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C. C. INSKEEP & E. & C. S. GOWLLAND.

RETINOSCOPE, OPHTHALMOSCOPE, AND THE LIKE.

APPLICATION FILED JULY 17, 1906.

Fig. 1.

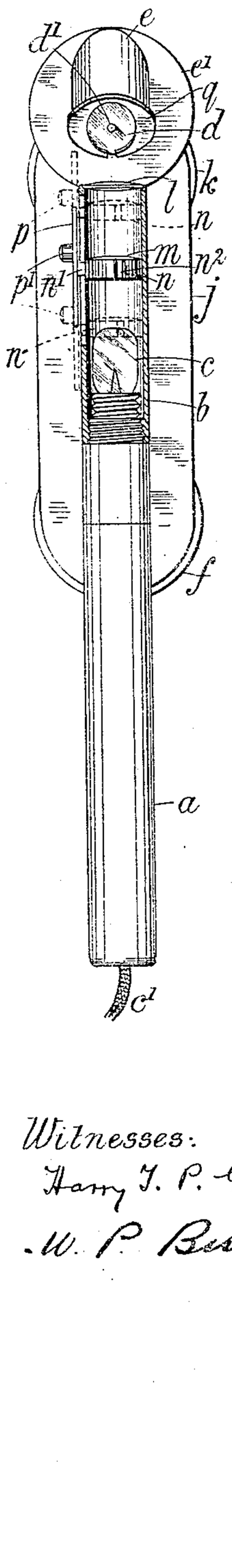


Fig. 2.

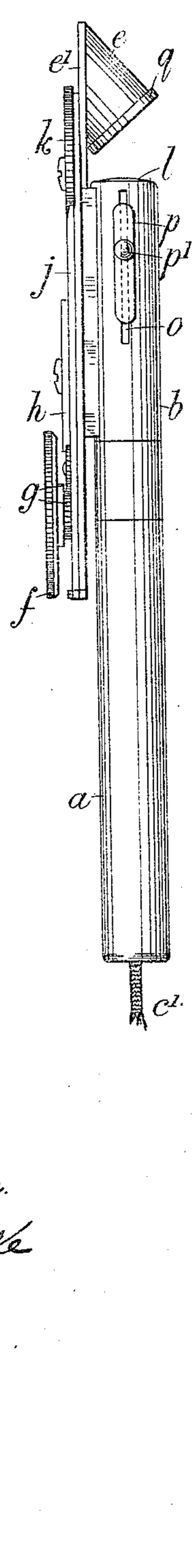


Fig. 3.

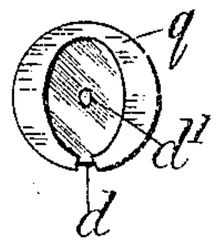


Fig. 4.

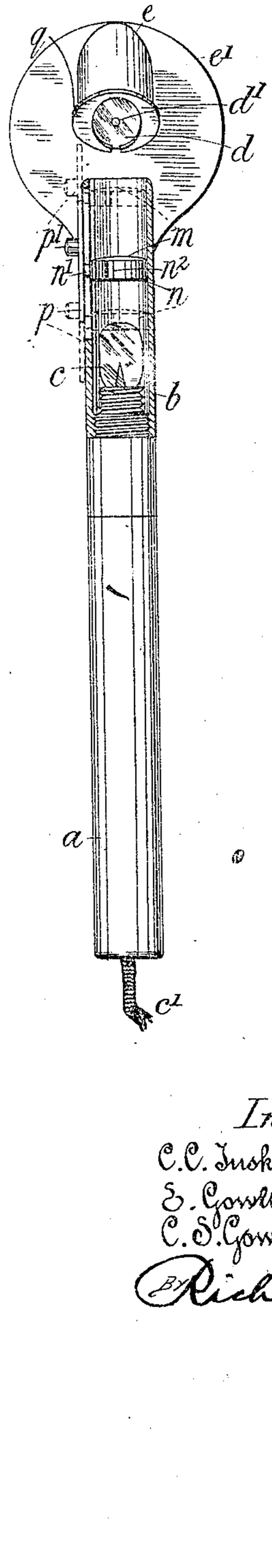
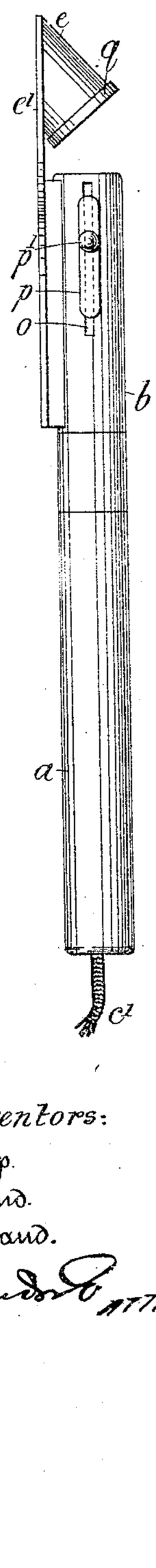


Fig. 5.



