DESCRIPTION

1. Field of the Invention:

The present invention relates generally to massage devices, massage robots, and physiotherapy treatment apparatuses. More particularly, the present invention relates to devices for performing automatic human-like pressing and rubbing massages. Massage involves working and acting on the body with pressure. Techniques are commonly applied using hands, fingers, elbows, knees, forearm, feet, or a device. In almost all massage principles and streams, massage therapists use a certain portion of their body or device of a certain shape to provide various massage manipulations. For example, shiatsu, or "finger-pressure" uses the finger to apply comfortable, sustained pressure to the body to restore health. In Traditional Chinese Medicine, fingers and elbow are used to perform acupressure massage or targeted massage treatment. In recent years, the demand for robotic massage and other automatic massage apparatus is rising.

2. Description of Related Art

Several devices have been proposed for use as automatic massage apparatus to simulate human-like massages. Various massage apparatuses are developed for massage chairs and massage apparatus which aim to provide human-like massages. Examples of such devices are disclosed in U.S. pat Nos. 5,352,186; 5,103,809; 5183,035. In spite of this development, there is lack of true human touch as the shape of the massage apparatus are quite different from human fingers, palms, and elbows. Those massage apparatuses are not soft and warm as the human touch. The motions of these inventions are not automatic or very different from human massage therapists' massage motions. Hence none of the previous inventions are able to provide automatic human-like massage sensations.

3. SUMMARY OF THE INVENTION

The present invention is to propose an apparatus which can be used alone or integrated with other massage chairs, beds, robots or devices to enhance the massage performances and effects.
A soft massage component which has the same shape as a certain portion of the human massage therapists, such as the finger, palm or elbow, is attached to another device which can provide a special circular motion in which the contact surface of the massage component remains the same orientation while rotating and rubbing with assigned pressing force.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

FIG.1 is an explanatory view of the whole apparatus including artificial touch massage module, rotational motion control module, force control module and a connection module.
FIG.2 is an explanatory view of an example of the artificial touch module which is named as artificial finger module for further description.

FIG.3 is the sectional view of the artificial finger module.
FIG.4 is another example of the artificial touch module which is named as artificial palm module for further description.
FIG.5 is the sectional view of the artificial palm module.
FIG.6 is an explanatory view of another embodiment of this invention for the circular massage motion module.
FIG.7 is an explanatory view of an embodiment of this invention which provides the force and drives circular motion module.
FIG.8 is an explanatory view of another example of the embodiment which can be used to replace the embodiment in FIG.7 to provide similar force to drive the circular motion module.
FIG.9 is an explanatory view of an embodiment of this invention for the force control module.

Alternative embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope and spirit of the invention being indicated by the claims.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The detailed description describes the invention as it may be used to provide human-like automatic massage to a specific portion of the human body. It is to be understood that these are merely examples of structures to simulate human massages, such finger, palm, elbow pressing, rubbing and other massage techniques.

The embodiments of the present invention are now discussed, referring to the drawings.

FIG.1 shows the structure of the whole apparatus including artificial touch massage module 004, rotational motion control module 003, force control module 001 and connection module 002. The connection module 002 can be used to attach this apparatus to other devices, equipment, robots or objects.
FIG.2 is an explanatory view of an example of the artificial touch module 004 and is named as artificial finger module 005 for further description. This module is used to simulate human finger massages. The artificial finger module 005 can be replaced by a similar module of other shapes to simulate other types of human massages.
FIG.3 is the sectional view of the artificial finger module 005. The artificial finger module 005 has a shape of the human finger and is covered by soft material cover 006. Inside the artificial finger module 005, there is a hard-supporting material 007 and thermal heating and temperature sensor module 009 to heat up the artificial finger module 005 to a certain temperature. In between the soft material 006 and thermal heating and temperature sensor module 009, force sensors layer 008 consists of several small force sensors to monitor contact force from different directions. The control unit 010 controls the thermal heating and temperature sensor module 009 as well as force sensors 008.

