

Myopia Therapy Apparatus

5 The present invention relates to apparatus which is particularly intended for use in therapy for the eye condition known as myopia (short sight).

 Although apparatus for treating myopia is known, the use of such apparatus is not only unsatisfactory but is
10 dull, and the time need for treatment is too long, especially for children.

 An object of the invention is to provide apparatus, based on the principle of vision physiology, which puts magnetic and optical physical therapy together, to provide
15 comprehensive treatment or eye health care.

 According to the present invention, myopia therapy apparatus comprises an observation tube, means for moving an optical target relatively to one end of the observation tube, and means for producing a magnetic or electromagnetic
20 field at the other end of the observation tube whereby, in use, an eye viewing the moving optical target through the observation tube is encouraged to refocus whilst simultaneously experiencing a field effect.

 In a particularly preferred embodiment:

25 said one end of the observation tube includes a lens, said other end of the observation tube includes a ring shaped to present a plurality of contact regions, and said ring is formed of iron;

 said optical target is rotatable relatively to said
30 observation tube, is reciprocable towards and away from said observation tube, has a plurality of faces and is rotatable from one face to the next in a predetermined rotary sense at a predetermined position during each successive cycle of reciprocation, and is provided with a
35 plurality of posts, each corresponding to a respective one of said faces, and each being deflected in said predetermined rotary sense by a fixed stop located at one

of the predetermined end positions of said successive cycles of reciprocation; and

said means for producing a magnetic or electromagnetic field includes a control system for adjusting the intensity of the field and/or adjusting the time of the treatment, with said control system including an electronic oscillator for generating pulse or sine waveforms, a timing counter and a display for the timing counter.

Advantages of the preferred embodiment of the invention are the following:

- (1) When the eye gazes fixedly at a picture on the optical target, whilst contacting the observation tube, the observation ring will oppress the eyeball naturally under the condition of multi-point oppressing, and the eyeball will change its shape thus improving the eyesight.
- (2) The observation tube has more than one usage, apart from providing an optical system for viewing the optical target, it is also a multi-contact electrode. One part of the control system (e.g. electronic therapy device) is connected to the observation tube (e.g. to an electromagnetic source within the observation tube) and another part of the control system is connected to the other eye at an acupoint (e.g. Qingming, Chengqi, Tongzi acupoint). Under the stimulation of current and field effects, the circulation of blood around the eye in contact with the observation tube could be strengthened, thus improving organ nutrition and causing the ciliary muscle to shrink and loosen repeatedly to recover its elasticity and improve the eyesight.
- (3) Because a magnetic source in the observation tube can generate a magnetic field, there is an active effect of magnetotherapy for the eye.
- (4) Based on the principle of vision physiology, a target picture moves back and forth in a controlled manner, creating the environment of alternately looking close

to and looking far away through the lens to force the eye to adjust focus constantly and cause the ciliary muscle to exercise repeatedly, thus not only increasing the interest of treatment but making the treatment effective.

As mentioned above, the invention puts the physics value of electromagnetic-optical, etc. treatment together skilfully to make a comprehensive treatment for myopia patient having rather good effect.

According to confidential clinical tests in Singapore and China the total effect rate is 90%, the noticeable effect rate is 60%, and the no effect rate is 10% (effect rate means that after 5 time treatments, tested with international standard test-chart, single bare eyesight increases at least two lines than before treatment, noticeable effect rate means that after less than 30 time treatments, single bare eyesight increases at least four lines than before treatment, cure means that after less than 30 time treatments, double bare eyesight both reach to more than 1.0, no effect rate means that after one time treatment, eyesight does not improve).

Myopia therapy apparatus according to the present invention is shown by way of example in the accompanying drawings wherein:-

Fig. 1 is a block diagram of myopia therapy apparatus; Fig. 2 is a schematic diagram of the observation tube; Fig. 3 is schematic diagram of the means for moving the optical target;

Fig. 4 is circuit diagram of the control system; and Fig. 5 is the front panel.

