

No. 725,483.

PATENTED APR. 14, 1903.

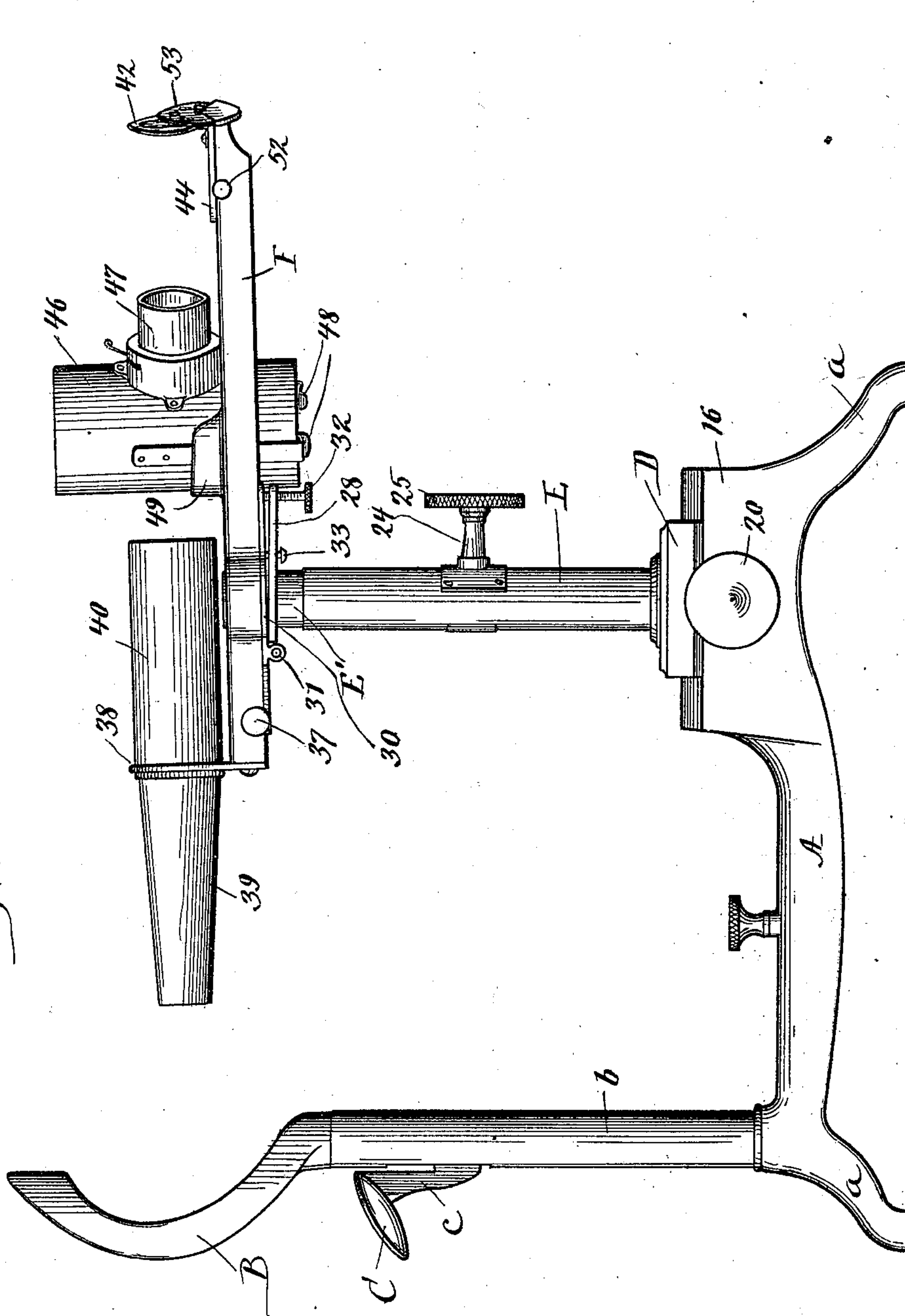
S. A. RHODES.  
OPHTHALMOSCOPE.

