# United States Patent [19]

**Berndt**

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[54] **METHOD AND APPARATUS FOR OCULAR SELF-EXAMINATION**


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[52] **U.S. Cl.** ..... **128/2 T;** 351/18

[51] **Int. Cl.**[2] ..... **A61B 3/00**

[58] **Field of Search**..... 128/2 T, 2 V, 2 A; 351/17, 351/18, 39



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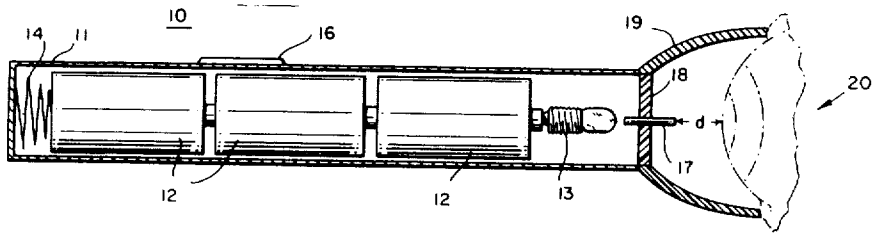
[57] **ABSTRACT**

An inexpensive, hand-held device to permit a patient to perform a self-examination of the eye and thereby determine if he should seek professional help.

The device comprises what is almost a perfect point source of light, to wit, a bulb, and a short length of fiber optic. Means are provided to position the fiber end precisely at the anterior focus of the eye.


**2 Claims, 2 Drawing Figures**



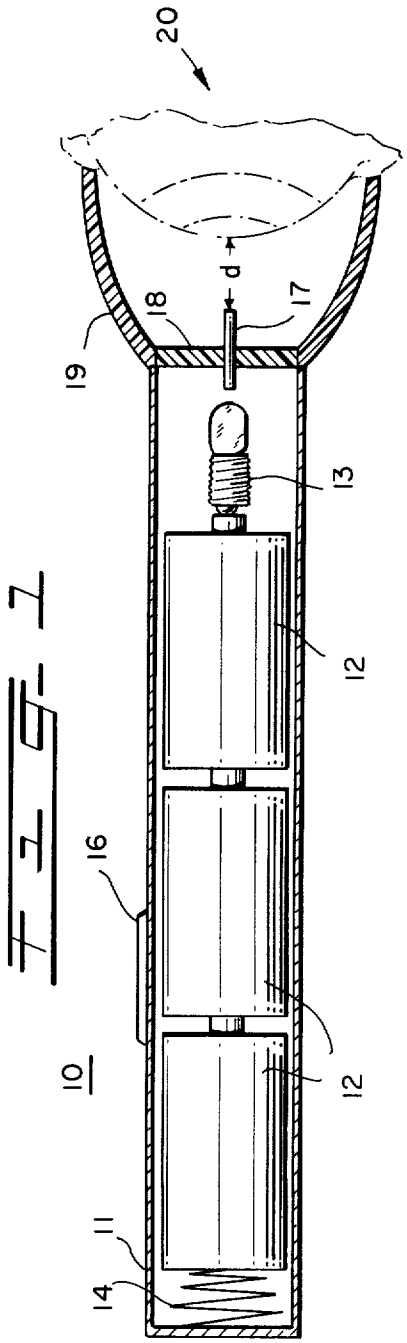



FIG. 1

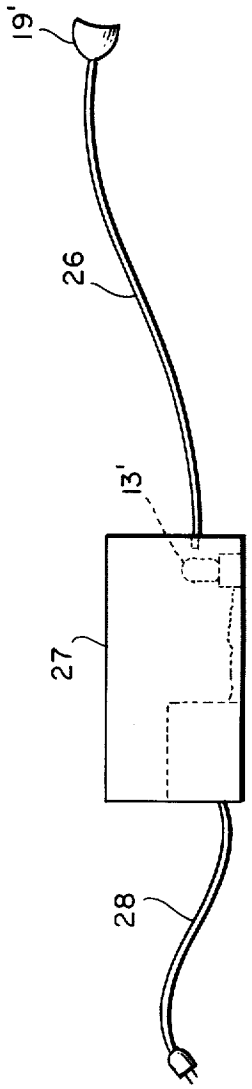



FIG. 2

# METHOD AND APPARATUS FOR OCULAR SELF-EXAMINATION

## BACKGROUND OF THE INVENTION

1. Field of the Invention

Broadly speaking, this invention relates to methods and apparatus for detecting disease in the human body. More particularly, in a preferred embodiment, this invention relates to methods and apparatus for performing a self-examination of the eye, the pattern thereby detected serving to warn the user to consult qualified professional advice if abnormalities are noted.

2. Discussion of the Prior Art

As is well known, in any general physical examination, the examining physician always examines the interior of the patient's eye with an ophthalmoscope. This is done because the condition of the eye, and its ability to respond to rapid light changes, is a barometer of the general health of the patient. Among the diseases that can be detected in this manner are cerebral syphilis, tabes, diabetes, prodromal chronic gloucoma, encephalitis lethargica, hypertension, cateracts, burns and lesions, ptomaine poisoning, botulism, etc., etc.

Unfortunately, millions of Americans never have a routine medical examination because they are either "too busy" or because they "cannot afford it". Thus, in many cases, these serious diseases are not detected until it is too late to take effective corrective action, whereas had they been detected earlier, they could have been arrested or completely cured.