Witnesses:
Harry J. P. Lee.
W. P. Burke

Inventors:
C. C. Inskeep.
E. Gowlland.
C. S. Gowlland.
By Richards & Co. Atty's

UNITED STATES PATENT OFFICE.

CHARLES CHAMBERS INSKEEP, OF OTTUMWA, IOWA, AND EGBERT GOWLAND AND CHARLES SEPTIMUS GOWLAND, OF CROYDON, ENGLAND.

RETINOSCOPE, OPHTHALMOSCOPE, AND THE LIKE.

No. 886,512. Specification of Letters Patent. Patented May 5, 1908.

Application filed July 17, 1906. Serial No. 326,639.

To all whom it may concern:

Be it known that we, CHARLES CHAMBERS INSKEEP, a citizen of the United States, residing at Ottumwa, in the State of Iowa, United States, and EGBERT GOWLAND and CHARLES SEPTIMUS GOWLAND, subjects of Edward VII, King of Great Britain and Ireland, and residing at Morland Road, Croydon, in the county of Surrey, England, have invented certain new and useful Improvements in Retinoscopes, Ophthalmoscopes, and the like, of which the following is a specification.

This invention relates to retinoscopes, ophthalmoscopes and the like, and it has for its objects to provide means whereby in the one instrument the beam of light reflected from the mirror may be in the form of either parallel, convergent or divergent rays, and whereby also any one form of such rays may be instantly changed to either of the other forms at will; further, to provide means, by the use of which the reflected beam of light is more nearly circular in cross section and is more uniform than that obtainable with self-luminous instruments as heretofore constructed.

In broad terms, the invention comprises an instrument in which one or both of the lenses (or the single lens, when only one is used), or the source of light is adjustable relatively to the mirror; and in which also the mirror is furnished with a diaphragm having an elliptical opening.

Our improved instrument is of compact form, and is one in which the amount of light carried to the mirror is greater than with instruments of the same type as previously made.

The invention may be conveniently carried out as shown in the accompanying drawings, wherein

Figure 1 is a sectional elevation of an ophthalmoscope carrying two condensing lenses, the upper one of which is stationary, while the lower one is adjustable; Fig. 2 is a side elevation of such ophthalmoscope; Fig. 3 is a front elevation of the diaphragm and mirror; Fig. 4 is a sectional elevation of a retinoscope in which there is only one condensing lens, this being adjustable; and Fig. 5 is a side elevation of such retinoscope.

Similar letters refer to similar parts throughout the several views.

Referring to the drawings, *a* is the usual tubular handle, on to which is screwed the casing *b*, and which carries also the electric lamp *c* connected by the wires *c'* with any suitable source of electricity.

d is the mirror mounted on the inclined end of the hood *e* which is carried by the plate *e'* secured to the casing *b*.

In Figs. 1 and 2, which show a "Morton" type of ophthalmoscope, *f* is the usual milled driving wheel geared by wheels *g* to the index disk *h* and adapted to operate the continuous chain of lenses arranged within the chamber *j*, at the upper end of which latter is pivoted the lens-carrying disk *k*. The casing *b*, in the example here shown, carries two condensing lenses, the upper one *l* being stationary and fixed in the top of said casing, while the lower one *m* is adjustable, and is carried in a ferrule *n* which is connected by a short stud *n'*, passing through a slot *o* in the casing *b*, to an elongated plate *p* furnished with a knob *p'* for operating the adjustable lens *m*. The ferrule is divided or split at n^2 and presses outwards against the casing *b'* in which it works friction-tight and thus maintains itself in any position in which it may be placed. The plate *p* is made as long as convenience will allow in order that it may prevent, as much as possible, the light from the lamp *c* passing outwards through the slot *o*. The broken lines in Fig. 1 indicate substantially the range through which the lens *m* may be moved. The diaphragm *q* (see Fig. 3) has an elliptical opening as shown, so that, when sprung on to the inclined end of the hood *e*, for the purpose of maintaining the mirror in position, the light proceeding from the lamp *c* impinges upon an elliptical area of the mirror and is consequently reflected in the form of a beam of light of circular, or approximately circular, cross-section. The mirror is furnished with an elliptical peep-opening *d'* which may be either an aperture through the mirror or a transparent portion of the mirror and by the term "peep-opening" is meant any means for enabling the light to pass through the mirror. The provision of a device of this character of such a construction as to cause the reflection of the light in a beam circular in cross section is of the greatest importance, since if the beam is elliptical in cross section, such as is of necessity the case when a circular mirror is employed, the operator is led to presume that astigmatism exists in the eye of the patient, even though

such is not the case. When the inclination of the mirror to the incident light is 45 degrees, the major axis of the elliptical area should be about 1½ times the length of the minor axis, and for different inclinations of the mirror the major axis will obviously require to be of different lengths.

