

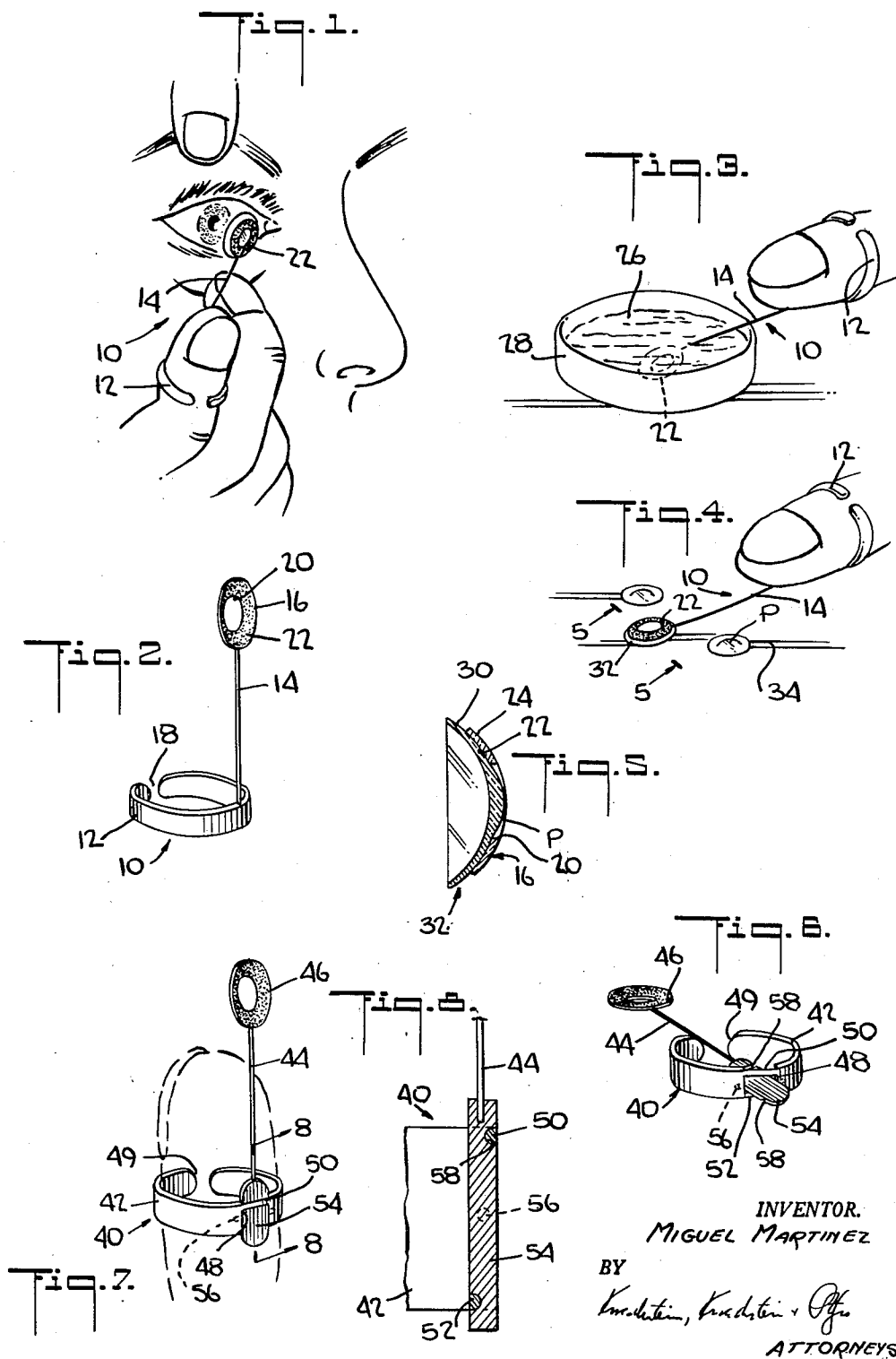
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APPLICATOR FOR CONTACT LENSES

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APPLICATOR FOR CONTACT LENSES

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This invention relates to an applicator for contact lenses.

Considerable difficulty is experienced, particularly by beginners, in the application of a contact lens to the eyeball. Not only must he overcome his instinctive fear of touching the eyeball, but he must perform this delicate operation while his vision is partially blocked by the finger utilized for such purpose.

