CLEANING DEVICE FOR CONTACT LENSES

The invention relates generally to a cleaning device for contact lenses and in particular to such a device actuated by pre-stored potential energy.

Contact lenses has been widely used by the visually impaired, especially for those not allowed to use common eyeglasses due to, for example, the requirements of jobs. As compared to the common eyeglasses, decontaminating and disinfecting are of vital importance for the contact lenses because of the direct contact thereof with eyes.

Conventionally, contact lenses are cleaned by hand and then kept in a storage case. This, however, has a great risk in damaging and contaminating the contact lenses. To overcome this disadvantage, a cleaning liquid is provided. The contact lenses are cleaned and disinfected by the reduction of hydrogen peroxide contained in the cleaning liquid. The reduced hydrogen peroxide solution then serves as a preserving liquid for the contact lenses. To conduct the gas generated by the reduction of hydrogen peroxide, a ventilation hole is provided. The hole, however, is not appropriately covered, and foreign debris can get through the hole to contaminate the liquid. In this way, the contact lenses are effectively disinfected but may not be so efficient in cleaning foreign debris attached thereon.

Another kind of commercially available cleaning

device for contact lenses has a receptacle in which the contact lenses are disposed. The receptacle has a plurality of passages to allow liquid to flow therethrough. The receptacle holding the contact lenses is immersed in the cleaning liquid contained in a container and rotated by hand to have the cleaning liquid flowing therethrough to remove any foreign debris attached on the contact lenses. It is quite inconvenient that a user has to continuously rotate the receptacle by hand.

It is therefore an object of the invention to provide a cleaning device for contact lenses which has a receptacle to receive the contact lenses that are immersed in cleaning liquid in a container, wherein the receptacle is rotated by pre-stored mechanical energy, not by human power directly.

It is another object of the invention to provide a plugged ventilation hole to exhaust the gas generated during cleaning procedure, wherein the ventilation hole is unplugged during exhaustion and is plugged otherwise.

The objects of this invention are achieved by providing a cleaning device including an open container for receiving cleaning liquid. A post is fixed on a bottom of the container for disposing a catalyzer. The cleaning device further includes a cover releasably secured to the container to close the container. The cleaning device further includes a receptacle for receiving the contact lenses. The receptacle is disposed inside the container and immersed in the cleaning liquid. A rotating rod projects from the receptacle to run through a central hole defined in the

cover. The cleaning device further includes a transmission mechanism disposed on the cover to receive and engage with the rotating rod. The transmission mechanism includes an energy storing means which is mechanically connected with the rotating rod and drives the rotating rod with energy stored therein, so as to make the cleaning liquid flow through the receptacle to clean the contact lenses. The cleaning device further includes an energy supplying means mechanically connected with the energy storing means so that the energy supplying means is manually activatable so as to supply energy to the energy storing means.

In the drawings:

Fig. 1 is an exploded perspective view of a cleaning device for contact lenses in accordance with the present invention;

Fig. 2 is a cross-sectional view of the cleaning device shown in Fig. 1, showing the construction thereof;

Fig. 3 is an exploded perspective view showing a transmission mechanism used to actuate the cleaning device shown in Fig. 1; and

Fig. 4 is a plain view showing a reduction gear train of the transmission mechanism shown in Fig. 3.

With reference to the drawings and in particular to Figs. 1 and 2, a cleaning device for contact lenses in accordance with the present invention comprises an open container 10 having a short post 11 fixed on the bottom thereof for disposing a piece of metal 70 serving as a catalyzer, a receptacle 20 with a rotating rod 21 extending upward therefrom, a cover 30 which is secured on the open container 10 with threads to close the container 10 when the receptacle 20 is immersed in cleaning liquid contained in the container 10, a transmission mechanism (to be described in detail hereinafter) encased by a casing 60 through which the rotating rod 21, via a central hole 31 formed on the cover 30, passes through to engage with the transmission mechanism, and a rotatable knob 50 which has an annular gear 52 to mate with a driving gear 61 mechanically connected to the transmission mechanism.

The receptacle 20 is openable to dispose the contact lenses (not shown) therein and has a plurality of liquid passages formed thereon to allow liquid to flow therethrough when the receptacle 20 is rotated by the transmission mechanism via the rotating rod 21.

The cover 30 further has a plurality of guiding strips 32 on which a holder 35 for fixing the casing 60 is disposed and fixed. A rotation axis hole 36 is provided on the holder 35 to receive therein a pivot 53 to be described in more detail hereinafter.

The rotatable knob 50 has a pivoting hole 51 formed thereon. The pivot 53 runs through the pivoting hole 51 and is received inside the rotation axis hole 36 so as to form a rotation axis for the knob 50. When the knob 50 is rotated about the axis formed by the pivot 53, the annular gear 52, which engages the driving gear 61 of the transmission mechanism, drives the driving gear 61, which in turn actuates the transmission mechanism.