Figs. 4 and 5 show a modified form of the invention as applied, for example, to a retinoscope. In this form, we provide only one lens *m*, and it is carried in the split ferrule *n* so as to be adjustable in the same manner as the lens *m*, Fig. 1. The broken lines in Fig. 4 indicate approximately its extreme upper and lower positions.

The relative adjustment of the condensing lens and lamp such as is obtained with the construction disclosed in Fig. 5 may be obtained in any other suitable manner as by the provision of a fixed lens and adjustable lamp, with the same results.

It is obvious that any suitable means for effecting the adjustment of the condensing lenses, other than the particular construction described herein, may be employed. It will also be obvious that the elliptical reflecting surface of the mirror may be obtained in any suitable manner.

The various forms of our invention are not confined to the particular types of instruments in which they are shown, but are applicable to any other type.

We claim:

1. In a retinoscope, ophthalmoscope or the like, the combination of a mirror, a source of light, a stationary condensing lens, and an adjustable condensing lens.

2. In a retinoscope, ophthalmoscope or the like, the combination with an angularly arranged mirror having an elliptical reflecting surface, of a casing, and a condensing lens and a source of light in said casing, said lens and source of light being adjustable relatively to each other.

3. In a retinoscope, ophthalmoscope or the like, the combination of a mirror with a diaphragm having an elliptical aperture.

4. In a retinoscope, ophthalmoscope or the like, the combination of a mirror, a diaphragm having an elliptical aperture mounted upon said mirror, a source of light, a stationary condensing lens, and an adjustable condensing lens.

5. In a retinoscope, ophthalmoscope or the like, the combination of a mirror, a diaphragm having an elliptical aperture mounted upon said mirror, a source of light, and an adjustable condensing lens.

6. In a retinoscope, ophthalmoscope or the like, the combination of a mirror, a source of light, a casing, a stationary condensing lens in said casing, an adjustable condensing lens in said casing, means for supporting and means of altering the position of said adjustable lens.

7. In a retinoscope, ophthalmoscope or the like, the combination with an angularly arranged mirror having an elliptical reflecting surface, of a source of light and a condensing lens.

8. In a retinoscope, ophthalmoscope or the like, the combination of a mirror, a diaphragm having an elliptical aperture mounted upon said mirror, a casing, a stationary condensing lens in said casing, an adjustable condensing lens in said casing, means for supporting and means for altering the position of said adjustable lens.

9. In a retinoscope, ophthalmoscope or the like, the combination of a mirror, a diaphragm having an elliptical aperture mounted upon said mirror, a casing, an adjustable condensing lens in said casing, means for supporting and means for altering the position of said adjustable lens.

10. In a retinoscope, ophthalmoscope or the like, the combination with a source of light, of a mirror provided with an elliptical reflecting surface.

11. In a retinoscope, ophthalmoscope or the like, a mirror provided with an elliptical reflecting surface and having an elliptical peep opening.

12. In a retinoscope, ophthalmoscope or the like, a mirror having an elliptical peep-opening.

13. In a retinoscope, ophthalmoscope or the like, a mirror having a peep-opening in combination with a diaphragm having an elliptical aperture.

14. In a retinoscope, ophthalmoscope or the like, the combination with a mirror and a source of light, of a plurality of condensing lenses, one of which is adjustable.

15. In a retinoscope, ophthalmoscope or the like, the combination of an angularly arranged mirror having an elliptical reflecting surface, of a casing, and a source of light in said casing.

16. In a retinoscope, ophthalmoscope or the like, the combination with an angularly arranged mirror having an elliptical reflecting surface and an elliptical peep opening, of a casing, and a source of light in said casing.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES CHAMBERS INSKEEP.
EGBERT GOWLLAND.
CHARLES SEPTIMUS GOWLLAND.

Witnesses as to Charles Chambers Inskeep:
CARRY INSKEEP,
CHAS. CONNELLY.

Witnesses as to Egbert Gowlland and Charles Septimus Gowlland:
HENRY K. SEMPKIN,
CHARLES F. TUCKER.