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Nevyas et al.

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[54] LIGHTING SYSTEM CONTROL FOR OPHTHALMIC EXAMINATIONS

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[52] **U.S. Cl.**.....**351/1,** 240/2 S, 240/52 R, 315/362, 351/38

[51] **Int. Cl.**.....**A61b 3/00,** H05b 37/02, F21v 33/00

[58] **Field of Search**.....351/1, 16, 36, 37, 38, 17; 240/2 S, 52 R; 200/61.48; 315/362

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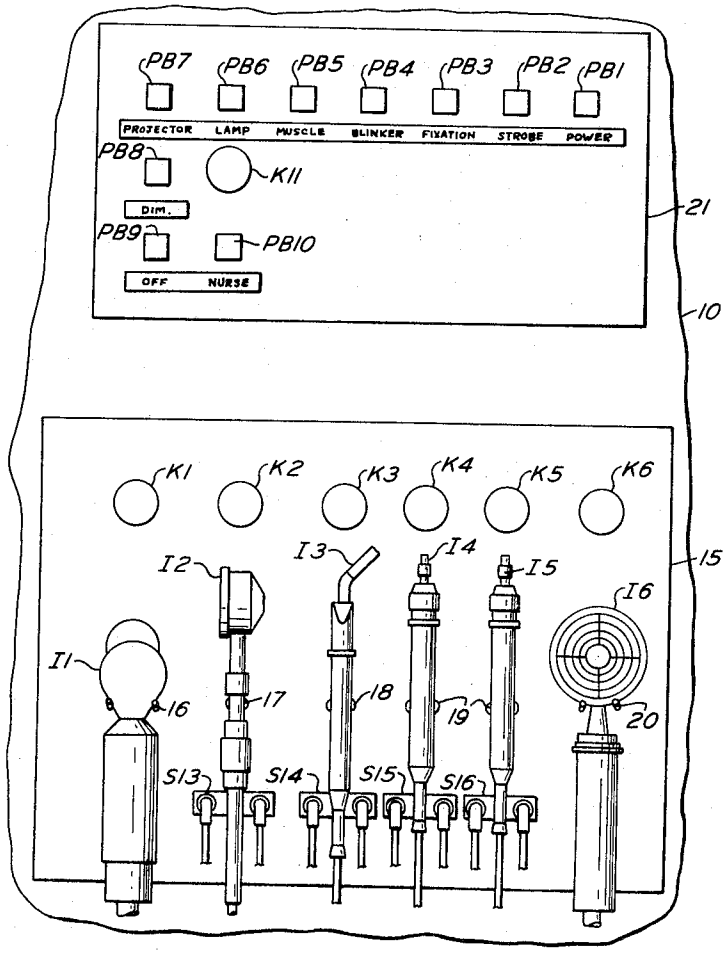
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[57] **ABSTRACT**

A control system coordinates fixture lighting in an ophthalmic examination room with the selection by a physician of a particular ophthalmic instrument with which a patient is to be examined. Selection of a portable instrument operates the necessary switches to automatically power the instrument and establish the optimum ambient conditions of room light for conducting the examination with the instrument selected.

