

March 18, 1941.

F. W. JOBE

2,235,319

SLIT LAMP

Filed Sept. 30, 1939

3 Sheets-Sheet 1

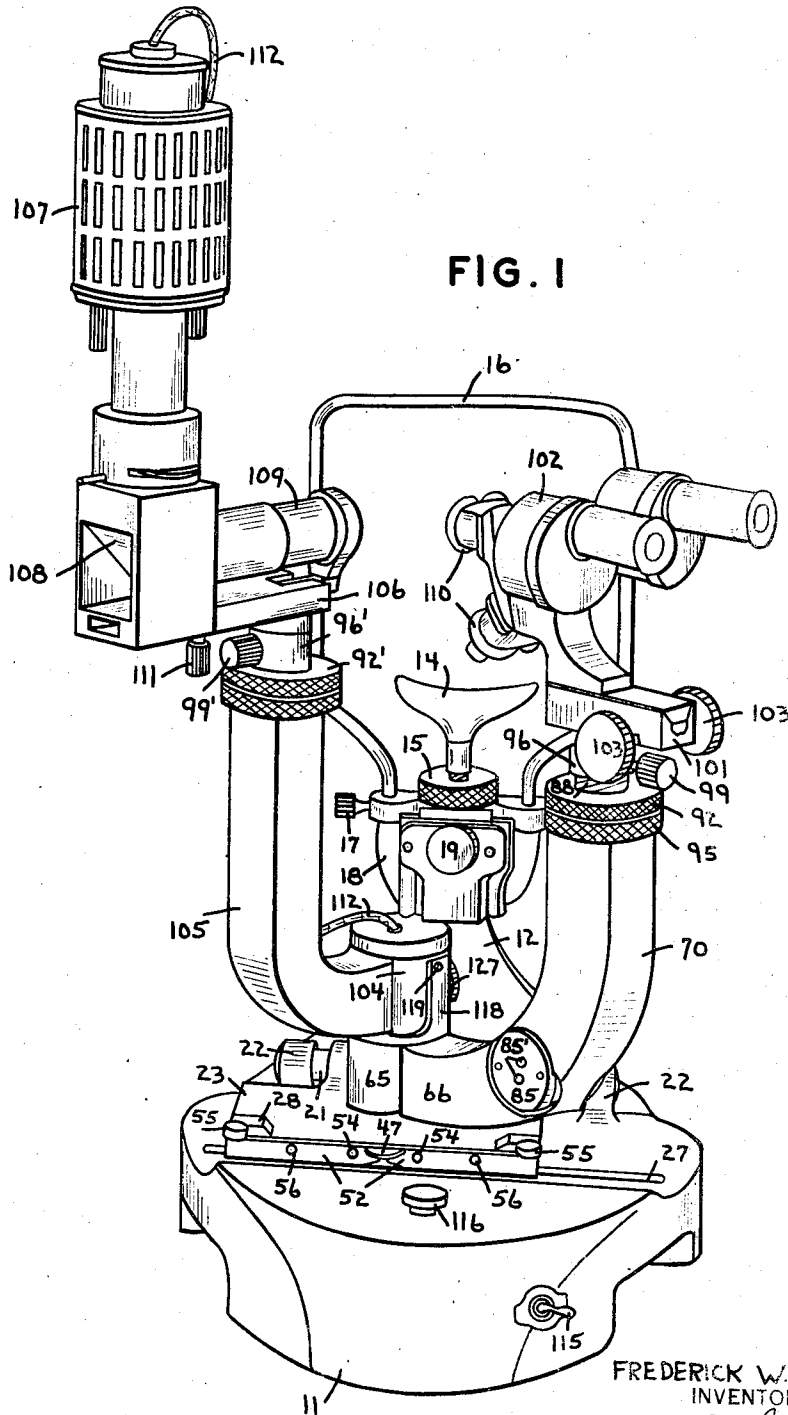


FIG. 1

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FIG. 2

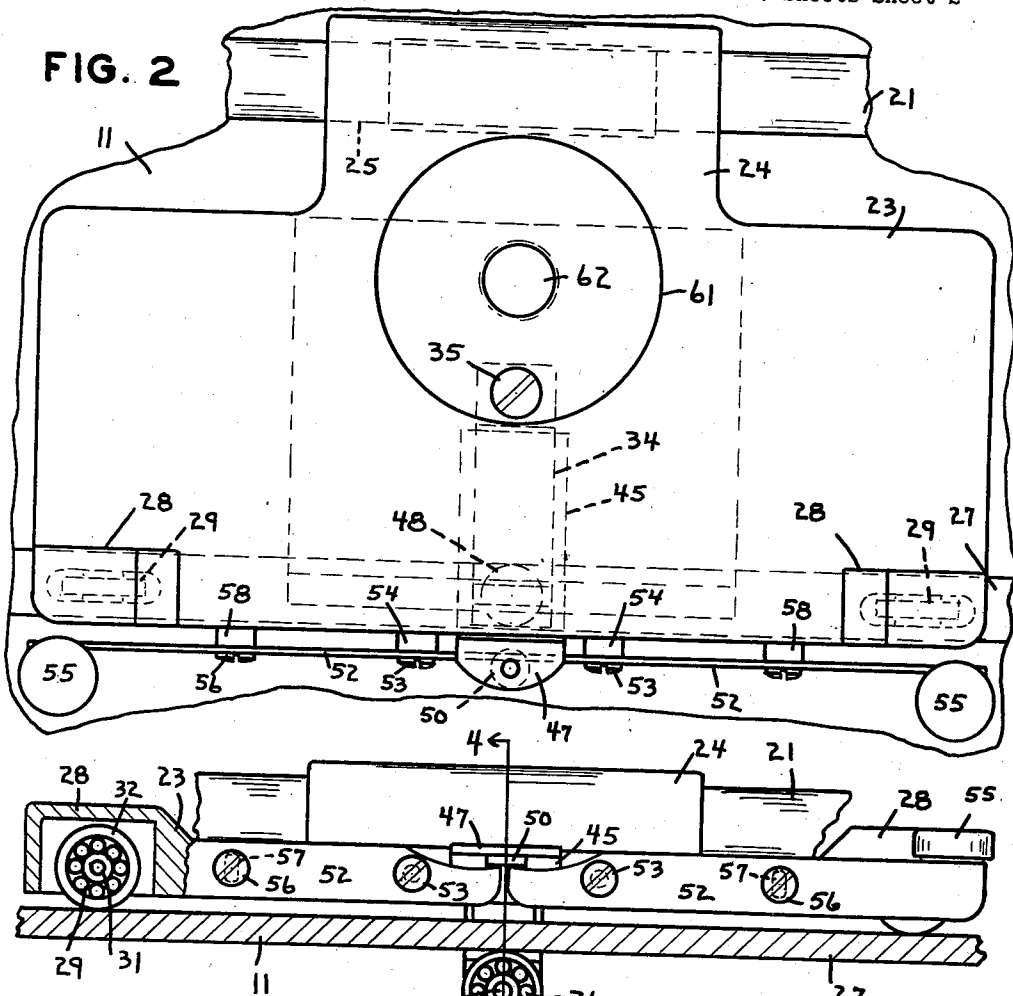