APPLICATION FILED SEPT. 15, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:  
*Frederick*  
*Harry L. Clapp*

Inventor  
*Seth A. Rhodes*  
By *Peirce & Fisher*  
Attorneys

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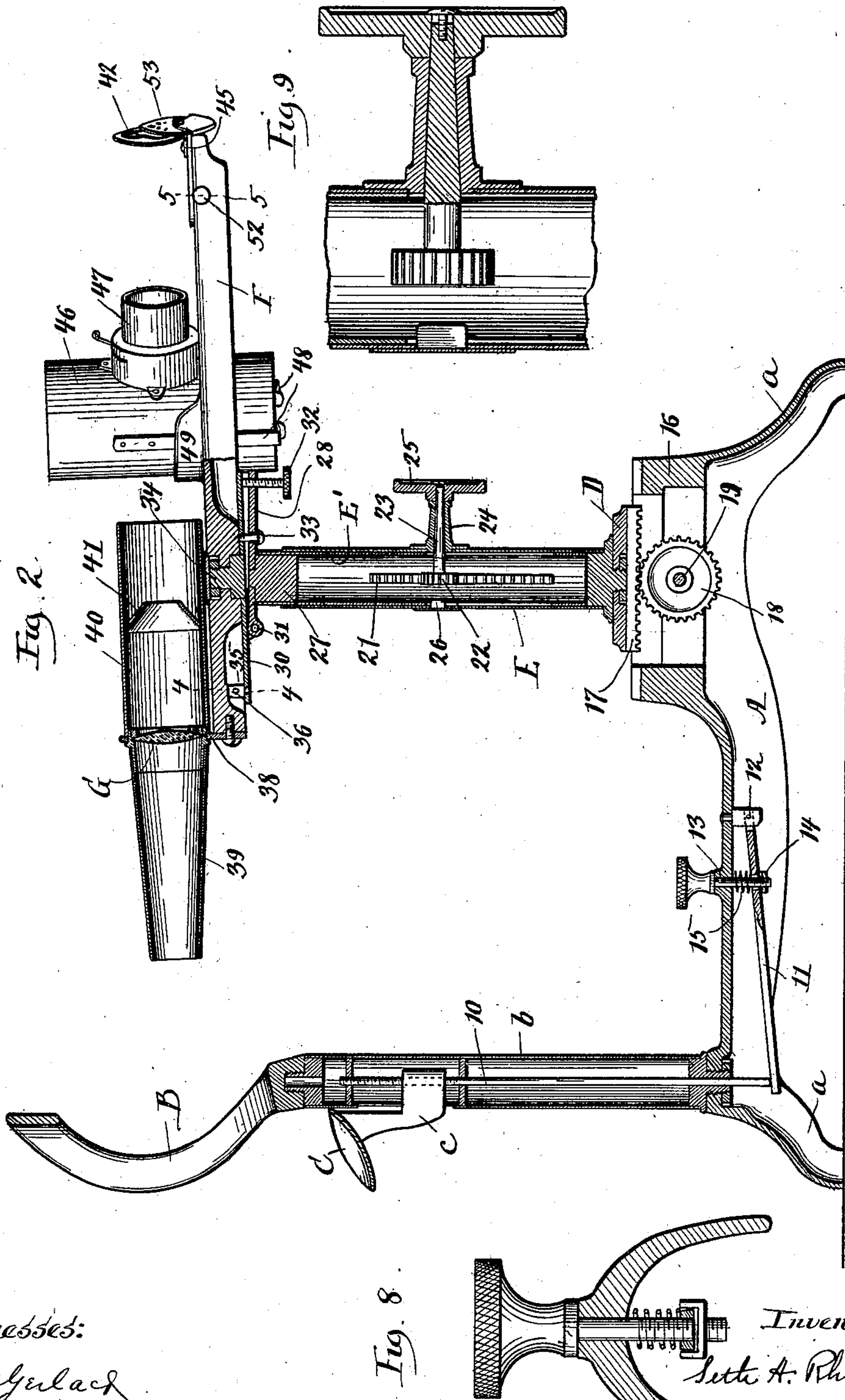
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3 SHEETS—SHEET 2.



