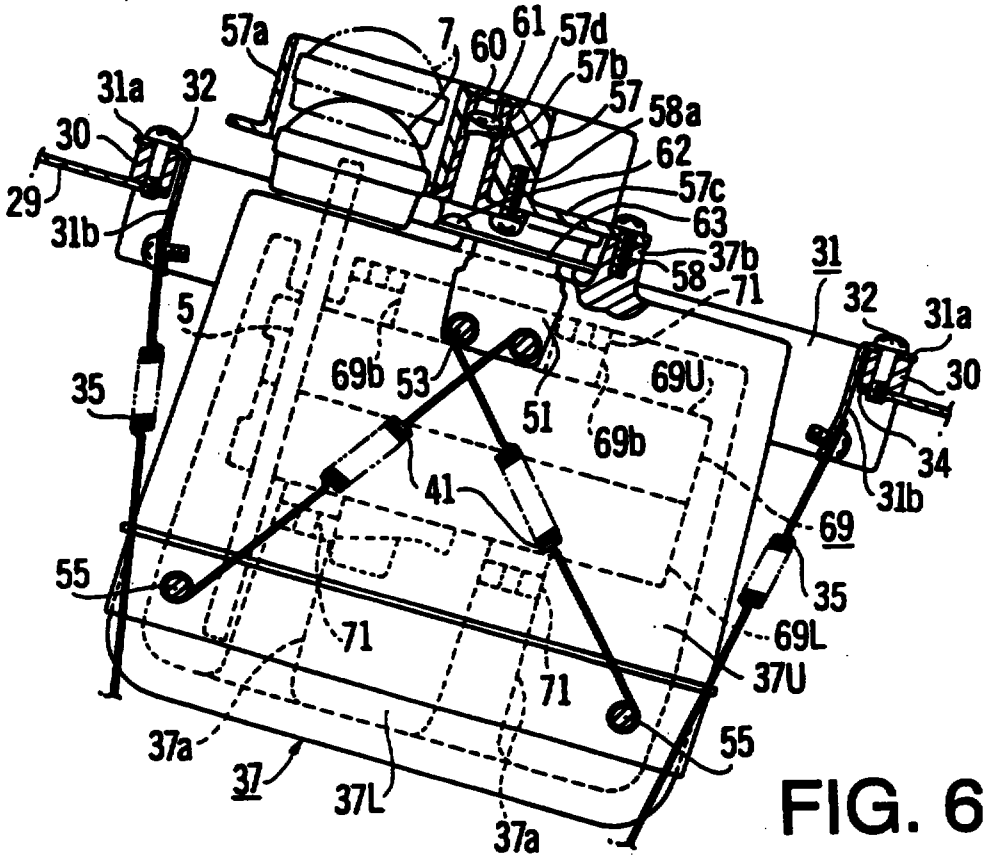


FIG. 6

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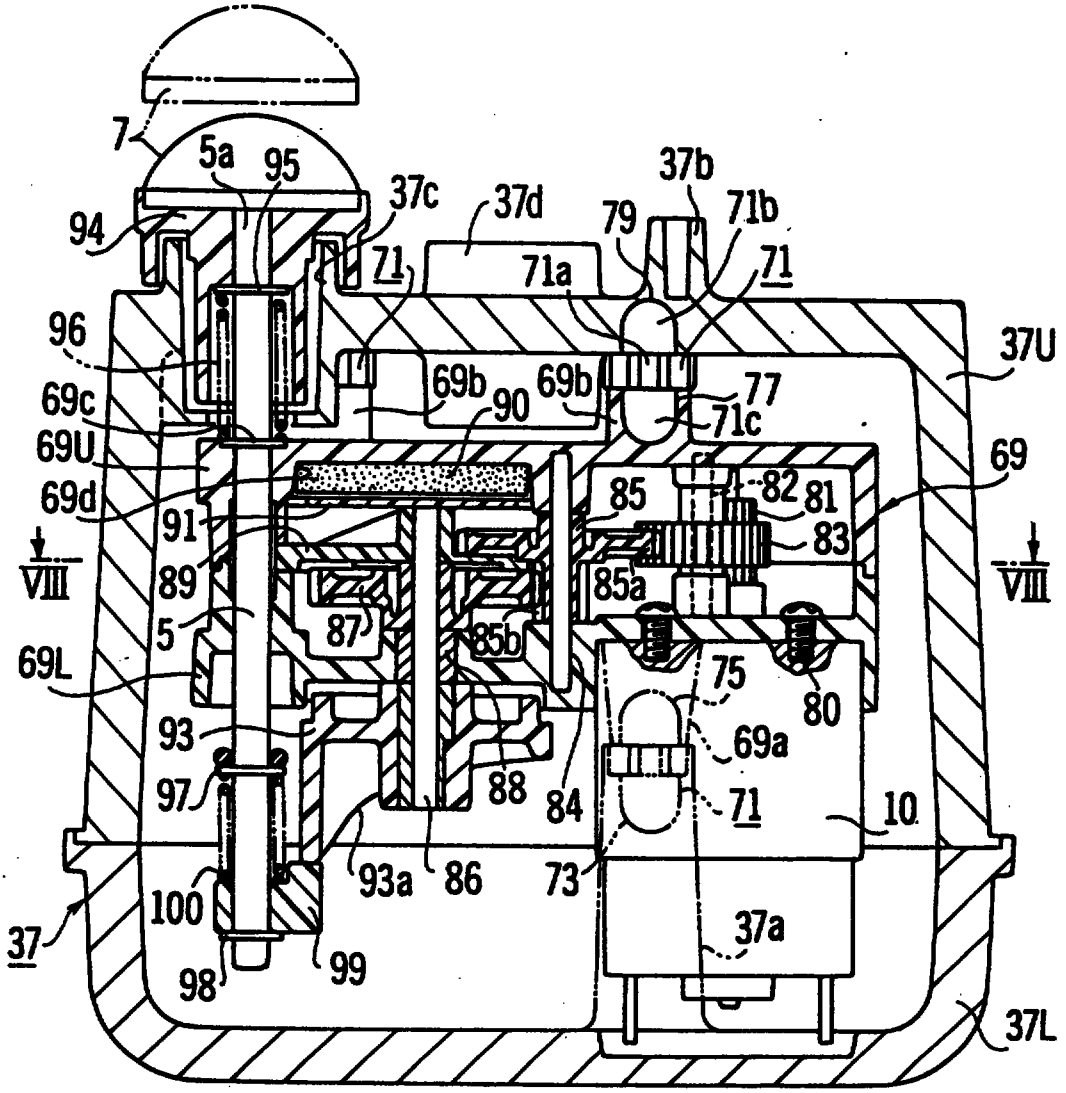