FIG. 3

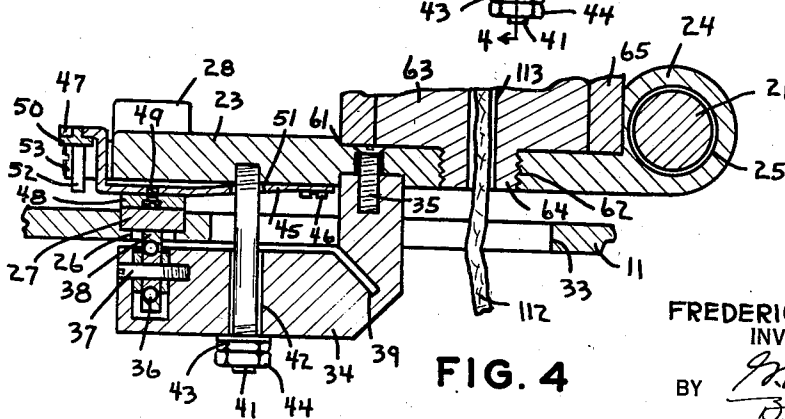


FIG. 4

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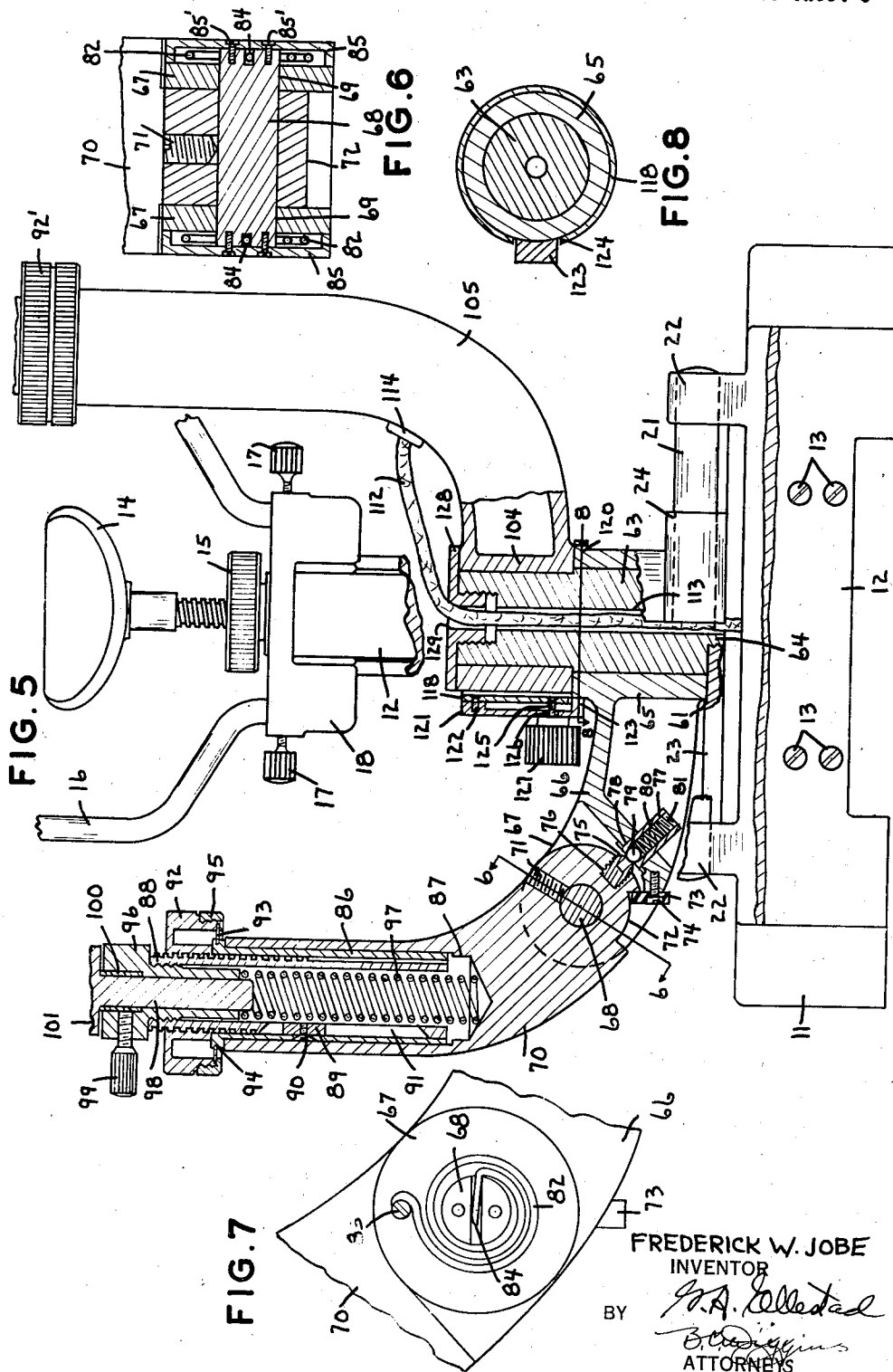
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,235,319

SLIT LAMP

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Application September 30, 1939, Serial No. 297,402

3 Claims. (Cl. 88—20)

The present invention relates to ophthalmic instruments and more particularly to ophthalmic instruments of the type known as slit lamps.