The preferred overall arrangement is shown in Fig. 1 illustrating an observation tube 1, acupoint of another eye at 2 and a control system 3 (which includes an electronic oscillator, timing counter and display therefor). A housing for the control system 3 also houses an automatic picture roll-over arrangement. The observation tube may be connected to the housing by a screw thread or be directly

inserted in an appropriate opening. The control system may be electrically connected to the observation tube by a wire through which signals are transmitted controlling field intensity and treatment time.

5 As shown in Fig. 2, there is a sawtooth observation ring 4 made of soft iron which is electrically and magnetically conductive inside an outermost shell 5 (made of plastics or stainless steel materials) in the sawtooth (or concave-convex) observation tube. Close connected to the ring 4 is an electromagnetic source 7 that can be made of permanent magnetic iron or produces an electromagnetic field. An electronic therapy device providing signals for the source 7 may be an electronic oscillator, e.g. circuits that can generate pulse square wave, sharp pulse wave and AC current, or any commercial circuits, except that it must provide suitable pulse current and magnetic field for eye therapy, which affect the patient's eye through the close connected observation ring 4. Below the electromagnetic source 7 is a soft iron ring 8 functioning as amplification. A hole of chosen diameter through the centres of 4, 7, 8 naturally constitutes an observation inner hole 6 through which the picture is to be seen. There is a compound optical lens 9 at the end of the observation tube 4 which also includes a screwthread 10.

25 In Fig. 3, motor 19 drives crank 18 to rotate at a slow speed, such as 6 revolutions per minute. The rotation of crank 18 forces slide 16 to advance and return in a straight line along guide 14 under control of crank-guide 15, the slide 16 and guide 14 being a sliding match. Target pictures 12 are mounted on table 11 which can rotate in one direction, there are ratchets inside the table 11 to ensure it can only rotate counterclockwise. Following the slide 16, rotation table 11 also advances and returns in a straight line. Six bumping posts 13 are mounted at positions corresponding to the pictures 12 on the bottom of rotation table 11. When rotation table 11 moves left, as shown, stop or reed 17 collides with one of the bumping

posts 13, so that with continued movement to the left by slide 16, the rotation table 11 itself keeps moving left, corresponding to reed 17 pushing bumping post 13 to cause rotation table 11 to rotate 60° . Because of the curve distortion of reed 17 caused by movement of rotation table 11, the end surface of the next bumping post 13 could be allowed to slide along the surface of reed 17. At the same time, a ratchet mechanism inside rotation table 11 prevents the rotation table 11 from moving back. In this way, rotation table 11 rotates 60° for one advance and return movement, i.e the picture is changed every 20 seconds, thus obtaining a picture automatic roll-over and periodic advance and return movement.

During that time, when the patient's eye gazes at the target image close to the observation tube, there is not only electromagnetic stimulation therapy, but through the compound optical lens 9 a picture 12 can be seen moving from distant to close and from close to distant, creating artificially an environment of looking far and looking close repeatedly, and for focusing the picture 12 the eye has to adjust its focus constantly, causing the ciliary muscle to exercise, improving the capability of adjustment, so the effect can further be improved.

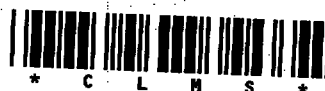
Shown in Fig. 4 is a circuit for auto-controlling the treatment time, auto-alarm and digital display, wherein N_1 is a 14 bits binary serial counter, divider and electronic oscillation circuit, R_1 , R_2 , C_1 constituting RC oscillator generating clock signal, pin 3 and 6 being output terminals. N_2 and N_3 are 4 bits binary-decimal add-subtract counter having preset terminal, N_4 is a decoder. When N_2 receives clock signal from N_1 , control signal at pin 5 in N_2 is low and level at pin 10 is high, N_2 comes into input terminal 4, 12, 13, 3 in N_3 from its output terminal 6, 11, 4, 2 respectively, then outputting to N_4 for decoding, during this time the circuit performs cyclic additive counting from 0 to 9. When pressing switch K to make pin 5 in N_2 to change from low to high, N_2 stops counting, the