Witnesses:

*Fredrick A. ...*

*Harry L. Clapp*

Fig. 8.

Inventor

*Seth A. Rhodes*

*By Peier & Fisher*  
Attorneys.





# UNITED STATES PATENT OFFICE.

SETH A. RHODES, OF CHICAGO, ILLINOIS.

## OPHTHALMOSCOPE.

SPECIFICATION forming part of Letters Patent No. 725,483, dated April 14, 1903.

Application filed September 15, 1902. Serial No. 123,424. (No model.)

*To all whom it may concern:*

Be it known that I, SETH A. RHODES, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Ophthalmoscopes, of which the following is declared to be a full, clear, and exact description.

The invention relates to that class of optical instruments used by oculists and others for objective tests of the eyes of a patient known as "ophthalmoscopes;" and the invention seeks to provide a convenient and efficient instrument by which eyes may be examined in accordance with the so-called "indirect" method.

The ophthalmoscope generally employed at the present time is a plane or spherical mirror having a central peep-hole and is held in the hand of the operator before his own eye in proper position to reflect a ray of light from a light-screen to the eye of the patient, while suitable lenses are held in the operator's hand in line between the patient's eye and the mirror. Such instruments must usually be employed in a dark room, and considerable skill and time are required in making the test, to the great inconvenience both of the patient and the operator.

The present invention provides an instrument which comprises a preferably open frame adapted at one end to position the patient's head and having a light-screen and a mirror mounted in proper relative position at the operator's end, together with an object-glass mounted upon the frame intermediate its end and between the mirror and the patient's eye, which object-glass may be readily focused and which is preferably provided on each side with a suitable tubular shield.

The invention consists in the features of construction, arrangements, and combinations of parts set forth in the following description, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings, in which like parts bear like designation throughout, Figure 1 is a view in elevation of the improved instrument. Fig. 2 is a view similar to Fig. 1 with parts shown in vertical section. Fig. 3 is a plan view of the improved instrument. Fig. 4 and

Fig. 5 are enlarged detailed sections on lines 4 4 and 5 5, respectively, of Fig. 2. Fig. 6 is an enlarged detailed section on line 6 6 of Fig. 3. Fig. 7 is an end view showing the mirror-disk and lens-carrier. Figs. 8 and 9 are detailed sections of parts shown in Fig. 2.

The instrument is mounted upon a suitable base A, provided with end supports or legs *a*. At the outer end of the instrument, which is adapted for the patient, is provided a tubular standard *b*, which is threaded or otherwise suitably secured upon the base A. To the top of the standard *b* is threaded a suitable head-rest for the patient, which preferably comprises an open oval frame B, extending laterally at either side to fit against the forehead and sides of the face of the patient, who may thus be conveniently placed in position for the examination of the eyes. Preferably, also, a chin-rest C for the patient is mounted upon the end of an angular supporting-plate *c*, which projects through an elongated slot in the side of a tubular standard *b*, near its upper end. A supporting-rod 10 for the chin-rest slides vertically within the tubular standard *b*, is threaded at its upper end through the inner end of the plate *c*, and its lower end projects downwardly within the base portion A. A shift-lever 11 is pivoted at 12 within the base, and its free end loosely engages the lower end of the rod 10. An adjusting-screw 13 for the chin-rest extends through the base portion A and through an opening formed in the lever 11 and is provided at its lower end with a nut 14, while a spring 15, interposed between the base portion and the lever 11, holds the latter against the nut 14. By this means the chin-rest may be quickly adjusted to the desired position. At the opposite end of the base A, upon an upwardly-extending portion 16, is mounted a slide D, which reciprocates lengthwise of the instrument upon suitable guides. A rack-section 17, fixed to the under side of the slide D, engages a pinion 18, mounted to revolve upon a shaft 19. The shaft 19 is suitably journaled in the base A and is provided at its outer end with an adjusting thumb-piece 20. (See Fig. 1.)