The prevailing practice is to apply the lens to the cornea with a wetted index finger. This method has gone into widespread use despite instruments proposed for such function because until now the instruments either have been clumsy and expensive or have hindered rather than aided application of the lens. The "wet finger" method, is however, neither easy, accurate, nor safe. There is real danger of scratching the cornea with a fingernail, and this is so serious and so likely that women using contact lenses are warned to keep their fingernails short, particularly the nail of the finger, usually the index finger, which is to be used for application of the lens.

It is an object of the present invention to provide an applicator for contact lenses which overcomes all of the foregoing drawbacks.

It is another object of my invention to provide an applicator of the character described through the use of which the introduction of bacteria, dirt or infectious material into an eye is avoided.

It is another object of my invention to provide an applicator of the character described which permits a person using the same to fully visualize the insertion of the lens, that is to say, the person will not have his vision seriously obstructed by the inserting finger as is the case today.

It is another object of my invention to provide an applicator of the character described which accurately will control the position of the lens during insertion, that is to say, an applicator on which the lens inherently will be placed in a predetermined centered position so that as the applicator is approached to the eye the user will know the exact location of the lens. This is in contrast to the "wet finger" method of application in which the location of the lens as it approaches the eye never is certain since the user is as likely to touch one part of the ball of his wetted finger to the lens as another when picking up the lens.

It is another object of my invention to provide an applicator of the character described which will place a contact lens on the cornea more gently than previous instruments and therefore is less likely to injure the eye by the application of undue pressure. Heretofore when the lens was in direct contact with the applying finger the user had to rely on the resilience of his flesh to absorb the shock of contact. However, in accordance with my invention the applicator is constructed with a built-in resiliency that absorbs shock.

It is another object of my invention to provide an applicator of the character described which in general encourages vision through the lens at the time of insertion.

It is another object of my invention to provide an applicator of the character described which ensures the remote location of the nail of the inserting finger.

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It is another object of my invention to provide an applicator of the character described the use of which is simple to teach to a novice and, indeed, is almost automatic.

It is another object of my invention to provide an applicator of the character described which is adapted to be operated by the index finger alone so that it is particularly easy to teach the use of the same to people who previously have become accustomed to the "wet finger" method.

It is another object of my invention to provide an applicator of the character described which in general expedites the insertion of a contact lens.

It is another object of my invention to provide an applicator of the character described which constitutes relatively few and simple parts, and is rugged in construction and foolproof in operation.

Other objects of my invention in part will be obvious and in part will be pointed out hereinafter.

My invention accordingly consists in the features of construction, combinations of elements and arrangements of parts which will be exemplified in the devices hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings, in which are shown various possible embodiments of my invention,

FIG. 1 is a perspective view showing my applicator in use;

FIG. 2 is a perspective view of an idle applicator;

FIG. 3 is a perspective view showing wetting of the applicator;

FIG. 4 is a perspective view showing the applicator picking up a contact lens;

FIG. 5 is an enlarged sectional view taken substantially along the line 5-5 of FIG. 4;

FIG. 6 is a perspective view of an applicator embodying a modified form of my invention, the same being illustrated in a storage position;

FIG. 7 is a perspective view of said applicator in erected position and mounted on a phantom finger; and

FIG. 8 is an enlarged sectional view taken substantially along the line 8-8 of FIG. 7.

Referring now in detail to the drawings, and more particularly to FIGS. 1 through 5, the reference numeral 10 denotes an applicator constructed in accordance with and embodying my invention. Essentially said applicator consists of three parts, to wit, a ring 12, a wand 14 and an annulus 16, suitably joined to one another in such a fashion that the wand is carried by and extends transversely away from the ring in a direction generally parallel to the axis of symmetry of the ring (perpendicular to the plane of the ring) and that the annulus is secured to the tip of the wand with the axis of the wand substantially constituting an extension of a diameter of the annulus and approximately in the plane thereof.

More particularly, the ring 12 is of generally circular shape and is fabricated from resilient material that is self-form-maintaining. Said ring preferably is expandable so that it can be fitted to fingers of various sizes and therefore need not be made in a series of different diameters. In the preferred use of my invention the ring is adapted to be fitted on the index finger of the user and, more specifically, on the distal phalange of the index finger behind the nail. Most conveniently, resiliency is imparted to the ring 12 by fabricating the same so as to include a split, i.e., a gap 18, whereby the ends of the ring at the gap can be readily spread apart to enable the ring to prehensively grip the user's finger.

