The present invention relates to ways and means whereby an acceptable and usable eye treatment technique known as iontophoresis (ionization and/or ionic medication) is followed in dispersing and applying penicillin or other medicaments directly to the cornea of the eye.

To those skilled in the art to which the invention relates it is acceptable knowledge that the use of the aforementioned ionization treatment has proved to be of appreciable and recognized value in eye work, particularly in pursuing a treatment in which penicillin is employed as the essential medicament. Repeated experimentation has shown that the greatest concentration of medication in the tissues of the human eye is achieved when the stated method or technique (iontophoresis) is used.

What is more, it is generally recognized that there are many eye electrodes, such as used in the stated technique or method, in use, these ranging from a piece of cotton wool soaked in solution and placed between a small metal plate and the eye, to an electrode consisting of a small cylindrical glass tube fitting over the cornea. Some technicians and doctors and workers use a plain probe rod such as for example Hamburger's electrode which, generally speaking comprises a thin carbon rod, the end of which is wrapped in cotton which has been soaked in an appropriate fluid.

Manifestly, all of these electrodes are hard to handle and manipulate and require careful manipulation and, even so, are apt to cause injury to the delicate epithelium of the cornea. Since the electrodes are not mechanically or otherwise sustained in place, they must be held in position, by hand, at all times. The usual procedure requires the presence of an assistant to handle the electrical apparatus, and the doctor whose job it is to hold the electrode in its proper position in relation to the cornea during the accomplishment of the medication technique.

An object of the present invention is to provide an electrode holder in the form of a contact "lens" which fits into the human eye in contact with the eyeball and which is so constructed that when once installed, it remains in place as an appropriate and reliable holder for an electrode.

Another object is to provide a contact-type electrode holder which is not likely to cause injury since only the solution or medicine is in contact with the cornea.

A further object is to provide a contact-lens-type electrode holder which, like the ordinary contact lens, stays in direct contact with the eyeball and therefore moves with the eye, thus obviating the likelihood that the electrical circuit will be broken when "on."

The principal object is to provide a simple and practical electrode holder in the form of an adaptor carried by a contact-type lens which sufficiently holds the electrode so that the assistant may be dispensed with and a doctor may operate the electrical apparatus.

Another object of the invention is to provide a contact-type holder which is made of plastic to act as an insulator and to minimize likelihood of breakage and to also provide a lightweight structure free from pressure and irritational tendencies.

Other objects and advantages will become more readily apparent from the following description and the accompanying illustrative drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the views:

Figure 1 is a sectional view of an electrode holder constructed in accordance with the principles of the invention and showing the manner in which the same, in practice, is used;

Figure 2 is a front elevational view of what is seen from left to right in Figure 1;

Figure 3 is a central vertical sectional view through the device removed from the eye; and

Figure 4 is an enlarged fragmentary sectional view to bring out certain other details.

The electrode holder is a unitary appliance, as denoted by the numeral 6 and is primarily made up of plastic or an equivalent light weight, durable insulating material. It is characterized primarily by a substantially semi-spherical cup 7 which resembles an ordinary contact lens and which is suitably concavo-convex in form to fit into the human eye A in proper relation to the cornea B of the eyeball C, as shown for example in Figure 1. The crown portion which may be said to be the corneal part of the cup is formed with a concavo-convex boss 8 and this forms a shallow cavity or receptacle 9 for the medicament (penicillin or whatever is to be used for cornea treatment). The receptacle forming boss 8 is provided with a centrally situated aperture permitting access to the cornea and this in turn is formed with an outstanding sleeve-like extension 10 which constitutes an adaptor socket for the silver electrode 11. The electrode has a shank portion fitting in the adaptor sleeve and has its inner end provided with a concaved head 12 forming an assembling flange. The other end...
of the electrode stem projects beyond the sleeve or socket 10, where it is formed into an eye 13 to accommodate the current supply wire means 14.

The corneal portion 8 has a radius usually of 7.5 mm. It has been found by experience that in 90% of all eyes fitted with contact lenses, a lens with a 6.5 mm. corneal curve can be used or in very high myopia a 2.0 mm. corneal curve is used. In use the cup 7 is inserted under the patient's lids in the usual way used in inserting ordinary contact lenses. The extension 10 serves not only to hold the metal electrode in place, but acts as an insulator. Otherwise, the patient's lid would strike against the metal when the current is "on," giving not only electric shocks to the patient, but causing the intensity of the current to fluctuate. The electrode is made from silver. It is slightly countersunk on the inner surface of the corneal portion, so as to present an even surface and projects through the sleeve, ending in a small eye. The wire from the galvanic machine (not shown) is inserted and looped through this ring making a simple and sufficient connection. Thus the current travels through the electrode and is conveyed into the medication contained in the corneal portion. This solution being in contact with the cornea, ionization (or iontophoresis) takes place and the medication is thus enabled to enter the cornea and tissues of the eye accordingly to the established principles underlying ionization treatment.

A careful consideration of the foregoing description in conjunction with the invention as illustrated in the drawings will enable the reader to obtain a clear understanding and impression of the alleged features of merit and novelty sufficient to clarify the construction of the invention as hereinafter claimed.

Minor changes in shape, size, materials and rearrangement of parts may be resorted to in actual practice so long as no departure is made from the invention as claimed.

I claim:

1. An eye appliance for use in connection with ionic medication technique comprising a substantially semi-spherical plastic contact cup adapted to be suction fitted in direct contact with an eyeball, the axial portion of said cup being provided with an outstanding concavo-convex boss forming a medicament receptacle, and the crown portion of said boss having an outstanding tubular extension, said extension being adapted to serve as a holding socket for an electrode, an electrode situated in said socket, said electrode having an eye at its outer end to accommodate a current supply wire, and having a headed portion on its inner end projecting into said boss to contact the medicament to be held in the latter.

2. An eye appliance for use by an eye doctor during an ionic medication treatment of a patient's eye, said appliance being self-sustained when it is once inserted into the patient's eye and obviating holding of same either by the doctor or an assistant comprising a concavo-convex medicament holding applicator having a marginally surrounding concavo-convex flange adapted to rest directly against the eyeball of the patient and to be held partly by suction and to reside beneath the eyelids and to be partly held in place by said eyelids, and an electrode carried by said applicator, said electrode being spaced clear of the cornea of the eye when in use and adapted to contact the medicament in said applicator.

3. An eye appliance for use by an eye doctor employing ionic medication techniques comprising a relatively small concavo-convex medication containing receptacle having a central aperture and an outstanding tubular extension constituting an electrode receiving and holding socket, and means for holding said receptacle in spaced opposed relation to the cornea of the eye, said means being an annular flange attached marginally to the receptacle and shaped to fit in direct contact with the eyeball of the user and being sufficiently thin to fit beneath the eyelids of the user whereby to utilize the eyelids and suction to hold said flange in place and consequently to position and hold said medication receptacle in place, and an electrode fitted in said socket and having a headed inner end anchored in the receptacle and its outer end located for connection thereto of a current delivering wire.

PAUL TOWER.

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