The outer tubular section E of a vertically-adjustable standard is suitably secured to the slide D, while the inner tubular section E' is



telescoped to slide within the outer section E. A rack 21 is secured to the inner face of the tubular section E' and is engaged by a pinion 22, as indicated. The pinion 22 is journaled upon a shaft 23, which extends through a slot in the inner section E' and is journaled in a suitable bearing 24, fixed to the outer tubular section E. By means of a thumb-piece 25 on the outer end of the shaft 23 the standard-section E' may be quickly adjusted to any desired height. Preferably a guide-block 26, fixed to the outer section E, extends within a vertical slot formed in the inner section E'.

A horizontal support or arm F is mounted to swing in a horizontal plane upon the upper end of a vertical adjustable standard E E', and for this purpose a pivot-piece 27 is mounted to turn within the upper end of the tubular standard-section E'. The supporting-arm F is preferably connected to the pivot-piece 27 by a hinged joint, so as to swing through a slight arc in a vertical plane. This hinge comprises the plate-piece 28, fixed to the upper end of pivot-piece 27, and the plate 30, which is hinged thereto, as at 31, and which is suitably connected to the arm F. An adjusting-screw 32, threaded through the outer end of the plate 28, engages the outer end of the plate 30 and serves to tilt the support F and the parts carried thereby through a slight arc. A headed stop-pin 33 extends through an opening in the plate 28 and is fixed to the plate 30 and serves to limit this vertical movement of the support F.

As previously stated, the support F and the parts carried thereby may swing upon a horizontal plane upon the upper end of the standard E E'; but to effect an accurate adjustment of the support F in a horizontal direction the latter is preferably journaled upon a suitable pivot-piece 34, fixed to the plate 30, and at the inner end of plate 30 is mounted a nut 35, through which is threaded an adjusting-screw 36, which is journaled, as indicated in Fig. 4, within downwardly-depending flanges upon the supporting-arm F. A thumb-piece 37 upon screw 36 may be thus manipulated to swing the support F and parts carried thereby through a small arc in a horizontal direction.

An upright supporting-collar 38 is mounted upon the inner end of the arm F and carries in any suitable manner an object glass or lens G. An object glass or lens G is preferably provided on opposite sides with the laterally-extending shades or light-shields 39 and 40, which are preferably tubular in form and, if desired, may be lined with light-absorbing black cloth. The tubular shade 40 may be provided, if desired, with a diaphragm 41 to obstruct dispersed rays of light.

A vertical mirror-support 42, carrying on its face a plane or spherical mirror 43, is provided with a horizontally-extending projection or arm 44 at its lower end and is held in place upon the outer end of the arm F by a

vertical bolt 45. The mirror 43 and its support 42 are provided with a central peep-hole for the operator.

A light-screen is mounted upon the supporting-arm F to one side of the line of sight between said mirror and said object-glass and preferably comprises a cylindrical body 46, of sheet metal or asbestos-board, and a tubular shield 47, secured to the cylinder 46 about a side opening thereto. The cylinder 46 is preferably provided with spring-clips 48 to support an electric or gas lamp or other suitable light-supply, and the shield 47 may, if desired, serve to support a condensing-lens, diaphragm, or ground-glass window. The light-screen is mounted upon the supporting-arm F in opposed relation with reference to the mirror 43 and may be secured, as indicated, within an arc-shape projection 49 of the supporting-arm F.

As clearly indicated in Fig. 3, the light-screen, mirror, and object-glass are so positioned that the ray from the light-screen will be projected by the mirror through the object-glass to the patient's eye. The mirror-support 42 is preferably pivotally mounted upon the bolt 45 to swing in a horizontal plane in order that the ray of light from the light-screen may be accurately projected through the object-glass to the patient's eye. To effect this adjustment, the arm 44 is provided with a pin 50, (see Fig. 5,) which projects downwardly within a depression formed in the upper face of the arm F and may be engaged on opposite sides by adjusting-screws 52, threaded through the side walls of the depression.