10 Claims, 9 Drawing Figures



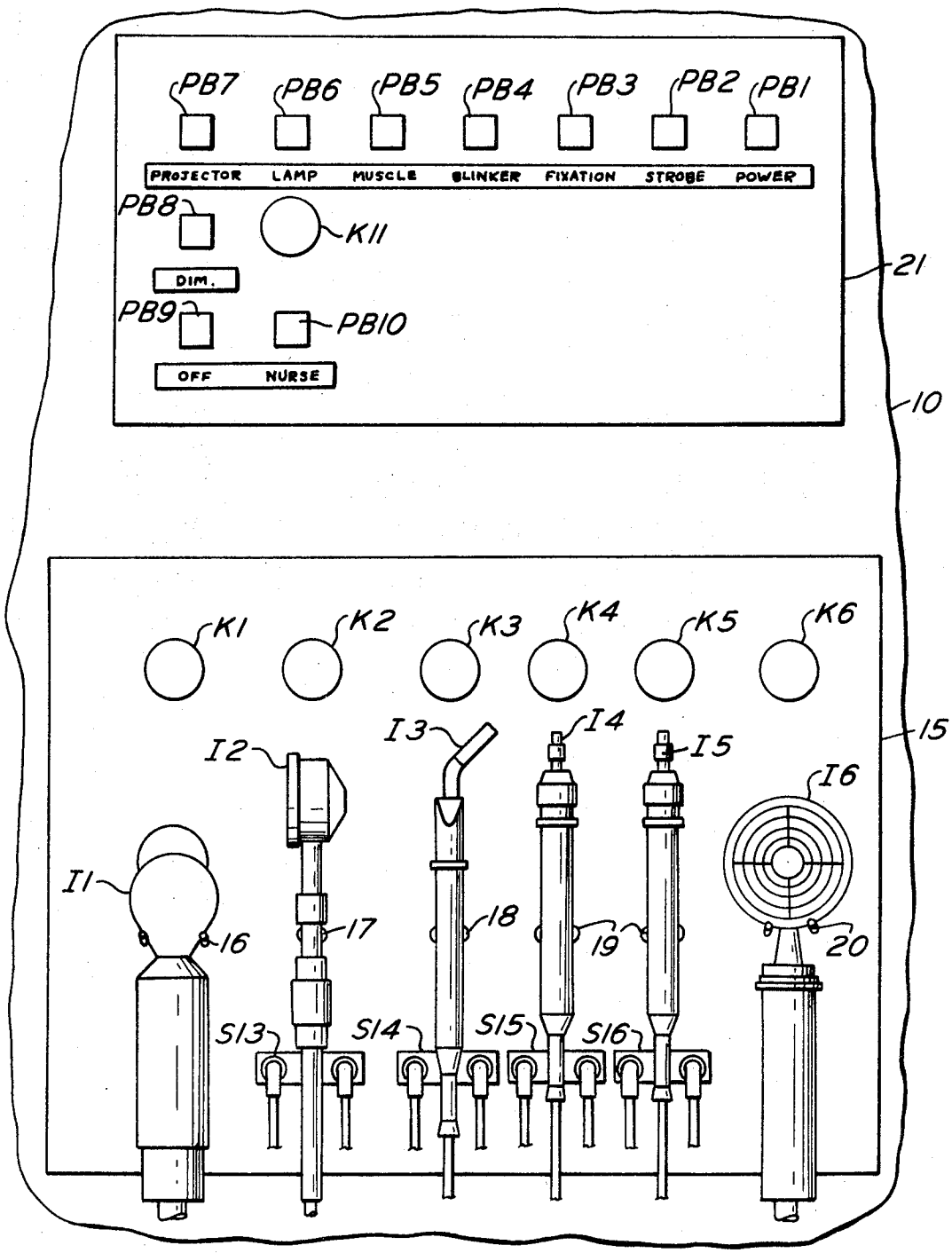


FIG. 1

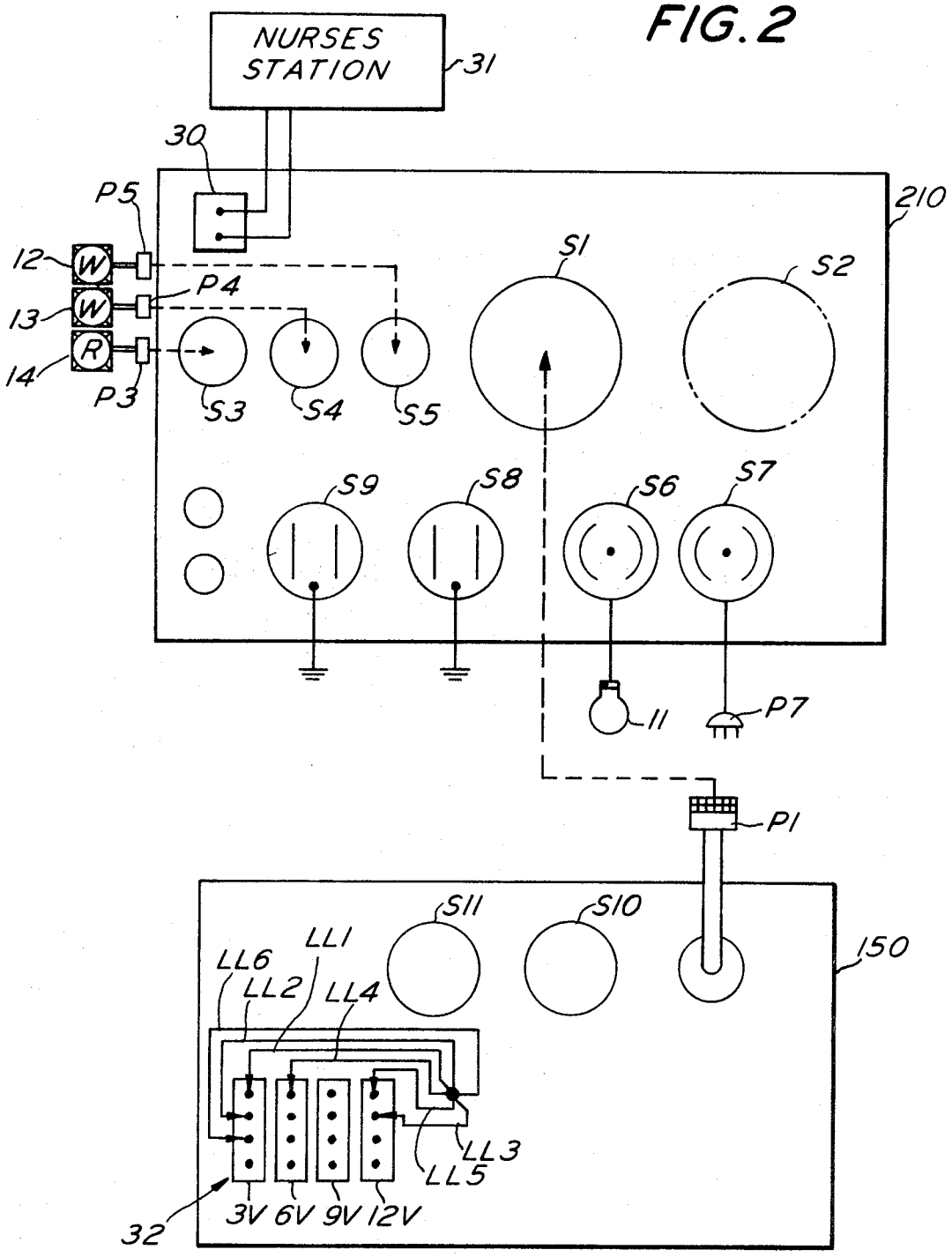
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FIG. 2



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FIG. 3

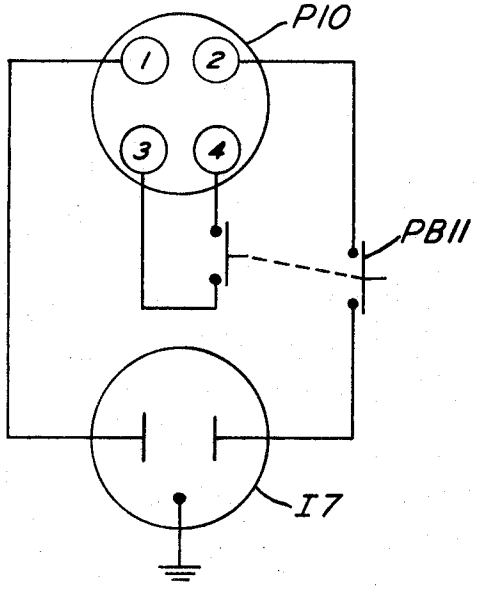
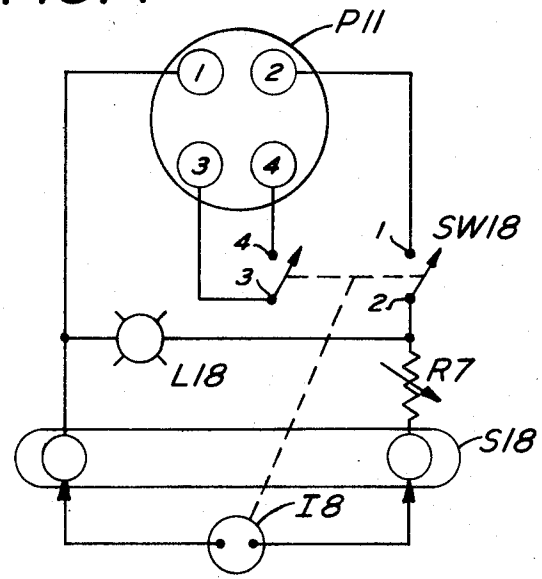