Further provided on the cover 30 is an exhaust chamber 40, inside which a ventilation hole 33 which communicates with as outside ventilation hole 34 is formed on the cover 30 to provide an exhausting passage for gas generated during the cleaning procedure for the contact lenses (not shown). The ventilation hole 30 is stopped by a movable plug 33 of which the movement is constrained by a vertical shaft 41 mounted on the ventilation hole 30. A guiding pin 43 is used to guide

an up-and-down movement of the plug 42, even outside the shaft 41.

When the pressure inside the container 10 increases due to the generation of gas during the cleaning procedure, to a level higher than the atmospheric pressure, the plug 42 moves upwards by the pressure inside the container 10, thereby unplugging the ventilation hole 33 and thus relieving the pressure inside the container 10. When the container pressure decreases, the plug 4 moves downwards to seal the ventilation hole 33 to prevent foreign debris from entering the container 10.

The transmission mechanism inside the casing 60 is known to those skilled in the art. Nevertheless, a brief description will be given hereinafter. With reference in particular to Figs. 3 and 4, the transmission mechanism comprises an upper casing 62 and a lower casing 63, inside which a horizontal partition 64 is disposed. On an upper side of the partition 64, a coil spring 65 is provided to store mechanical energy when the knob 50 is rotated. An axle 66 runs from an under side of the partition 64 to the upper side thereof to have the coil spring 65 fixed thereon by fixing means 661, and the axle 66 further runs out of the casing 60 to have the driving gear 61 secured thereon, so that when the driving gear 61 is rotated by the knob 50, torsional potential energy will be stored in the coil spring 65. Under the partition 64, a pawl

section 662 is formed on a lower end of the axle 66 to cooperate with a ratchet means 671 to control and transmit movement to a driven gear 67 integrated with the ratchet means 671. The driven gear 67 in turn rotates the receptacle 20 through a plurality of reduction gears 68; the rotating rod 21 fixed on the reduction gears. A speed control 69 is also provided.

To operate, the knob 50 is rotated first. Energy is stored in the coil spring 65 through the annular gear 52 and the driving gear 61. At the some time, due to the ratchet means 671, the receptacle 20 is not rotated. Thereafter, when the stored energy is released, movement is transmitted to the receptacle 20 through the reduction gears 68, thus rotating the receptacle 20 to have the contact lenses (not shown) disposed therein cleaned by the cleaning liquid flowing therethrough.

The invention herein has been described in an illustrative manner and it is understood that the description of the preferred embodiment is for the purposes of illustration, rather than limitation. It is to be understood that the invention may be practiced otherwise than as specifically described herein and yet remains within the scope of the appended claims.

Claims:

1. A cleaning device for contact lenses, comprising:

an open container for receiving cleaning liquid, the container having a post fixed on a bottom thereof for disposing a catalyzer;

a cover releasably secured on the container to close the container;

a receptacle for receiving the contact lenses, the receptacle disposed inside the container and immersed in the cleaning liquid and having a rotating rod extending therefrom to run through a central hole formed in the cover;

a transmission mechanism disposed on the cover to receive and engage with the rotating rod, the transmission mechanism comprising an energy storing means which is mechanically connected with the rotating rod and drives the rotating rod with energy stored therein, so as to make the cleaning liquid flow through the receptacle to clean the contact lenses; and

an energy supplying means mechanically connected with the energy storing means so that the energy supplying means is manually activatable so as to supply energy to the energy storing means.

2. A cleaning device as claimed in claim 1, wherein the energy storing means is a coil spring and the energy supplying means is a knob rotatable about a central axis of the container, the knob having an annular gear engaging a driving gear which rotates with

an axle to drive said coil spring, so that when said knob is rotated, said annular gear and said driving gear store torsional potential energy in said coil spring;

and wherein said axle connects to a plurality of reduction gears via a ratchet and pawl means and said rotating rod engages with and rotates with said reduction gears, so that when said coil spring releases said potential energy stored therein, said rotating rod and said receptacle rotate.

3. A cleaning device as claimed in claim 1 further comprising an exhaust chamber having a first ventilation hole formed therein communicating with said container and a second ventilation hole formed therein communicating with outside atmosphere, said first ventilation hole communicating with said second ventilation hole to exhaust gas generated during a cleaning procedure of said contact lenses, said first ventilation hole being stopped by a removable plug which opens said first ventilation hole when said gas is generated inside said container and closes said first ventilation hole otherwise.

4. A cleaning device substantially as hereinbefore described with reference to and as shown in the accompanying drawings.