One of the objects of the present invention is to provide a new and improved slit lamp which is simple and convenient to use yet rugged, compact and accurate in construction. Another object is to provide a slit lamp in which the slit lamp projector and microscope can be moved angularly either separately or together without the need for refocusing. A further object is to provide a slit lamp in which both eyes of a patient may be examined without moving the patient's head. These and other objects and advantages reside in certain novel features of construction, arrangement and combination of parts as will hereinafter be more fully set forth and pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a front perspective view of my new slit lamp.

Fig. 2 is a top plan view of the carriage.

Fig. 3 is a front elevation of the carriage with parts in section.

Fig. 4 is a vertical section of the carriage taken on line 4—4 of Fig. 3.

Fig. 5 is a rear elevation of my slit lamp microscope with parts in section.

Fig. 6 is a section taken on line 6—6 of Fig. 5.

Fig. 7 is an enlarged fragmentary elevation of the microscope arm joint.

Fig. 8 is a horizontal section taken on line 8—8 of Fig. 5.

One preferred form of my invention is illustrated in the drawings wherein 11 designates the instrument base which may be supported on any suitable stand or table. A standard 12, fastened at the rear end of the base 11 by screws or bolts 13, overhangs the base 11 and carries a chin rest 14 which may be raised or lowered by a nut 15. The usual forehead rest 16 is removably fastened by screws 17 to a bracket 18 which is pivotally mounted on the standard 12 beneath the chin rest 14. A screw 19 serves to tilt the bracket 18 and forehead rest 16 forward and backward relative to the chin rest 14. The chin rest and forehead rest are provided to fix the head of the patient under observation and their particular structures form no part of the present invention. Suitable devices for positioning the head of a patient are well known to persons skilled in the art.

A stub shaft 21 is fixed at its ends in two projections 22 and extends transversely across the rear portion of the base 11 beneath the chin rest 14 and forehead rest 16. A carriage 23 has a rear portion 24 formed with a bore 25 which fits snugly around the stub shaft 21 and is slidable on the stub shaft 21 between the projections 22.

The base 11 is formed with a slot 26 in front

of and parallel to the stub shaft 21 and a track 27 is fixed in this slot 26. The front of the carriage 23 is provided with two housings 28 one at each end, and a ball bearing assembly 29 is fixed on a shaft 31 in each housing. The outer race 32 of each ball bearing assembly 29 rests on the track 27 and serves as a roller or wheel for the carriage 23.

Between the stub shaft 21 and the slot 26, the base 11 has a large opening 33. A bracket 34 is fastened beneath the center of the carriage 23 by a screw 35 and projects forwardly beneath the base 11 beyond the slot 26. Directly beneath the slot 26 and track 27, the bracket 34 is recessed and a ball bearing assembly 36 is secured in this recess by a screw or bolt 37. The outer race 38 of the ball bearing assembly 36 bears against the under side of the track 27.

In order to prevent any looseness between the carriage 23 and the track 27, the bracket 34 is formed with a deep slot 39 at the elbow. A stud bolt 41 is threaded into the bottom of the carriage 23 and projects downwardly through a hole 42 in the bracket 34. A nut 43 is threaded on the lower end of the stud bolt 41 and serves to draw the outer end of the bracket 34 upward toward the carriage to clamp the track 27 tightly between the races 32 and 38 of the ball bearing assemblies 29 and 36. The usual lock nut 44 may be used on the stud bolt 41 if desired.

A heavy leaf spring 45 is secured to the bottom of the carriage 23 in front of the bracket 34 by a screw or bolt 46. Beyond the front edge of the carriage 23, the spring 45 is bent upwardly and terminates in an overhanging lip 47 which carries a hardened insert 50. A friction brake 48 is fastened to the spring 45 by a screw or bolt 49 directly over the track 27 and is urged into contact with the track 27 by the spring 45. The spring 45 is formed with a hole 51 surrounding the stud bolt 41.