Preferably a lens-carrier is mounted adjacent the outer face of the mirror-support 42 and may comprise, as indicated, a centrally-pivoted disk 53, carrying near its edge a series of lenses 54 and so arranged that the lenses may be moved before the peep-hole in the mirror-support and mirror.

The use of the instrument will be readily understood by those skilled in the art. The patient's head is placed in stationary position on chin-rest C and against the open head-rest B. The frame F is adjusted to proper height and swung in a horizontal plane for the examination of either eye. In Fig. 3, for example, the instrument is positioned for the examination of the patient's left eye. The instrument may be accurately positioned to throw the beam of light into the patient's eye; but means of adjusting thumb-pieces 32 and 37 and the support F and the object-glass G, carried thereby, may be tilted in a vertical plane by adjusting screw 32 to throw the annoying reflect from the cornea of the eye under examination off of the operator's field of view. In instruments heretofore used great difficulty has been experienced in "finding the patient's eye"—i. e., properly directing the beam of light into the pupil of the patient's eye. The beam is preferably directed into the pupil near its outer edge, so



as not to strike directly upon the sensitive portion of the retina, and thus contract the pupil. With the present instrument, in which the patient's head is firmly positioned within the open head-rest and in which the movable parts of the instrument, including the tubular shield about the object-lens, terminate short of the head-rest, the instrument may be nicely adjusted by the operator before looking through the peep-hole mirror to direct the ray of light accurately in the desired position. In other words, it is not necessary to hunt around with his eye to the peep-hole mirror before finding the patient's eye, and much time and annoyance, both to the operator and the patient, are thereby saved. The object glass or lens G is of such strength that by adjusting the frame F on standard E E' back and forth by manipulating the thumb-pieces 20 the reflected rays from the eye under examination may be brought to a focus to form a well-defined inverted image of the fundus of the eye.

By providing the laterally-extending shade on opposite sides of the object-lens G images of surrounding objects will be cut out of the field of view and the image of the fundus of the eye rendered clear and distinct.

It will be observed that I have provided an open-framed instrument which may be used without resort to a dark room and which will give a clearly-defined image of the fundus of the eye under examination. It is obvious that numerous changes may be made in the details of construction, if desired. Other means may be provided for adjusting the supporting-arm F to a proper position and for focusing the object-glass G. So, also, if desired, the mirror and light-screen may be arranged to shift from side by side, as indicated in prior Letters Patent of the United States, issued to me September 16, 1902, No. 709,359. So, also, other forms of lens-carriers may be mounted adjacent the front side of the mirror at the operator's end of the instrument. Other changes may be made by individuals skilled in the art without departure from the essentials of the invention as defined by the claims.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In ophthalmoscopes, a suitable frame, an object-lens and a mirror having a peep-hole mounted on said frame in opposed relation, a light-screen mounted on said frame to one side of the line of said mirror and object-lens and a shade for said lens.

2. In ophthalmoscopes, a suitable frame, an object-lens and a mirror having a peep-hole mounted on said frame in opposed relation, a light-screen mounted on said frame, to one side of the line of said mirror and object-lens, a shade for said lens and means for focusing said lens carried by said frame.

3. In ophthalmoscopes, a suitable base, a vertical standard on said base, a horizontal

support carried by said standard, a vertically-disposed object-lens and a vertically-disposed mirror having a peep-hole mounted upon said horizontal support in opposed relation, a shade arranged on opposite sides of said object-lens, a light-screen carried by said support to one side of the line of said mirror and object-lens and means for focusing said object-lens.

4. In ophthalmoscopes, a suitable base, a supporting-standard carried by said base, a support mounted to swing in a horizontal plane upon the upper end of said standard, means for vertically adjusting said support, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation, a light-screen carried on said support to one side of the line of said mirror and object-lens, a shade laterally extending on opposite sides of said object-lens and means for focusing said object-lens.