FIG. 4



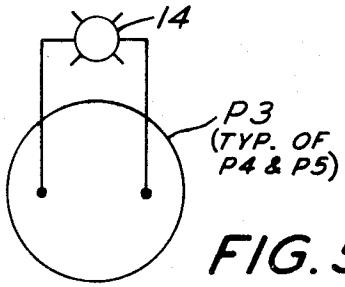
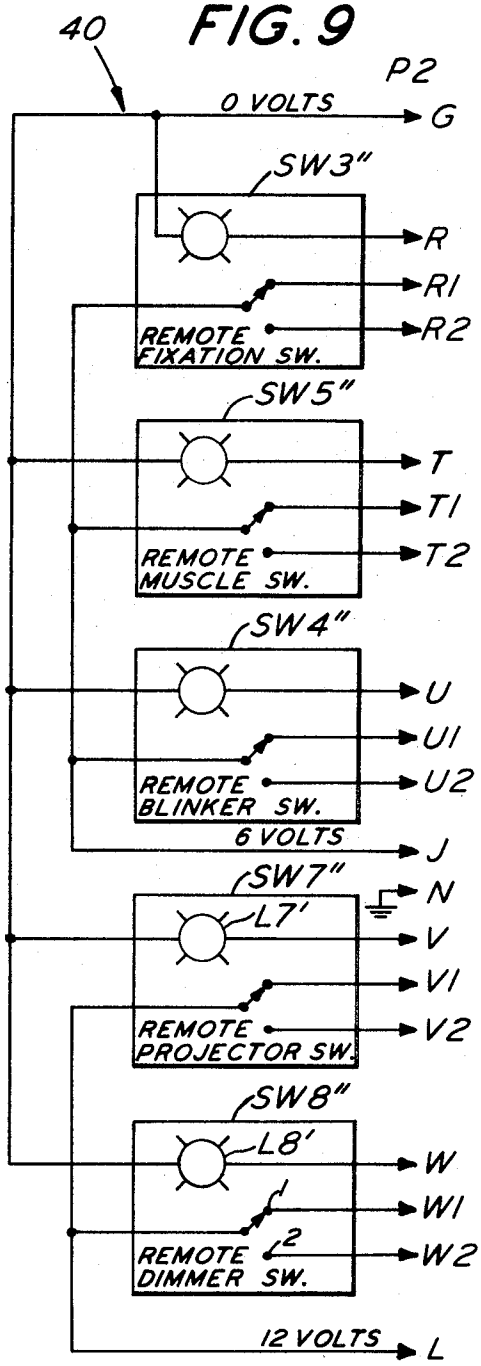


FIG. 5

FIG. 9



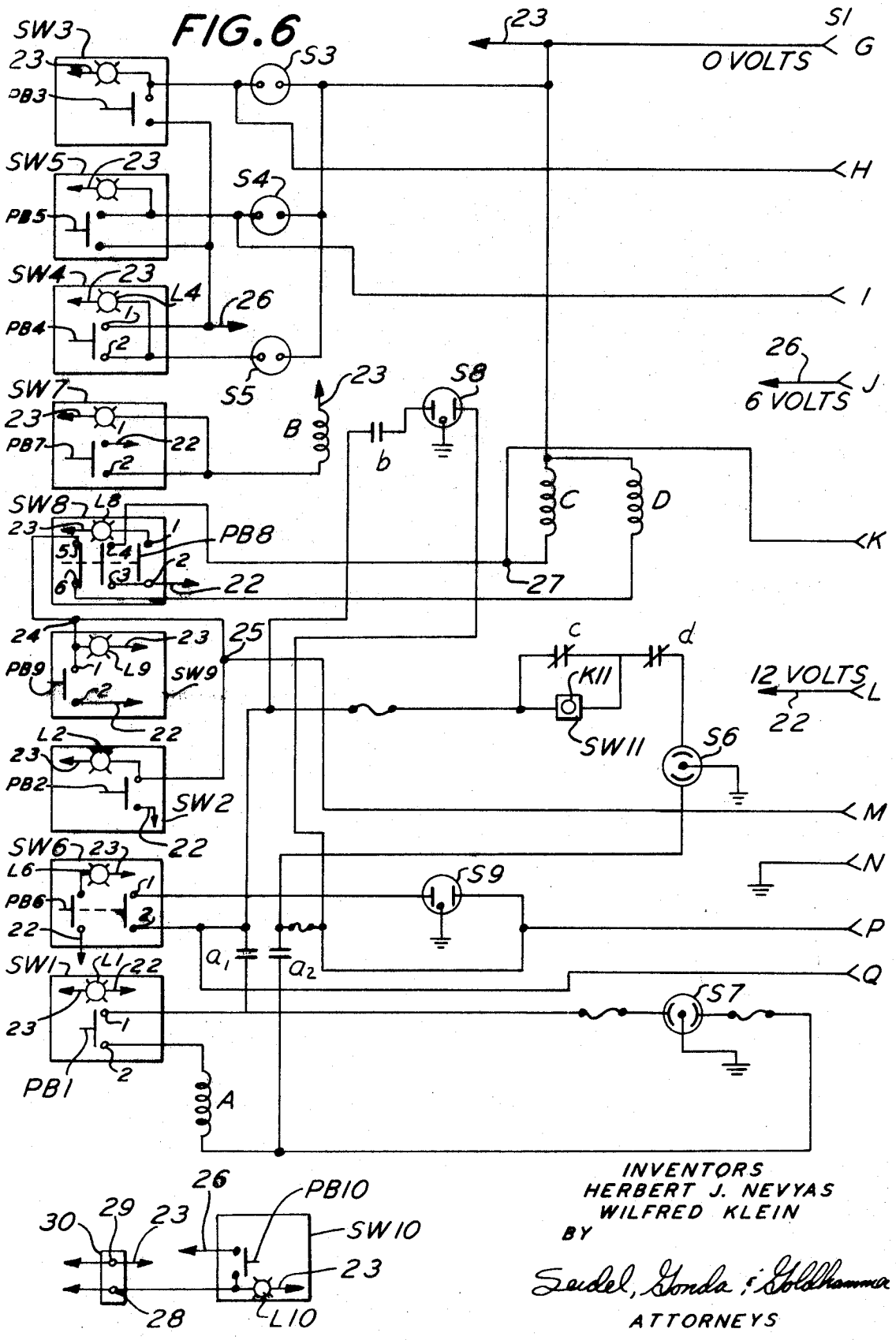
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FIG. 6