## SUMMARY OF THE INVENTION

What I propose, therefore, is a simple, inexpensive technique for self-examination of the interior of the eye and an apparatus for performing the same. It is specifically not intended that the user diagnose the conditions that he observes in his eye. Rather, he is given with the self-examining instrument charts which give him just enough information to realize that a potentially serious condition may exist. He is then urged to seek professional diagnosis and in this regard the invention is not unlike a thermometer which will indicate to the user that he has an abnormal condition (i.e., a high or low temperature) without attempting to indicate any of the hundreds of medical factors or diseases that might be responsible for that condition.

## DESCRIPTION OF THE DRAWING

FIG. 1 is a cross-sectional view of a preferred embodiment of the invention; and

FIG. 2 is an isometric view of another embodiment of the invention.

## DETAILED DESCRIPTION OF THE INVENTION

Of interest to an examining physician is the condition of the patient's retina, the spherical rear surface of the eye containing the optic nerve and the light receptors, the iris, and the lens. Disease may affect any or all of these elements. The retina may be observed directly, but the iris and lens are checked by observing the degree of accommodation that the patient has. Accommodation, of course, is the power of the eye to change focus as an object of interest is brought closer to or further from the eye lens.

It is well known that a human eye has an anterior focus such that if a point source of light is placed at the anterior focus the eye lens will form a parallel beam of light within the eye. Put another way, if a point source of light is placed at the anterior focus of the human eye, the light rays correspond to a uniform diffuse radiator of energy which is refracted and collimated in parallel rays by the eye's optics.



I have discovered that this phenomenon enables the viewer to "see" his own visual system. That is, he can "see" the condition of his retina and readily observe scar tissue, shadows suggestive of tumors, etc. Further, because a point source of light is employed, the size of the image seen is controlled by the pupil opening and the particular state of the observed occular accommodation.

Hence, when the device to be described below is switched on, the observers accommodation will change and he can observe the motion of his iris and the pupil opening. The spot size covers the macular region of the human retina, the centroid of human vision. It is, thus, possible for the observer to detect physiological changes such as cataracts, tumors, burns, etc., anywhere in the eye from the cornea to the retina. Also, if any paralysis of accommodation is present, e.g., from syphilis, food poisoning, diabetes, gloucoma, etc., this will also be detected.

As previously discussed, it is not necessary, and indeed not desirable, that the user be able to associate any particular image or pattern with a particular defect or disease. It is sufficient if he is merely alerted to the fact that professional help should be sought.

FIG. **1** depicts an illustrative apparatus for practicing the methods of this invention. As shown, this embodiment comprises a hand-held instrument **10** comprising an outer casing **11** which is not unlike a conventional flashlight in construction. The casing includes a plurality of batteries **12** which are forced into engagement with a bulb **13** by a spring **14.** A simple slide switch **16** completes the electrical circuit to lamp **13.** An optical fiber **17** is passed through an aperture in an opaque end piece **18** so that one end thereof is proximate the bulb **13.** A flexible rubber cup **19** is fastened to the end of the casing **11** to limit how closely the other end of fiber **17** may be brought to the eye and to exclude extraneous light.

Fiber **17** may be clad or unclad and will typically be in the order of **10** mils diameter, or less. For most individuals, the anterior focus is about **16** mm from the cornea, so fiber **17** extends from opaque end piece **18** such that when the flexible rubber cup is pressed into engagement with a human eye **20,** the distance *d* will be about **16** mm. Of course, if the anterior focus of the user is less or greater than **16** mm, the flexibility of the cup will enable the user to adjust the fiber-to-cornea spacing *d* to the exact anterior focus, which is easily found. The flexibility of cup **19** should not be so great, however, as to permit the end of fiber **17** to touch the cornea of eye **20.**

FIG. **2** illustrates another embodiment of the invention for use where portability or expense are not so important. This latter embodiment may be used, for example, in the examining room of a doctor's office, etc.

As shown, in this embodiment a flexible optical fiber **26** is connected at one end to a flexible cup **19'** and at the other end to a box **27** including a bulb **13'**, an a.c. transformer **27** and a line cord **28.** In this embodiment, the batteries **12** are eliminated and a more powerful bulb may be employed, if desired.

In use, with either embodiment, the flexible cup is brought into engagement with the user's eye and positioned until the end of the illuminated fiber is precisely at the anterior focus. The retinal pattern is then observed and compared with typical patterns furnished on cards to the user. Next, the light is switched on and off and the action of the retina noted. Finally, the size of the observed image is compared to typical images furnished to the user, as a check on accommodation. The other eye is then checked in the same manner.

One skilled in the art may make various changes and substitutions to the arrangement of parts shown without departing from the spirit and scope of the invention. For example, although more expensive and less convenient, other point sources of light could be used, for example, a low-power laser or a high-intensity source and a pin-hole, etc.

What is claimed is:

1. A method of detecting disease in the human eye comprising positioning an illuminated optical fiber of 10 mm diameter, or less, at the anterior focus of the eye, thereby to cause the eye to focus a parallel beam of light on the retina of the eye, the uniform retinal illumination caused by said point source permitting the user to see an image on his own retina.



2. Apparatus for detecting the presence of disease in the human eye, comprising

means for supplying a source of light;

means for supplying electrical power to said light supplying means to energize the same;

a flexible cup having a concave surface such that the user's eye-ball is adapted to be received therein; and

an optical fiber of 10 mils diameter, or less, said fiber having one end positioned proximate said light supplying means and the other end positioned in said cup such that the light from said light supplying means is transmitted along said fiber to a point within said cup where the anterior focus of the user's eye is located.

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