5. In ophthalmoscopes, a suitable base, a vertically-adjustable standard mounted on said base, a horizontal supporting-arm mounted to swing in a horizontal plane upon the upper end of said standard, an object-lens and a mirror having a peep-hole mounted upon opposite ends of said supporting-arm, a light-screen mounted on said supporting-arm to one side of the line of said mirror and object-lens, a tubular shade arranged on opposite sides of said lens and means for adjusting said supporting-arm to and from the ends of the instrument.

6. In ophthalmoscopes, a suitable frame adapted at one end for the patient, a mirror having a peep-hole mounted at the opposite end, an object-lens mounted upon said frame between its ends and in the line of sight between said mirror and the patient's eye, and a light-screen carried by said frame to one side of the line of said mirror and object-lens, the parts being so positioned that the ray of light from the light-screen is reflected by the mirror through the object-lens to the patient's eye and the object-lens being adapted to form a real image of the fundus of the patient's eye.

7. In ophthalmoscopes, a suitable frame adapted at one end for the patient, a mirror having a peep-hole mounted at the opposite end, an object-lens mounted on said frame between its ends and in the line of sight between said mirror and the patient's eye, a light-screen carried by said frame to one side of the line of said mirror and object-lens and means for focusing the object-lens, the latter being adapted to form a real image of the fundus of the patient's eye.

8. In ophthalmoscopes, a suitable frame, means at one end of said frame for securely positioning the patient's head, a mirror having a peep-hole mounted at the opposite end of the frame, an object-lens mounted upon said frame between its ends and in the line of sight between said mirror and the patient's eye, a shade for said lens and a light-screen carried by said frame to one side of the line



of said mirror and object-lens, the latter being adapted to form a real image of the fundus of the patient's eye.

9. In ophthalmoscopes, a suitable frame, means at one end for positioning the patient's head, a mirror having a peep-hole mounted at the opposite end of the frame, an object-lens mounted on said frame between its ends and in the line of sight between said mirror and the patient's eye, a shade arranged on opposite sides of said object-lens, means for focusing said lens and a light-screen mounted on said frame to one side of the line of said mirror and object-lens, the latter being adapted to form a real image of the fundus of the patient's eye.

10. In ophthalmoscopes, a frame comprising a suitable base, means at one end for positioning the patient's head, a support independent of said means and mounted at the opposite end, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation and a light-screen carried by said support to one side of the line of said mirror and eyepiece.

11. In ophthalmoscopes, a suitable frame comprising a base, a head-rest mounted at one end of said base, a horizontal support mounted to swing in a horizontal plane at the opposite end, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation, means for focusing said lens and a light-screen carried by said support to one side of the line of said mirror and eyepiece.

12. In ophthalmoscopes, a frame comprising a base, a head-rest at one end of said base, a standard at the opposite end of said base, a horizontal support mounted to swing in a horizontal plane upon the upper end of said standard, means for vertically adjusting said support, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation and a light-screen carried by said support to one side of the line of said mirror and lens.

13. In ophthalmoscopes, a frame comprising a base, a suitable head-rest at one end, a horizontal support mounted to swing in a horizontal plane at the opposite end, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation, a light-screen carried by said support to one side of the line of said mirror and lens and a shade laterally extending arranged on opposite sides of said lens, said shield terminating short of said head-rest.

14. In ophthalmoscopes, a suitable base, a head-rest at one end, a horizontal support at the opposite end, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation, a shade for said object-lens terminating short of said head-rest and a light-screen on said support to one side of the line of said mirror and lens.

15. In ophthalmoscopes, a suitable base, means at one end for positioning the patient's

head, an adjusting-standard mounted at the opposite end, a horizontal support pivoted to swing in a horizontal plane upon the upper end of said standard, an object-lens and a mirror having a peep-hole mounted on opposite ends of said support, a light-screen mounted on said support to one side of the line of said mirror and lens and means for focusing said lens.

16. In ophthalmoscopes, a suitable base, adjustable means at one end for positioning the patient's head, a supporting-standard at the opposite end, a support pivoted to swing in a horizontal plane upon the upper end of said supporting-standard, an object-lens and a mirror having a peep-hole mounted on opposite ends of said support, a light-screen on said support to one side of the line of said mirror and lens, a shade for said object-lens and means for focusing said lens.