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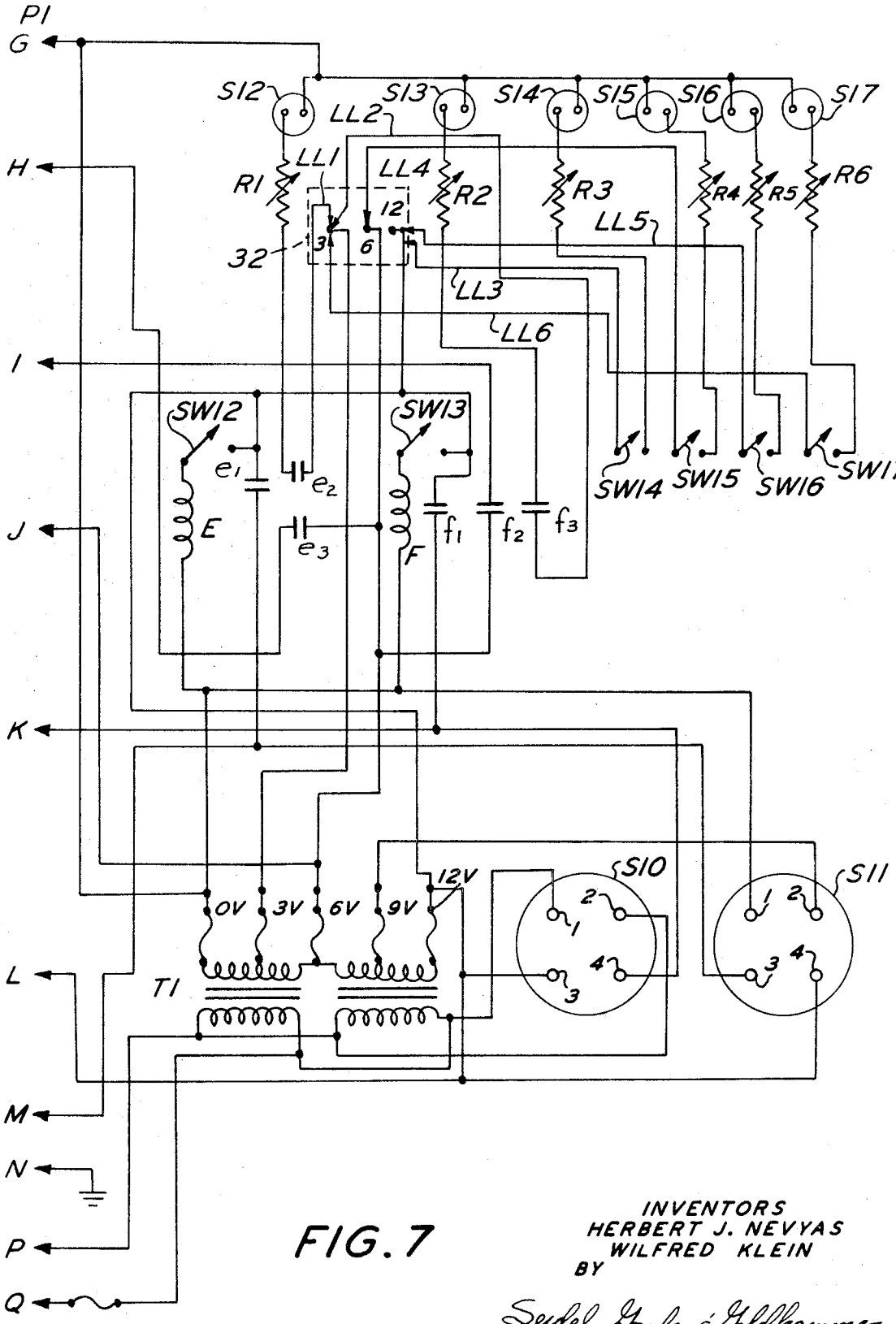
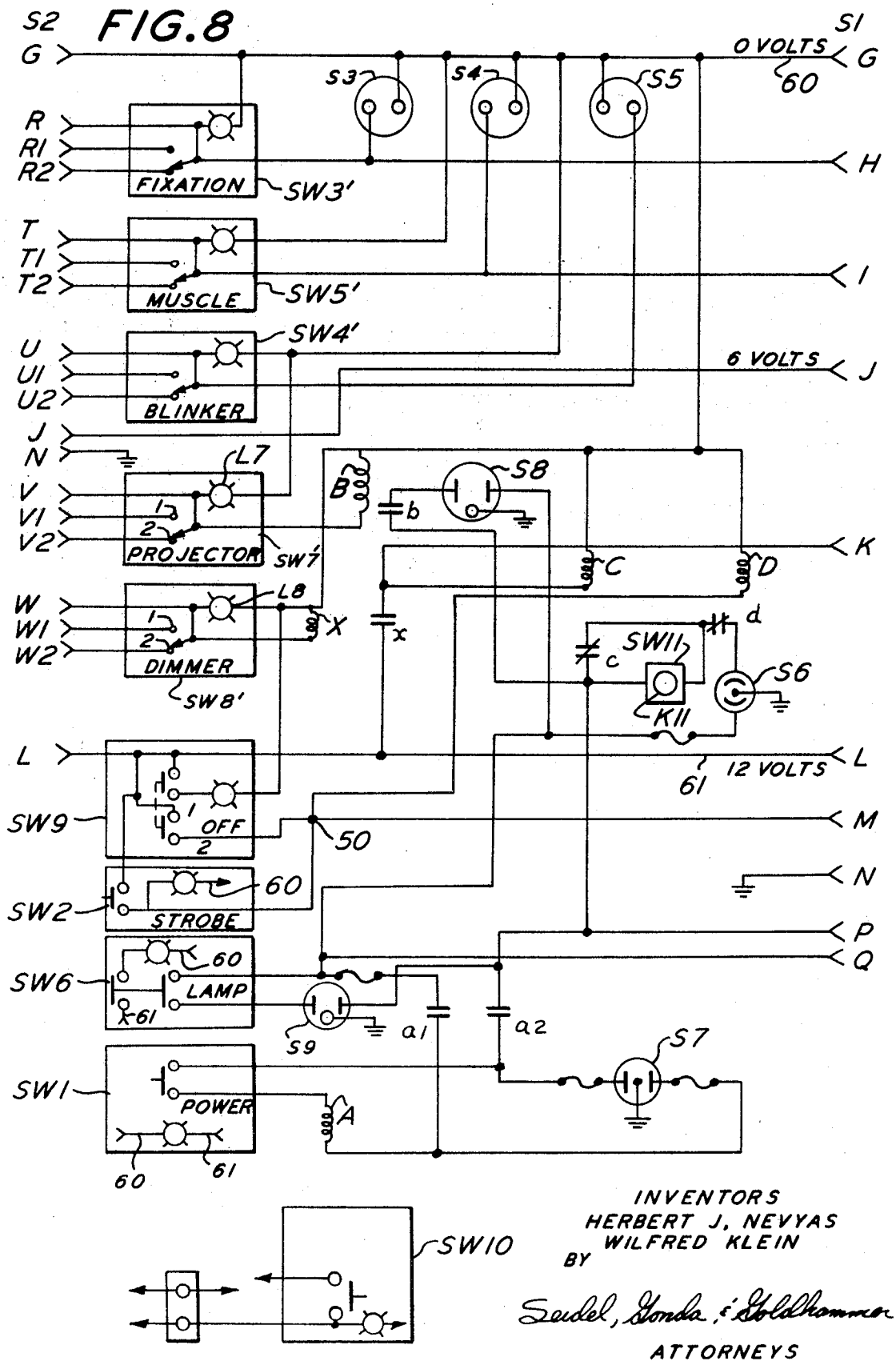