The ring, as mentioned, desirably is made from a resilient material in order to permit it to be flexed, a suitable material being a springy metal, e.g., spring steel of Phosphor bronze. However, I prefer not to use metal so as to avoid the chance of harming an eyeball through careless handling. Therefore, in the preferred form of my invention, the ring is made from plastic, resilience being inherent inasmuch as the thickness of the flat strip which constitutes the ring is comparatively slight. Moreover, to encourage the desired resilience I prefer to use synthetic plastics that are known for their resiliency. Plastics with which I have obtained excellent results are vinyl polymers, vinyl copolymers, nylon (an acrylic resin) and a Buna S modified styrene resin.

The ring can be made by casting or injection molding, or can be formed by heated dies from sheets of plastic. The diameter of the ring is made small enough so that it will constrict on the slightest finger which a user is likely to have. The flexibility of the ring will enable it to open up to receive larger fingers.

The wand 14 is flexible, resilient and self-form-maintaining, i.e., not limp or readily permanent deformable. It is elongated and slender, that is to say, of rod-like configuration, hence the appellation "wand"; and, moreover, it is linear and of a very slight, absolute, as well as relative, diameter. More specifically, the wand is of a wire-like diameter and, in the form shown, actually is thinner than the strip which constitutes the ring 12. In the illustrated form of my invention the wand is secured to the ring by forming a bore in the ring diametrically opposite to the gap 18 and running parallel to the axis of symmetry of the ring, the wand being dimensioned to be snugly received in said bore. The wand is fixed in the bore in any convenient manner, as by cementing, or, mechanically, by indenting the ring into the wand.

Like the ring, the wand can be made of metal, e.g., of resilient spring wire such as spring steel or bronze; but, as indicated earlier, I prefer not to have any part of the applicator made of metal, and, accordingly, in the form of my invention being described the wand is made of synthetic plastic which in the shape and dimensions indicated is sufficiently resilient. For the purpose I may employ any of the thermoplastic resilient resins I have mentioned above. With the wand I find it convenient to use nylon since this is readily obtainable in the form of a monofilament of proper, i.e. slight, cross-section which is sufficiently thick to be self-form-maintaining. The length of the wand is not critical. However, too short a wand or too long a wand makes the applicator inconvenient to use. I have obtained desirable results with a wand length in the order of one inch.

It will be appreciated and should be noted that a nylon monofilament wand that is small enough to be inserted in a bore formed in the thin ring strip is sufficiently flexible to avoid injury to the eye upon application of the contact lens and yet is rigid enough to support said lens without flexing or shaking thereby insuring accurate control of said lens during application thereof.

The annulus 16, which is the element of the applicator directly bearing the lens during insertion, preferably is of ring-like configuration so as to provide a central opening 20 and also obtain a substantial degree of contact between it and the lens. To enhance said contact, i.e., the mutually juxtaposed areas of the annulus and contact lens, said annulus has a front surface 22 shaped to a concave configuration (see particularly FIG. 5) that approximately matches the convex (external) surface of a contact lens. The opposite (back) surface 24 of the annulus can be of any configuration. For economy of manufacturing, simplicity of structure, and neatness of appearance, I find it best to have the front and back surfaces of approximately matching configurations; that is to say, said annulus 16 is of uniform thickness so that its two opposite broad surfaces are of like curvature.

It will be observed that the front surface 22, which is the surface that is adapted to engage a contact lens and which is the concave surface of the annulus, faces laterally away from the ring 12, i.e., faces in a direction outwardly of the curvature of said ring. In the preferred form of my invention the plane of said annulus, which for convenience may be considered to be the plane of the periphery of said annulus, is approximately tangent to the ring 12.

The annulus is made from a material which, since it is the most likely to contact the eyeball, is least likely to harm the same, this preferably being a synthetic plastic. Any one of the synthetic plastics can be employed, either a thermoplastic or thermo-setting plastic, providing that it is non-toxic and dermatologically innocuous. Thus I may utilize almost all of the conventional synthetic plastics, excluding for example only such irritating materials as epoxy resins. By way of example, the annulus 16 may be fabricated from cellulose acetate, cellulose acetate butyrate, vinyl polymers, vinyl copolymers, nylon, styrene, modified styrene, phenol formaldehyde, phenol furfural or melamine. The annulus can be made by any accepted molding procedure, injection molding or transfer molding being preferred.