17. In ophthalmoscopes, a suitable base, a head-rest mounted at one end, a supporting-standard at the opposite end, a support pivoted to swing in a horizontal plane upon the upper end of said standard, an object-lens and a mirror having a peep-hole mounted on opposite ends of said support, a light-screen on said support to one side of the line of said mirror and lens and means for adjusting said support to and from said head-rest.

18. In ophthalmoscopes, a suitable open frame comprising a base, a head-rest mounted on said base at one end of the instrument, a vertically-adjustable standard mounted on said base at the opposite end, a horizontally-disposed supporting-arm pivoted to swing in a horizontal plane upon the upper end of said adjustable standard, an object-lens and a mirror having a peep-hole mounted on opposite ends of said supporting-arm, a tubular shade laterally extending on opposite sides of said object-lens, means for focusing said lens and a light-screen carried by said supporting-arm to one side of the line of said mirror and lens.

19. In ophthalmoscopes, a suitable base, a head-rest having an adjustable chin-support at one end of said base, an adjusting-standard at the opposite end, a support mounted to swing in a horizontal plane upon the upper end of said standard, an object-lens and a mirror having a peep-hole mounted upon the opposite ends of said support, a laterally-extending shade for said object-lens terminating short of said head-rest, a light-screen on said support to one side of the line of said mirror and lens and means for adjusting said support to and from said head-rest.

20. In ophthalmoscopes, a suitable base, a head-rest at one end vertically adjustable, a horizontal swinging support at the opposite end, an object-lens and a mirror having a peep-hole mounted on said support in opposed relation, a shade for said lens, means for focusing said lens and a light-screen mounted on said support to one side of said mirror and lens.



21. In ophthalmoscopes, a suitable base, a head-rest at one end, a vertically-adjustable standard at the opposite end, a support mounted to swing in a horizontal plane upon the upper end of said standard, a vertically-disposed object-lens and a vertically-disposed mirror having a peep-hole mounted on said support in opposed relation, a shield arranged on the opposite side of said lens, means for focusing said lens and a light-screen carried on said support to one side of the line of said lens and mirror.

22. In ophthalmoscopes, a frame comprising a suitable base, a head-rest at one end, a standard mounted on said base, a horizontally-disposed support pivoted to swing in a horizontal plane on said standard, an object-lens and a mirror having a peep-hole mounted on the opposite ends of said support, a light-screen carried on said support to one side of the line of said mirror and lens and means for tilting said support in a vertical plane upon the upper end of said standard.

23. In ophthalmoscopes, a suitable base, a standard on said base, a horizontally-disposed support mounted upon the upper end of said standard, a vertically-disposed object-lens and a vertically-disposed mirror having a peep-hole mounted on said support in opposed relation, a light-screen mounted on said support in the same horizontal plane

with and to one side of the line of said mirror and object-lens, said mirror being adjustable about a vertical axis and means for focusing said object-lens.

24. In ophthalmoscopes, a suitable base, a standard on said base, a horizontally-disposed support mounted upon the upper end of said standard, a mirror having a peep-hole and an object-lens mounted on said support in opposed relation, a light-screen mounted on said support to one side of the line of said mirror and object-lens, means for focusing said lens and a lens-carrier mounted adjacent the outer face of said mirror.

25. In ophthalmoscopes, a suitable open frame comprising a base, a head-rest at one end of said base, an adjusting-standard at the opposite end of said base, a horizontal supporting-arm pivoted to swing upon the upper end of said standard, an object-lens and a mirror having a peep-hole mounted upon opposite ends of said supporting-arm, a shade laterally extending on opposite sides of said lens and terminating short of said head-rest, means for focusing said lens and a light-screen on said supporting-arm to one side of the line of said mirror and eyepiece.

SETH A. RHODES.

Witnesses:

ALBERTA ADAMICK,  
HARRY L. CLAPP.