FIG. 7

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FIG. 8



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LIGHTING SYSTEM CONTROL FOR OPHTHALMIC EXAMINATIONS

DETAILED DESCRIPTION

This invention relates to a control system that coordinates fixture lighting in an ophthalmic examination room with the ophthalmic instrument being used by a physician examining a patient.

Equipment for performing complete ophthalmic examinations includes such portable instruments as an ophthalmoscope, a retinoscope, a trans-illuminator, various muscle lights, a gonioscopic illuminator, and a indirect ophthalmoscope, for example, and such standing instruments as a slit lamp and a keratometer. These instruments require several different voltage levels, such as 3, 6, 9, or 12 volts a.c., as well as 110 volts a.c.; and each instrument is used under different ambient lighting conditions. Some parts of the ophthalmologic examination are best performed under conditions of full room lighting,some under conditions of dim lighting, and some in total darkness. For most examinations, it is best to stabilize the position of a patient's eyes by providing fixation lighting at a remote location in the room. For some examinations, this fixation lighting is best located above the patient's eye level, while for other examinations, such fixation lighting is best positioned at eye level.

To secure the optimal room lighting and fixation lighting conditions in preparation for using a particular portable ophthalmic instrument, the physician is required to switch on the instrument, adjust the room lighting, and switch on the proper fixation light. This, of course, requires time and concentration on the part of the physician and detracts from the primary purpose of the examination. In the event that the examiner neglects to adjust either room lighting or fixation lighting or both, the examination will be performed under less than optimal conditions. It is therefore the primary object of the present invention to provide a lighting system control that will save the examiner time and increase his productivity by eliminating the necessity for constantly coordinating room light with the instrument being used, while at the same time improving the quality of the examination by insuring optimal lighting conditions for each phase of the eye examination.

Briefly, the lighting system control of the present invention includes a control panel into which the various ophthalmic instruments are plugged to secure electrical power, and hangers for holding the instruments when not in use. Switches associated with the hangers actuate circuit means in the control panel when an instrument is removed from its hanger for powering the instrument and for controlling the ambient room lighting to provide optimum lighting conditions for use of the particular instrument selected. For example, use of a direct ophthalmoscope requires a completely darkened room; but, examination is facilitated if the patient fixes his eyes on a remote spot just above his eye level. The present system responds to removal of the direct ophthalmoscope from its hanger by automatically powering the instrument with the required low level A.C. voltage, by turning off the room light, and by turning on a low level fixation light at the opposite end of the room from the patient. On the other hand, the use of a retinoscope requires a dimly lighted room, and an eye level fixation light at the opposite end of the room from the patient.

These results are achieved by appropriately located switches operating on the circuit means in the control panel. In each instance, returning the particular instrument to its hanger will cause the ambient lighting condition to revert to its former status before the instrument was removed from its hanger. The circuit means of the control panel is constructed and arranged so that the operation of the circuit means in response to the removal of an instrument from its hanger can be modified by manual override switch means. The present invention thus relieves the examiner of the task of adjusting either room or fixation lighting for each of the examinations necessary for a complete ophthalmologic study of a patient. Consequently, the examiner saves time and increases his productivity. Simultaneously, the quality of the examination is improved because optimum ambient lighting for each phase of the eye examination is provided automatically.

The features of this invention for which protection is sought are pointed out with particularity in the appended claims. The invention itself, however, both as to its organization and method of organization, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings, wherein like parts in each of the several figures are identified by the same reference character, and wherein:

FIG. 1 shows a typical wall mounted control panel and instrument hanger bank;

FIG. 2 shows the back panel arrangement of the housings whose front panels are shown in FIG. 1;

FIG. 3 is a schematic showing of a slit lamp instrument and plug therefor;

FIG. 4 is a schematic showing of a receptacle suitable for an indirect ophthalmoscope including a plug suitable for mating with a suitable socket in the panel shown in FIG. 2;

FIG. 5 is a schematic showing of a typical plug associated with the fixation, muscle and bunker lights;

FIG. 6 is an electrical schematic of the circuit means contained in the housing whose front panel is shown at the top of FIG. 1;

FIG. 7 is an electrical schematic of the circuit means shown in the housing whose front panel is shown at the bottom of FIG. 1;

FIG. 8 is a modification of the circuitry shown in FIG. 6 to accomodate a remote station at which certain of the switches can be operated; and

FIG. 9 is an electrical schematic of the circuit means of a remote station at which certain of the switches can be operated.