Although it is not absolutely essential, best results are secured in the use of my invention where the annulus is dark and opaque, e.g., black; a suitable plastic desirably is selected to that end. I prefer to make the annulus of a pigmented opacified nylon and to have its front and back surfaces and its inner and outer peripheries smooth and well finished.

For practical purposes it is desirable to have all three elements, to wit, the ring, wand and annulus, made of the same material since this simplifies the source of supply and the interconnection of the parts. Accordingly, in the preferred form of my invention, all three elements are of nylon.

The applicator is used by slipping the ring 12 over the distal phalange of one of the fingers, preferably the index finger of the dominant hand, i.e. the hand customarily used for manipulation purposes, the ring being forced beyond the nail but forward of the distal joint. The gap 18 is disposed on the outer (nail) side of the finger so that the wand lies against the fleshy part of the finger. This locates the annulus 16 beyond the tip of the finger and the outer end of the wand clear of said finger so as to permit the wand to flex when the pressure is applied to the annulus.

With the applicator thus mounted, the index finger is manipulated to dip the annulus in a body 26 of liquid, e.g. water, which may be in a shallow dish 28, whereby to wet the annulus and, in particular, the operationally effective front surface 22 thereof. When the annulus is withdrawn from the liquid the surface 22 will have a film of water covering the same.

Next the index finger is manipulated to place the wetted front surface 22 on the external, i.e., convex, surface 30 of a contact lens 32, resting, for example, on a support 34. The water on the applicator will in part be transferred to and wet the surface 30 of the contact lens so that there is located between these two juxtaposed surfaces, i.e., the surfaces 22, 30, a film of liquid which is adhered to both surfaces. Thus the film which wets the surfaces 22, 30, acts as an adhesion means which lightly but securely attaches the contact lens to the annulus 16 through the phenomenon of capillary attraction. Accordingly, simply touching the annulus to the contact lens will form a sufficiently firm engagement between the two for the lens to be lifted with the applicator as the annulus is raised from the support 34. The degree of adhesion between the lens and annulus is a function of their area of mutual contact.

It will be appreciated that because the annulus is circular and because its outer diameter is smaller than that

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of the contact lens, said annulus easily can be centered on the lens by observation and manipulation. Moreover, the contrast between the dark circle of the annulus and the periphery of the lens makes such centering particularly simple. In addition, it is usual for the central part of the external surface 30 of a contact lens to include a protuberance P by which the optical correction of the lens is performed. The central opening 20 of the annulus is of a somewhat greater diameter than such protuberance, thereby further facilitating the centering of the lens on the annulus so that with a minimum of skill the lens will be centered on the annulus each time the applicator is used.

Finally, the applicator is manipulated to place the contact lens on the cornea. Most conveniently, this is accomplished by using the index finger of the subordinate hand to lift the upper eyelid, using the middle finger of the dominant hand to draw down the lower eyelid and using the index finger to apply the contact lens to the eyeball as shown in FIG. 1.

The exposed portion of an eyeball is covered with a liquid film; therefore, when the contact lens is applied thereto said lens will adhere to the eyeball by virtue of the coherence of such film which adheres both to the eyeball and lens (capillary attraction). Due to the presence of the opening 20 and to the difference in sizes between the outer peripheries of the annulus and the contact lens the capillary attraction between the contact lens and eyeball is greater than the capillary attraction between the annulus and contact lens. Therefore once the contact lens is on the eyeball the applicator can be disengaged from the lens simply by pulling it off.

The applicator 10 as described hereinabove has the wand 14 permanently located in a protruding, i.e., erect, position which may be undesirable for some people who by careless handling might damage the wand. This drawback is obviated in the modified applicator 40 illustrated in FIGS. 6 through 8. Said applicator 40, like the applicator 10, includes a ring 42, a wand 44, and an annulus 46, the wand 44 and annulus 46 being identical in construction with the wand 14 and annulus 16 of the first described form of my invention. However, the ring 42 and attachment between the wand and ring are modified to permit shifting of the wand between an erect operative position, shown in FIG. 7 and a flat idle position for storage, shown in FIG. 6.