Two levers 52 are pivotally mounted on screws or bolts 53, one on each side of the spring 45. Spacers 54 on the screws or bolts 53 hold the levers 52 away from the front end of the carriage 23. The inner ends of the levers 52 bear against the insert 50 on the under side of the overhanging lip 47 of the spring 45 and the outer ends of the levers 52 are provided with enlarged knobs 55. In order to limit the movement of the levers 52, two screws or bolts 56 project outwardly from the front of the carriage 23 through elongated slots 57 in the levers 52. These screws or bolts 56 are provided with spacers 58 similar to the spacers 54.

It can readily be seen that pressure on either knob 55 raises the spring 45 and brake 48 away from the track 27 leaving the carriage 23 free to slide transversely on the base 11 beneath the

chin rest 14. Upon release of the knobs 55, the spring 45 presses the brake 48 into engagement with the track 27 and locks the carriage 23 against transverse movement.

5 A circular recess 61 is formed in the center of the top of the carriage 23 and a tapped hole 62 extends through the carriage at the center of this recess 61. A vertical stud 63 is provided with a reduced threaded portion 64 which is threaded in
10 the tapped hole 62 in the carriage 23.

A bearing sleeve 65 is journaled on the stud 63 and extends with the stud into the recess 61. An arm 66, which may be cast integral with the bearing sleeve 65 extends laterally therefrom
15 and is bifurcated at the outer end to form two spaced ears 67. A transverse shaft 68 is journaled in bores 69 in the ears 67 and the microscope arm 70 is fixed on the shaft 68 between the ears by a suitable screw or bolt 71 as shown in
20 Figs. 5 and 6.

A transverse slot 72 is formed in the lower end of the microscope arm 70 to receive a stop 73 which is fixed to the arm 66 between the ears 67 by a screw or bolt 74. The microscope arm 70
25 is thus free to swing on the shaft 68 and the swinging movement is limited by the width of the slot 72.

To insure return of the arm 70 to its proper vertical position, a cup-shaped member 75 is threaded into a tapped hole 76 in the lower end
30 of the arm 70. A sleeve 77 is fixed in a hole 78 in the arm 66 and contains a ball or detent 79 which is pressed toward the microscope arm 70 by a coil spring 80. A screw 81 in the bottom end of the sleeve 77 regulates the tension of the spring 79 and the top end of the sleeve 77 may
35 be restricted or reduced to prevent the escape of the ball 79 as is well known in the art. When the arm 70 is in its proper vertical position, the ball 79 engages in the cup 75 and holds the arm 70 against displacement.

As shown in Fig. 5, the weight of the arm 70 tends to swing the arm 70 counterclockwise away from its vertical position. To correct this, two
45 counterbalancing springs 82 are secured at one end, one on the outside of each ear 67, by screws or bolts 83. The springs 82 are then wound around the shaft 68 and their free ends are positioned in transverse slots 84 in each end of
50 the shaft 68. Covers 85 are secured on each end of the shaft 68 by screws 85' over the springs 82 and, if desired, the outside of the ears 67 may be recessed so that the covers 85 are flush with the sides of the arms 66 and 70 as shown in
55 Fig. 1.

The arm 70 is curved adjacent the shaft 68 and the other end extends upwardly parallel to the stud 63. A sleeve 86 is rigidly fastened in a bore 87 in the upper end of the arm 70. A tubular
60 screw 88 is vertically slidably mounted within the sleeve 86 but is held against rotation by a key 89 which is secured to the sleeve 86 by a screw 90 and engages a vertical slot 91 in the tubular screw 88. A knurled nut 92 is threaded on the
65 tubular screw 88 above the sleeve 86 to raise and lower the screw 88. This nut 92 is held against longitudinal movement relative to the sleeve 86 by a washer 93 which is seated in an annular groove 94 in the sleeve 86 and is fastened to the
70 nut 92 by a collar 95.