Referring now to FIG. 1, reference numeral 10 denotes one wall of an enclosed eye examination room. Such room (not shown) is illuminated by room light 11 (FIG. 2) and is provided with three special 6 volt, A.C. incandescent lamps on the wall at the end of the room remote from the end of the room at which is seated a patient whose eyes are to be examined. Blinker lamp 12 (FIG. 2) produces a blinking white light when power is applied thereto. It is useful in attracting the attention of children during eye examinations. Muscle lamp 13 is positioned substantially at eye level with respect to a

seated patient in the examination room, and produces a steady white light when operated. The muscle lamp is useful in providing a remote point in space upon which a patient can focus his eyes when being examined with the retinoscope. Fixation lamp **14** is also positioned substantially at ceiling level with respect to a patient seated in the eye examination room, and produces a steady red light when operated. The fixation lamp is useful in providing a remote point in space upon which a patient can focus his eyes when being examined with an ophthalmoscope.

Referring again to FIG. **1**, wall **10** defines the end of the room at which the patient being examined is seated. Mounted in wall **10** are two metal enclosures or chasses (not shown) provided with separate removable panels **15** and **21** mounted flush with wall **10**. Panels **15** and **21** are conveniently located adjacent to the examination chair and are easily accessible by the examiner.. Instrument hanger panel **15** is provided with a plurality of hangers **16–20** specially designed for the instruments conventionally used for eye examination purposes. Such instruments may include opthalmoscope II, retinoscope I2, trans-illuminator I3, muscle lights I4 and I5, and Barkan light I6. Instruments other than these can also be accommodated on instrument panel **15**. Also mounted on instrument hanger panel **15** are six rotary knobs K1–K6, each of which is individually associated with one of the six instruments as shown in FIG. **1** and is used to adjust lamp intensity. Panel **15** is also provided with a plurality of sockets S12–S16 which provide outlets into which the various instruments may be connected to the proper source of electrical power.

When an examiner wishes to utilize the ophthalmoscope for examining a patient's eyes, the instrument must be powered, and certain ambient lighting conditions must be established in order that the examination be performed under optimum conditions. Such ambient lighting conditions include total room darkness except for the illumination of fixation lamp **14**. The apparatus of the present invention responds to the removal of instrument I1 from hanger **16** by automatically operating the necessary switches to power the instrument and achieve the desired ambient lighting conditions. Knob K1 is used by the examiner to adjust the intensity of the lamp in this instrument.

Sometimes the examiner's assistant must enter the darkened room while ophthalmoscopy is in process to perform some task such as obtaining a chart or the like, and it would be helpful to provide a dim light by which the assistant could see well enough to complete his task without significantly interrupting the examination. For this reason, the circuit means of the lighting control system provides a manual override for certain of the functions occurring automatically upon removal of an instrument from its hanger. The override in this case, is provided by pushbutton PB8 on switch panel **21**. Depression of this switch when the room light is extinguished, turns on room light **11** but at a reduced intensity. Rotation of knob K11 on panel **21** provides a control for the intensity of light **11**. When the examiner returns instrument I1 to its hanger **16**, it will be depowered, and ambient lighting will be restored to the state that existed prior to the removal of this instrument from its hanger.

When the examiner wishes to conduct a retinoscopy, and instrument I2 is removed from hanger **17**, the circuit means of the present invention will automatically power this instrument, dim the room lamp **11** and switch on muscle lamp **13**. Returning instrument I2 to its hanger **17** will de-power the instrument and restore the lighting in the room to its initial condition.

The removal of any of instruments I3–I6 from its respective hanger will automatically provide electrical power of the correct voltage to the instrument. The knobs K3–K6 may be used by the examiner to adjust the intensity of the lamp in the instrument with which the knob is associated.

The bench mounted slit lamp I7, as shown schematically in FIG. **3**, is provided with plug P10 in place of its usual power cord. Plug P10 is mated with socket S10 which may conveniently be located on rear cover panel **150** which closes the rear of the lower chassis in wall **10** whose front is closed by instrument hanger panel **15**. When pushbutton PB11 is depressed by the examiner, the circuit means of the present invention will automatically provide power to the slit lamp, and simultaneously dim room light **11**.

The indirect ophthalmoscope I8 plugs into socket S18 (FIG. **4**) associated with a separate control box (not shown) located adjacent to panels **15** and **21**. When instrument I8 is lifted from its hanger, the circuit means of the present invention will automatically provide power at the proper voltage level to the instrument lamp, and simultaneously extinguish light **11**. The return of the instrument to its hanger will restore the initial ambient lighting conditions.

In addition to the above-described instrument, it is conventional for an examiner to have available a projector by which numbers and letters can be projected on a screen in front of the patient. To this end, panel **210** is provided with socket S8 with which a plug from a projector can be mated. Provision is also made for controlling a high-intensity lamp useful to an examiner when testing near vision or performing minor surgery. Such lamp may be plugged into socket S9 in panel **210**.

The circuit means by which the present invention achieves the above-described operation is shown in detail in FIGS. **6** and **7** to which reference is now made. FIG. **6** shows the circuitry in the chassis behind panel **21**; and FIG. **7** shows the circuitry in the chassis behind panel **15**. The circuitry includes relay operated contacts; and the convention used in this application for designating a relay and its associated contacts is as follows: a relay coil is designated by a capital letter, and the contacts operated by the coil when the latter is energized are designated by the same letter but lower case. Normally open contacts are shown as a pair of spaced parallel lines perpendicular to a conductor; and normally closed contacts are shown with a diagonal line interconnecting the parallel lines of the normally open contacts. Energization of a coil will close normally open contacts associated with the coil and will open normally closed contacts.