More particularly the ring 42 which is made in the same manner as the ring 12 differs therefrom in one respect, to wit, the provision of a second gap 48 diametrically opposite to a gap 49 that permits the ends of the ring to be flexed. The two halves of the ring on opposite sides of the gap 48 are integrally joined to one another by an upper bar 50 and a lower bar 52 in one piece with the ring. One of the bars, e.g., the bar 50 which is at the upper side of the ring, is disposed on the external surface of the ring. The other bar 52 which is at the lower side of the ring is disposed on the internal surface of the ring, this arrangement being quite clear from FIG. 8.

The wand 44 is not directly secured to the ring. Instead it is mounted on a plate 54 which preferably, for the reasons already mentioned hereinabove, is made of nylon. The plate has a thickness substantially equal to the thickness of the ring, a width substantially equal to but not exceeding the breadth of the gap 48 and a length somewhat in excess of the distance between the bars 50, 52. Said plate is provided with a bore into which the wand 44 is inserted and secured (see FIG. 8). Said plate also is provided with a pair of oppositely extending coaxial trunnions 56 located between the opposite ends of the plate and operationally integral with the plate. The trunnions are rotatably received in bearing openings formed in the opposite sides of the gap 48 thus permitting oscillation of the plate 54 between the operative erect position of FIG. 7 and the flat storage position of FIG. 6.

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6. The operative position is defined by reception of the bars 50, 52 within grooves 58 formed at opposite surfaces of the plate 54 in proper position to admit said bars.

It is preferred to lock the plate in operative position and I accomplish this simply by slightly restricting the mouths of the grooves 58 so that they will expand to receive the bars 50, 52 and then contract after the bars are located therein. The locking force provided is sufficient to hold the wand erect but easily can be overcome by slight pressure on the plate when turning the same to the storage position of FIG. 6.

It is desired to call attention to certain of the advantages of my novel applicator which have not already been mentioned. Thus it will be apparent that by carrying the contact lens in a position remote from the tip of the index finger, I make certain that the nail of this finger will not touch the eyeball and also that this finger is kept out of the line of vision during application of the lens. Because the annulus is dark and opaque, the user is able to sight through the center of the annulus and thus obtain control of the position of the lens during application thereof. Vision at this time is enhanced by the opening 20 which leaves a clear space for the optical correcting protuberance P during its application to the cornea.

It thus will be seen that I have provided devices which achieve all the objects of my invention and are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein described, or shown in the accompanying drawings, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. An applicator for contact lenses, said applicator comprising a finger receiving portion, a flexible resilient wire-like wand, means securing said wand to said finger receiving portion for movement between a flat storage position and an erect position in which it extends away from the ring, and an annulus carried by said wand and shaped to engage the convex surface of the contact lens over an annular portion thereof.

2. An applicator for contact lenses, said applicator comprising a finger embracing portion, a slender elongated wand mounted on and extending away from the finger embracing portion, and an annulus secured to the end of the wand remote from the finger embracing portion, said annulus having a smoothly concave front surface approximately matching the convex surface of the contact lens so that the annulus when wetted with an aqueous liquid will hold a lens by capillary attraction.

3. An applicator as set forth in claim 2 wherein the wand is flexible and the annulus is of synthetic plastic material.

4. An applicator as set forth in claim 2 wherein the longitudinal axis of the wand substantially constitutes an extension of a diameter of the annulus.

5. An applicator as set forth in claim 2 wherein the wand is rigidly secured to the finger embracing portion.

6. An applicator as set forth in claim 2 wherein means is provided to secure the wand to the finger embracing portion for movement between a flat storage position and an erect operative position in which the longitudinal axis thereof is perpendicular to the plane of the finger embracing portion.

7. An applicator for contact lens, said applicator comprising a finger embracing portion, an elongated element mounted on and extending away from the finger embracing portion, and an annular element secured to the end of the elongated element remote from the finger embracing portion, said annular element having a smoothly curved front surface approximately matching the curved surface of the contact lens so that the annular element when wetted with an aqueous liquid will hold a lens by capillary attraction.

8. An applicator for contact lens, said applicator comprising a finger embracing portion, an elongated wand mounted on and extending away from the finger embracing portion, and an annulus secured to the end of the wand remote from the finger embracing portion, said annulus having a smoothly curved surface approximately matching the curved surface of the contact lens so that the annulus when wetted with an aqueous liquid will hold a lens by capillary attraction.

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