A bearing 96 is threaded into the top of the screw 88 and the screw 88 and bearing 96 are urged upward by a coil spring 97 which bears
75 against the bottom of the bore 87 and the bottom of the bearing 96. A shaft 98 is rotatably

mounted in the bearing 96 and may be locked in any angular position by a set screw 99 which bears against the split sleeve 100 surrounding the shaft 98.

A conventional microscope slide 101 is fastened 5 on top of the shaft 98. This slide 101 carries the usual microscope 102 provided with the usual interchangeable objectives 110, which may be focused by the usual knobs 103. The construction of the microscope and focusing mechanism form
10 no part of the present invention and are well known to those skilled in the art.

A second bearing sleeve 104 is rotatably mounted on the stud 63 above the sleeve 65. The slit lamp arm 105, which may be formed integral with
15 the sleeve 104, projects outward and upward parallel to the microscope arm. This arm 105 is hollow like the arm 70 and carries an identical elevating mechanism which is controlled by the nut 92'. A shaft, not shown, but substantially identical with the shaft 98, is rotatable in a bearing
20 96' and may be locked against rotation by a set screw 99'. A bracket 106 fixed on the end of shaft, not shown, and the slit lamp unit is mounted on this bracket 106.

This slit lamp unit includes a vertical lamp house 107 and a reflector 108 for directing the light from the lamp house in a horizontal direction. An objective lens is mounted in the movable sleeve 109 and may be moved back and forth
30 by a rack and pinion mechanism, not shown, under the control of a knob 111.

Current is supplied to the lamp by an electric cord or wire 112 which passes upward from the base through a central hole 113 in the stud 63.
35 This wire enters the arm 105 at 114, coming out near the top of the arm 105 and entering the top of the lamp house 107. A suitable hand switch 115 may be secured on the base 11 to turn the current on and off and the amount of illumination may be regulated by a suitable rheostat, not shown, under the control of a knob or handle 116.

The details of construction of the slit lamp unit form no part of the present invention and are
45 well known to those skilled in the art.

It is sometimes desirable to swing the microscope 102 and slit lamp together as a unit. To accomplish this, an apron 118 is secured to the bearing sleeve 104 by screws or bolts 119. The
50 lower portion of this apron 118 extends down beyond the bearing sleeve 104 and encircles the bearing sleeve 65 which is enlarged at the top as indicated at 120 in Fig. 5. A spring arm 121 is secured at the top of the apron 118 by a screw
55 122. The lower end of this arm 121 is formed with a brake shoe 123 which passes through a slot 124 in the apron 118 to bear against the sleeve 65. A screw 125 extends outwardly from the apron 118 through a hole 126 and carries an enlarged knurled nut 127. Ordinarily the spring arm 121 urges the brake shoe 123 away from the sleeve 65 but the shoe 123 may be moved into
60 braking engagement by the nut 127.

A cover plate 128, threaded into the top of the stud 63, extends over the sleeve 104 and prevents the ingress of dust and dirt between the stud 63 and bearing sleeves 65 and 104. A hole 129 in the cover plate 128 permits the passage of the electric cord 112.
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In using my new slit lamp microscope, the patient's chin is placed on the chin rest 14 and the chin rest is raised or lowered to a comfortable and convenient height by the nut 15. The forehead rest 16 is then moved forward or back by
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the screw 19 until the eyes of the patient are over the plane of the center of the stud 63, that is, over the pivotal axis of the two arms 105 and 66. The carriage brake is then released by pressing one of the knobs 55 and the carriage 23 moved sidewise until the stud 63 is directly under one of the patient's eyes.

The slit lamp projector is then lit by means of the switch 115 and its intensity regulated by the rheostat knob 116. The slit lamp projector is then raised or lowered on the arm 105 by the nut 92' until it is level with the patient's eye and the slit beam is focused on the eye by turning the knob 111 and moving the objective sleeve 109. The slit lamp projector can be directed into the eye at an angle by releasing the set screw 99' and turning the bracket 106 on the bearing 96'.