Assume that all instrument plugs are mated with their respective sockets, that plug P1 is mated with socket S1 to interconnect the two chassis, and that power plug P7 is mated with a socket supplying 110 volts A.C., 60 Hz power. Also assume that each switch on panel **21** has the condition shown in FIG. **6**. In such

case, power switch SW1 is open, and relay coil A is unenergized. As will be seen, none of the sockets S2–S18 will have power, and room light 11 will be extinguished. When pushbutton PB1 is depressed closing the two contacts associated with this switch, relay A is energized closing normally open contacts *a*1 and *a*2. As a consequence of the closing of these contacts, A.C. power is applied to transformer T1 (FIG. 7) through terminal pins P and Q of plug P1 and socket S1. In addition, 110 volts A.C. power is applied across contact pins 1 and 2 of socket S10 which mate respectively with contacts 12 of plug P10 associated with slit lamp I7. A.C. power is also supplied across open terminals 1 and 2 of switch SW6 which controls the application of power to socket S9 into which a high intensity lamp is plugged. In addition, A.C. power is applied across normally open contacts *b* associated with relay coil B thus preparing projector socket S8 to be powered when relay coil B is energized by the closing of contacts 1 and 2 of switch SW7. Lastly, A.C. power is applied through normally closed contacts *c* and *d* to socket S6 into which room light 11 is plugged, thus turning on this light.

The flow of A.C. power through the primary of transformer T1 shown in FIG. 6 provides selective low order voltages across the secondary of transformer T1. The secondary is provided with five voltage taps providing the following A.C. voltages: 0, 3, 6, 9, and 12 volts. The voltage cross-leads 22 and 23 derived from contacts L and G of socket S1 is 12 volts A.C. Leads 22 and 23 are connected across lamp L1 in switch SW1 so that the closing of contacts 1 and 2 in this switch upon depression of the pushbutton has the effect of illuminating L1 indicating that the power to the circuit means of the invention has been turned on. Summarizing, the operation of the power switch will illuminate the lamp associated with this switch, will turn on the room light, apply the power line voltage to the slit lamp socket, and will prepare for the operation of the projector associated with socket S8 and the lamp associated with socket S9.

To turn off the room light 11, pushbutton PB9 is depressed closing contacts 1 and 2 and applying 12 volts A.C. to node 24. As a consequence, lamp L9 associated with this switch is illuminated and current flows through normally closed contacts 5 and 6 of switch SW8 and into coil D. Normally closed contacts *d* are opened when coil D is energized, thus disconnecting socket S6 from the 110 volt A.C. power supply. Room lamp 11 is thus extinguished.

Strobe switch SW2 has a spring-loaded pushbutton which, when depressed, will momentarily energize relay coil D and momentarily illuminate lamp L2, thus momentarily interrupting the power to socket S6. The strobe switch is used to flash the room light on and off rapidly to produce a stroboscopic effect to facilitate the elicitation of after-images for the purpose of testing anomalous retinal correspondence.

In the event that the examiner wishes to utilize the projector or the high intensity lamp, the switches associated with these instruments would be depressed before the "off" button PB9 is depressed to extinguish room light 11. When the "lamp" pushbutton PB6 is depressed, 12 volts A.C. is applied across lamp L6 illuminating the pushbutton and the power line voltage is applied across contacts 1 and 2 of this switch, thus powering socket S9. Similarly, depression of "projector" pushbutton PB7 will illuminate the lamp associated with this pushbutton and apply 12 volts to coil B closing contacts *b* and powering socket S8.

Assuming again that only the power switch has been operated and that room light 11 is illuminated, operation of pushbutton PB8 associated with dimmer switch SW8, will cause bridging of contacts 1 and 2, thus illuminating lamp L8 to show that this switch has been operated, and bridging of contacts 3 and 4 applying 12 volts A.C. across relay coil C. The energization of relay coil C will open normally closed contacts *c* which will result in the insertion of a conventional SCR dimmer switch in series with socket S6. Adjustment of knob K11 will achieve the desired control of the intensity of the illumination of the examining room. Note that the operation of pushbutton PB8 will open contacts 5 and 6, thus removing relay coil D from the effect of any voltage present at nodes 24 and 25. In this manner, the operation of the dimmer switch overrides the operation of "off" switch SW9 and "strobe" switch SW2. As will be seen later, the operation of the dimmer switch also will override the effect of any voltage present at contact M of the socket S1.

Operation of the "fixation", "blinker", or "muscle" switches will apply 6 volts A.C. across the appropriate sockets S3, S4, or S5. For example, the blinker light can be operated by the examiner upon depression of pushbutton PB4. Operation of this switch closes contacts 1 and 2 powering socket S5 with 6 volts A.C. and illuminating lamp L4 associated with this switch.

Turning now to the effect of removing any of instruments I1 through I6 from the hangers on panel 15, reference is made to FIG. 7. The removal of instrument I1 closes switch SW12 which applies 12 volts A.C. across relay coil E. In response to the energization of coil E, normally open contacts *e*1, *e*2 and *e*3 are closed. The closing of contacts *e*1 applies 12 volts A.C. to contact M of plug P1 which is directly connected to node 25 as can been seen from inspection of FIG. 6. Consequently, when dimmer switch SW8 is not operated, 12 volts A.C. is applied across relay coil D when contacts *e*1 are closed, thus opening normally closed contacts *d* and extinguishing room lamp 11. The closing of contacts *e*2 applies 3 volts through potentiometer R1 across socket S12 into which the power leads of the ophthalmoscope are plugged. The closing of contact *e*3 applies 12 volts A.C. to contact H of plug P1. This has the effect of powering socket S3 which turns on fixation lamp 14.

In summary, the circuit means associated with the hanger for the ophthalmoscope will, first of all, power the instrument upon its removal from its hanger. In addition, the circuit means will also cause the room light to be extinguished and will turn on fixation light 14. When the ophthalmoscope is returned to hanger 16, switch SW12 will open removing power from relay coil E and opening relay contacts *e*1, *e*2 and *e*3. As a consequence, the lamp of the ophthalmoscope will be extinguished, fixation light 14 will be extinguished, and power will be reapplied to socket S6 as relay coil D is deenergized. Thus, the return of instrument I1 to its hanger will restore the initial ambient lighting conditions.