FIG. 7

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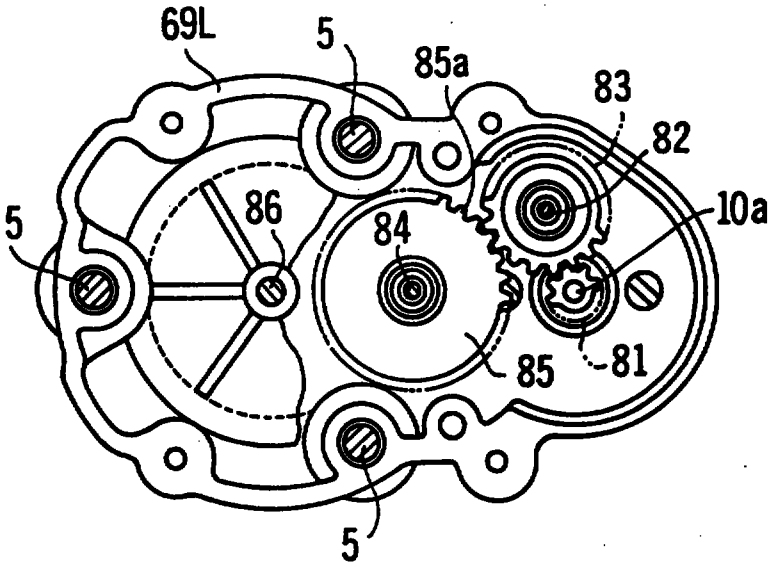


FIG. 8

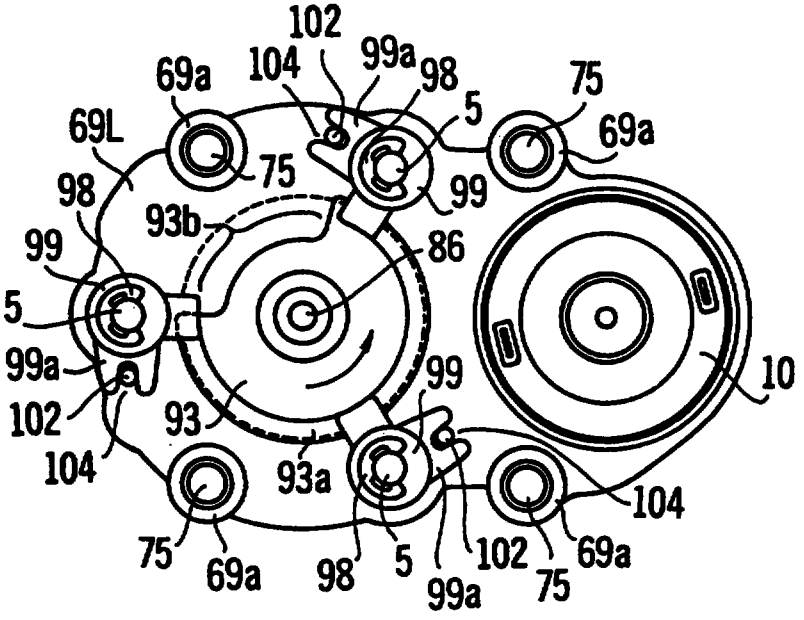


FIG. 9

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SOLE MASSAGE DEVICE

Abstract of the Disclosure

A housing having an inclined surface and a pair of footrests is provided for housing devices. A plurality of impact rods are disposed in perpendicular to the inclined surface and axially slidably mounted in the housing. An impact head is secured to a top of each of the impact rods. A reciprocating device is provided for reciprocating the impact rods so as to impact a sole of a user mounted on the footrest.