The microscope 102 is then raised to the level of the patient's eye by the nut 92. The proper power objective 110 is selected and the microscope is focused on the eye by means of the knobs 103. The microscope 102 may be adjusted angularly by releasing the set screw 99 and turning the microscope slide 101 on the bearing 96. The microscope counterbalancing spring 97 and the corresponding counterbalancing spring in the slit lamp arm 105, makes the raising and lowering of the microscope and slit lamp projector smooth and uniform.

Since both the microscope arm and the slit lamp arm rotate on the stud 63 about an axis which passes through the eye of the patient, these arms may be moved without the need for refocusing either the slit lamp projector or microscope. The eye of the patient can thus be easily examined from varying angles and at varying angles of illumination.

It is sometimes desirable to move the microscope and slit lamp together through different angles while examining the eye and this may be accomplished by tightening the nut 127 and bringing the brake shoe 123 into contact with the sleeve 65.

When the positions of the slit lamp and microscope are to be reversed, as for example when the patient's other eye is to be examined, the microscope arm 70 is swung outward on the shaft 68 and the two arms 70 and 105 can pass without interference. Throughout the entire examination, the patient's head remains fixed and both eyes can be examined while the head is in this one fixed position.

From the foregoing, it will be apparent that I am able to attain the objects of my invention and provide a new and improved slit lamp which is simple, efficient, convenient and compact. Various modifications can, of course, be made without departing from the spirit of my invention and the scope of the appended claims.

I claim:

1. In an eye examining apparatus having a base, a head rest on the base and pivotally mounted illuminating and observation devices rotatable either separately or together about a common axis, the combination therewith of a slidable carriage for supporting said illuminating and observation devices and spring pressed friction means for releasably locking the carriage at any point in its path of travel, said base having a track on its upper surface parallel to

its front edge and a shaft supported thereon towards its rear edge in parallel relation to said track and the surface of the base, said carriage being slidably supported on said base by sleeved bearing means slidably engaging said shaft and by rotating bearing means contacting both sides of said track, said rotating bearing means being mounted upon said carriage near each side thereof and upon a bracket depending from the carriage and extending below said base.

2. In an eye examining apparatus having a base, a head rest and pivotally mounted illuminating and observation devices rotatable either separately or together about a common axis, the combination therewith of a slidable carriage supporting said illuminating and observation devices, said base being provided with a slot parallel to its front edge and also with an enlarged opening adjacent thereto, a track supported in said slot, a shaft supported on the upper surface of said base towards its rear edge in parallel relation to said track and to the surface of said base, sleeved bearing means on said carriage engaging said shaft and slidably supporting the rear of the carriage, a ball bearing assembly mounted on said carriage at each side of the front thereof, the outer ball race of each ball bearing assembly being in supporting and rolling contact with the upper surface of said track, a bracket secured to the underside of said carriage and extending through the opening in said base and parallel to the under surface of the base, said bracket carrying a ball bearing assembly with its outer ball race in supporting and rolling contact with the under surface of said track, a leaf spring carrying a friction brake mounted on the under side of said carriage to normally maintain the brake in engagement with said track, and lever means mounted on the front edge of said carriage for engagement with said spring whereby said brake may be released.

3. In an eye examining apparatus having a base and a head rest mounted thereon, the combination of a carriage slidably mounted upon said base with spring pressed means for releasably locking the carriage at any point in its path of travel and a vertical stud supporting superposed bearing sleeves in freely rotatable relation to each other, one bearing sleeve having a support arm carrying an illuminating device and the other sleeve having a support arm carrying an observation device, an apron fixed to one sleeve and extending partly over the second sleeve, locking means comprising a spring with a brake thereon and a screw for moving said spring carried on said apron and normally out of contact therewith for locking said apron to the second sleeve whereby both sleeves may be simultaneously rotated, said base having a track on its upper surface parallel to its front edge, a shaft supported on the upper surface of said base in parallel relation to said track and to the surface of the base, said carriage being slidably supported on said base by sleeved bearing means slidably engaging said shaft and by rotating bearing means contacting both sides of said track, said rotating bearing means being mounted upon said carriage near each side thereof and upon a bracket depending from the carriage and extending below said base.

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