FIG.4 is another example of the artificial touch module 004 which is named as artificial palm module 011 for further description. The artificial palm module 011 can be used to replace artificial finger module 005 to simulate human palm massages.
FIG.5 is the sectional view of the artificial palm module 011. The artificial palm module 011 has a shape of the human palm and covered by soft material cover 012. Inside the artificial palm module 011, there is a hard-supporting material 015 and thermal heating and temperature sensor module 013 to heat up the artificial palm module 011 to a certain temperature. In between the soft material 012 and hard supporting material 015, force sensors layer 014 consists of several small force sensors to monitor various contact force at different positions.
FIG.6 is an explanatory view of an embodiment of this invention for the circular massage motion module. When the main shaft pulley 020 rotates, the rotational shaft 018 which is fixed to the main shaft pulley 020 also rotates simultaneously. The rotary motion of rotational shaft 018 pulls the connecting plate 017 to move circularly while remaining the orientation unchanged. The rational pin 019 reduces the frictions and helps to achieve a smooth motion. The follow shaft pulley 021 is fixed to other rotational shaft 018 to follow the rotation and motion through connecting plate 017. The artificial touch module 004 is attached to the connecting plate 017 so that the artificial touch module 004 is able to perform a massage rubbing motion which is similar to human massage rubbing motion.
FIG.7 is an explanatory view of an embodiment of this invention which provides the force and drives circular motion module. The main shaft pulley 020 is connected to a motor 025 which provides the rotary force. The main shaft pulley 020 also drives the belt 023 to pass the power to the follow shaft pulley 021, which rotates the rotational shafts 018 to drive the connecting plate 017 to move circularly. The Upper plate 024 and smooth lower plate 016 are connected by several supporting struts 022.
FIG.8 is an explanatory view of another example of the embodiment which can be used to replace the embodiment in FIG.7 to provide similar force to drive the circular motion module. The motor 025 can be connected to another circular motion module shown in this diagram to achieve the same function of the rotational motion control module shown in FIG.7. In FIG.8, the motor 025 can rotate the gears 028 to drives the rotational shafts 018 to rotate, and hence drives the circular motion of the connecting plate 017, to move the artificial touch module 004 to achieve circular massage rubbing motion.
FIG.9 is an explanatory view of an embodiment of this invention for the force control module 001. The force control module 001 consists of a motor 029 which can rotate and drive the linear rail bar shaft 032 through a belt 030. The linear rail bar shaft can transfer the rotary motion of motor into the linear motion of moving block 033 to control its position. As the moving block 033 connects to the rotational motion control module 003 and artificial touch module 004, when a larger massage force is required, the motor will rotate in the direction to lower the moving block 033 and hence push the rotational motion control module 003 and artificial touch module 004 closer to human body to achieve a larger pressing force. Vice versa, the motor 029 will rotate in the opposite direction to move the moving block 033 and artificial touch module 004 further from the human body to reduce the massage force. The encoder 031 can record and monitor the rotation speed and angle of the motor 29 for better control. The linear potential meter 035 measures the position of the spring to give an estimate of the contact force between

artificial touch module 004 and the human body. The spring 034 helps to store mechanical energy and make moving block’s motion smoother.

CLAIMS

1. An automatic artificial human-like massage apparatus comprising: a massage module of certain shape of human body, such as finger, palm, elbow or other portion of human body, which is covered by soft material and embedded with force sensor, temperature sensor and heating element; a specially designed motion module which can drive the massage module to perform the circular or rubbing motion while keeping the module's orientation unchanged; a force control module which can apply various force to the massage module according to the command; and a connecting module which can connect the whole apparatus to another device or robot for enhanced performance.
2. A specially designed rotational motion control module which includes a mechanical structure and drives the artificial massage touch module or other objects and devices to perform a specially designed circular motion while keeping the orientation of the attached module or component unchanged while rotating.