

DEVICE FOR ACCUPRESURE WORKING IN MAGNETIC FIELD

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Abstract

An acupressure device designed and developed for rotational and axial motion for the treatment of biologically active points. The device is intended to be used in combination with an electromagnetic coil to simultaneously perform magnetic and acupuncture physiotherapy.

1. INTRODUCTION

Acupressure is a massage effect on biologically active points (point massage) or linear action on the meridians and the direction of energy in them (surface massage) [1,2].

Massaging is usually done manually (Fig. 1), with slight pressure and circular motion, making from 50 to 200 movements per minute depending on the location of the point on the various meridians.



Fig.1 Massage technique

Massage points should not be treated either very strongly or very poorly for both treatment and prophylaxis.

In magnetotherapy, the local application of low-frequency magnetic field is the most common [3,4]. This field is excited by inductors that are connected to the magnetotherapy apparatus. This method is used in many diseases. Inductors are most commonly round (toroidal) coils with an opening as shown in Figure 2.

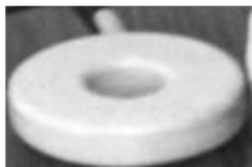


Fig.2 Inductor

If the massaging device can carry massaging movements through the opening of the coil, the two methods of magnetotherapy and acupressure can be combined in simultaneous application. Of course, the inductors should be located above the acupuncture point for the appropriate treatment.

The purpose of this article is to develop and propose acupressure devices that perform simultaneously rotative motion and straight-line motion along with the magnetotherapy procedure. In this way a synergistic effect of the simultaneous effects of both methods will be obtained.

2. BASIC MOVEMENTS AND DEVICE PARAMETERS

Based on the analysis of the main techniques used in the acupressure, it can be seen that the main movements associated with the treatment of the respective points can be reduced to rotational motion, vibration and translational movement (knocking). Furthermore, the thrust pressure on the respective points is in the range of $5 \div 15$ N. Depending on the location of the meridian point, the thickness of the treated area and the sensitivity of the skin layer, the torque of the device should be within the range of $0.5 \div 2.5$ Nm.

3. DEVICE STRUCTURE

In the above mentioned prerequisites, a device with rotational-straight-line motion and a maximum torque of 2.5 Nm has been developed.

Figure 3 shows a drawing of the device design. The movable part 8 has a longer length so that the device can be combined with the inductor 9 for the

simultaneous execution of both acupuncture and magnetic therapy.

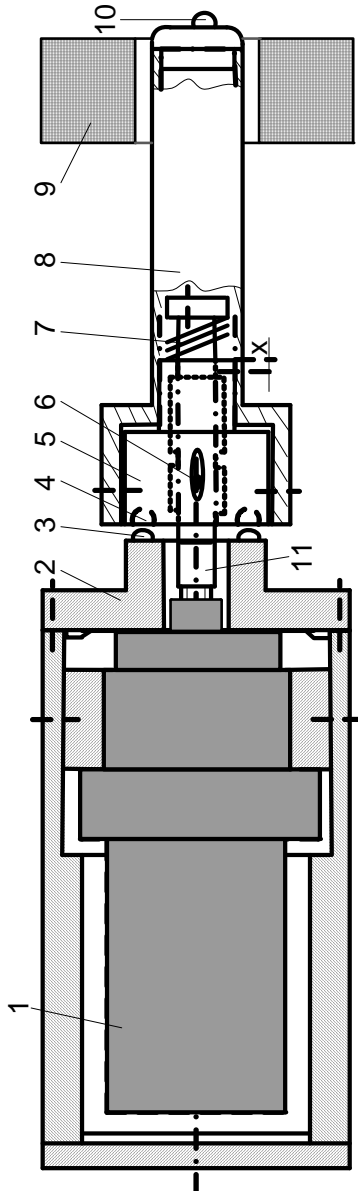


Fig.3 Construction scheme

The rotary motion with frequency of $35 \div 150 \text{ min}^{-1}$ on the shaft 11 is obtained from the motor 1 and the sleeve 2 is fixedly attached to the device body. The translational movement ($x = 2\text{mm}$) is obtained by axial displacement of the bush 5 at the hemispherical butts 3 from the holes 4 when the rotary motion is performed. The spring 7 performs a continuous pressure effort between 2 and 5. The number of holes is four, which allowing for four reciprocating movements of the nozzle 8 for one revolution. The torque of the shaft 11 is fed to the movable part 8 by the pin 6.

The massaging butt 10 is eccentrically positioned on the movable part axis, allowing a massaged area around the acupuncture point about 15 mm in diameter.

The stepper motor control system (Fig. 4) consists of a clock generator, a pulse distributor and a driver.

The clock generator is built on the IC NE555. The impulse distributor consists of D-triggers CD4013, and the final stage is constructed with ULN2804. The maximum supply voltage is 18V, and the current of each phase of the motor is 0.4A. The motor used has 48 steps per turnover. The engine speed changes from 0.5 to 2 turnovers per second, which corresponds to a frequency of steps of 24 to 96 steps per second. This frequency is produced by the clock generator and can be adjusted using the potentiometer R7.

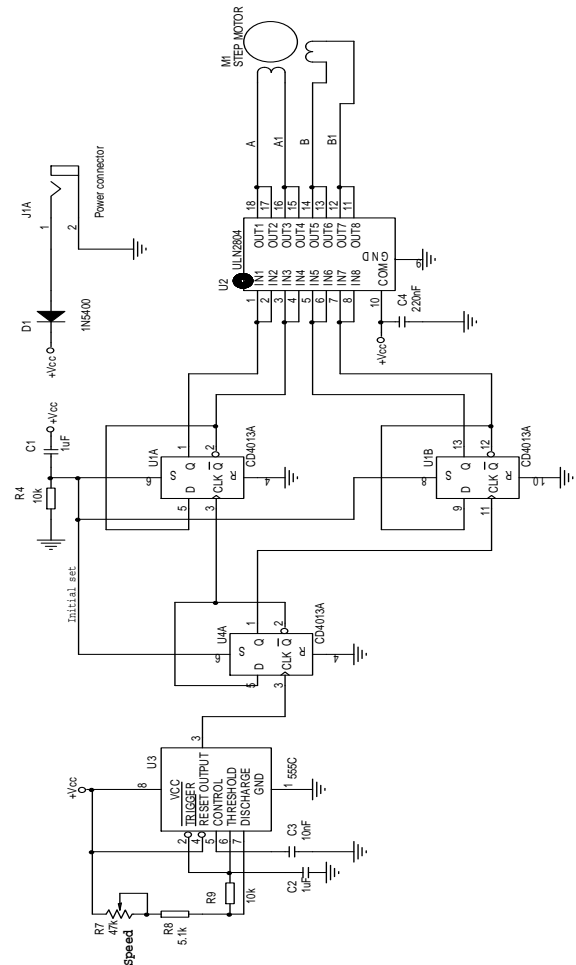


Fig.4 Stepper motor control scheme

Figure 5 shows the device together with the control unit and its application in use.



Fig.5 Acupressure device and application scheme

4. CONCLUSION

A device for acupressure with a torque range of 2.5 Nm, a force of 15 N and a massaging area around the acupuncture point with a diameter of 15 mm has been developed. The design of the devices is consistent with the possibility of simultaneous execution of magnetic therapy. The device has been experimented in real clinical conditions and has demonstrated its ability to work.

References

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