presetting number required is stored in N_3 . A bistable circuit consists of R_{14} , C_6 and two inverter; when pressing jogging switch AN_1 , the presetting signal at pin 1 in N_3 could be allowed to change from high to low and subtraction is performed by N_3 , pressing jogging switch again, pin 1 in N_3 from low to high, display D_{12} , D_{13} display the originally presetting number again, Q_3 , Q_4 and Q_5 are used to drive the indication lights, R_{13} , R_{16} and R_{17} being the base biasing resistor for these three transistor. R_9 , C_4 and two inverter comprise a delay circuit, R_7 , C_3 and two inverter comprise an audio oscillator, the connection point of R_8 and C_5 ordinarily is high, but when counter counts to zero, pin 7 in N_3 changes from high to low, at this point, the above connection point becomes low, causing C_4 and R_9 to high through inverter and charging C_4 , after charging completely, C_4 begins to discharge, making inverter to maintain high level for a period of time, during this time oscillator is oscillating. Q_1 and Q_2 are used to drive delay, when pin 7 in N_3 is high delay closes and when pin 7 low delay opens. Pin 12 in N_1 is a clear terminal, once having finished a period of cyclic counting, pin 12 is cleared through R_3 finishing the whole timing and digital display, display time is free adjusted from 1 minute to 9 minutes, D_{12} , D_{13} are control display controlling the time for making alarmer Y to alarm.

Fig. 5 is a diagram showing the panel control of the apparatus, wherein 20 is an observation hole in which the sawtooth observation tube in Fig. 2 is mounted. 21 is the general power on switch of device, controlling the power supply for whole device. 22 and 23 are jogging switch AN_1 and AN_2 in Fig. 4. 24 is power on light, 25, 26 and 28 are indication diodes D_8 , D_9 and D_{10} in Fig. 4 respectively, 27 is to display D_{12} , D_{13} in Fig. 4. 29 is a trademark.

CLAIMS

1. Myopia therapy apparatus comprising an observation tube, means for moving an optical target relatively to one
5 end of the observation tube, and means for producing a magnetic or electromagnetic field at the other end of the observation tube whereby, in use, an eye viewing the moving optical target through the observation tube is encouraged to refocus whilst simultaneously experiencing a field
10 effect.
2. Myopia therapy apparatus according to claim 1, in which said one end of the observation tube includes a lens.
3. Myopia therapy apparatus according to claim 1 or claim 2, in which said other end of the observation tube includes
15 a ring shaped to present a plurality of contact regions.
4. Myopia therapy apparatus according to claim 3, in which said ring is formed of iron.
5. Myopia therapy apparatus according to any preceding claim, in which said optical target is rotatable relatively
20 to said observation tube.
6. Myopia therapy apparatus according to any preceding claim, in which said optical target is reciprocable towards and away from said observation tube.
7. Myopia therapy apparatus according to claim 5 and
25 claim 6, in which said optical target has a plurality of faces and is rotatable from one face to the next in a predetermined rotary sense at a predetermined position during each successive cycle of reciprocation.
8. Myopia therapy apparatus according to claim 7, in
30 which said optical target is provided with a plurality of posts, each corresponding to a respective one of said faces, and each being deflected in said predetermined rotary sense by a fixed stop located at one of the predetermined end positions of said successive cycles of
35 reciprocation.
9. Myopia therapy apparatus according to any preceding claim, in which said means for producing a magnetic or



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electromagnetic field includes a control system for adjusting the intensity of the field and/or adjusting the time of the treatment.

- 5 10. Myopia therapy apparatus according to claim 9, in which said control system includes an electronic oscillator for generating pulse or sine waveforms.
11. Myopia therapy apparatus according to claim 9 or claim 10, in which said control system includes a timing counter and a display for the timing counter.
- 10 12. Myopia therapy apparatus substantially as hereinbefore described with reference to the accompanying drawings.