When the retinoscope is removed from hanger **17**, switch **SW13** will be closed applying **12** volts A.C. across relay coil F. As a consequence, normally open contacts *f1*, *f2*, and *f3*, will be closed. The closing of contacts *f1* will apply 12 volts A.C. to contact K of plug **P1** which will result in the application of 12 volts to node **27** and the energization of relay coil C. Normally closed contact *c* will thus be opened switching the dimmer circuit in series with socket **S6**. The closing of contacts *f2* will apply 6 volts A.C. to contact I of plug **P1** thus applying **6** volts A.C. across socket **S4** and turning on muscle light **13**. The closing of contacts *f3* will apply 3 volts A.C. through potentiometer **R2** to socket **S13**. This socket is associated with the retinoscope **I2** so that the closing of contacts *f3* will power the lamp associated with this instrument. In summary, the removal of instrument **I2** from its hanger will simultaneously power the lamp in the instrument, dim the room lights, and turn on muscle light **13**.

Returning instrument **I2** to its hanger will reopen switch **SW13** deenergizing relay coil F and opening contacts *f1*, *f2* and *f3*. The initial ambient lighting conditions will thus be restored when instrument **I2** is returned to its hanger. The removal of any instrument **I3, I4, I5** or **I6**, from its respective hanger will result in the closing of switch **S14–SW17** thus powering the lamp in the individual instruments. The intensity of the lamp associated an instrument is controlled by the setting of the potentiometer which is controlled by the knob on panel **15**. For example, knob **K6** is associated with potentiometer **R6**; and rotation of this knob when instrument **I6** is in use will change the setting of the potentiometer and adjust the lamp intensity of this instrument.

When the examiner wishes to utilize the slit lamp **I7** in his examination, pushbutton **PB11** is depressed, thus connecting 110 volts A.C. appearing at terminals **1** and **2** of plug **P10** across the lamp of this instrument. In addition, the closing of this pushbutton will also interconnect terminals **3** and **4** of plug **P10**. As can been seen from inspection of FIG. **7**, the interconnection of terminals **3** and **4** of socket **S10** will apply 12 volts A.C. to terminal K of plug **P1**. As indicated previously, power applied to this terminal appears at node **27** and will energize relay coil C which opens normally closed contacts *c* and inserts the dimmer circuit in series with socket **S6**, thus resulting in dimming of room light **11**. When pushbutton **PB11** is released, the connection between terminals **3** and **4** of socket **S10** is broken and relay coil C is deenergized resulting in the closing of contacts *c* and the shunting of the dimmer circuit. The illumination provided by lamp **11** is thus returned to its initial condition.

When the examiner wishes to utilize the indirect ophthalmoscope **I8** and such instrument is removed from its hanger, contacts **1** and **2** of switch **SW18** are closed applying the voltage appearing across terminals **1** and **2** of plug **P11** across lamp **L18** indicating that this switch has been closed and across the terminals of socket **S18** thus powering instrument **I8**. Note that the voltage across terminals **1** and **2** is 9 volts A.C. Potentiometer **R7** may be adjusted by the examiner to provide the desired intensity for the lamp associated with instrument **I8**.

The closing of switch **SW18** when instrument **I8** is removed from its hanger also closes contacts **3** and **4** associated with this switch and bridges terminals **3** and **4** of plug **P11**. When terminals **3** and **4** of socket **S11** are bridged by the closing of switch **SW18**, 12 volts is applied to terminal M of plug **P1**. This causes 12 volts A.C. to appear at node **25** as shown in FIG. **6**; and 12 volts are applied across relay coil D. This results in the energization of this coil, the opening of contacts *d*, and the extinguishing of room light **11**.

Switch panel **21** also includes pushbutton **PB10** for signalling the nurse or assistant outside the examination room. Operation of the pushbutton associated with this switch will apply 6 volts A.C. across terminals **28** and **29** on terminal board **30** attached to panel **210**. Wires connected to these terminals run to a nurse's station **31** to provide a suitable indication that the examiner is calling for the nurse or assistant.

The various voltages which are required for operation of the instrument associated with instrument panel **15** are provided for by terminal blocks **32** shown schematically in FIG. **7**. Each of terminal blocks **32**, as shown in FIG. **2**, includes a plurality of electrically connected sockets adapted to receive terminal pins attached to leads **LL1–LL6**. These leads are individually associated with each of the various instruments as shown in FIG. **7**. Each of the sockets associated with the terminal strip is electrically connected to a different tap on transformer **T1**. This will provide voltages of 3V, 6V, 9V, and 12V and will permit any one of these voltages to be applied to the various sockets for the instruments.

Sometimes it is desirable to provide for operation of some of the pushbutton switches from a location remote from wall **10** where main panel **21** is located. For example, it may be desirable to have remote operation of the dimmer circuit and the projector, as well as the operation of the three lamps **12, 13** and **14**. In such case, the circuitry contained in the chassis behind panel **21** and shown in detail in FIG. **6** may be modified in accordance with the subject matter shown in FIG. **8** of the drawing; and rear panel **210** (FIG. **2**) is provided with socket **S2** which mates with plug **P2** on the remote switch bar designated by reference numeral **40** in FIG. **9**.

The operation of switch **SW1** in FIG. **8** bridging the two contacts in this switch energizes relay coil A and results in illumination of the lamp in this switch and the closing of normally open contacts *a1* and *a2* in the same manner as described in connection with FIG. **6**. Thus, socket **S6** is directly powered illuminating lamp **11**, and sockets **S8** and **S9** are conditionally powered depending upon the operation of switch **SW7'** and switch **SW6**. With the contact arms of the various switches in the position shown in FIGS. **8** and **9**, it can be seen that there will be **12** volts A.C. on terminal pins **V1** and **W1** of plug **P2** and socket **S2**. In addition, there will be 6 volts A.C. at terminals **R1, T1**, and **U1**, of plug **P2** and socket **S2**.

When the "strobe" switch **SW2** is operated and the two contacts therein are bridged, the lamp associated with this switch is illuminated and 12 volts is applied to node **50**. As a consequence, 12 volts are applied across relay coil D causing it to be energized and contacts *d* to be opened thus depowering socket **S6** and extinguish-

ing the room light. When the push button associated with the "strobe" switch is released, the contacts are unbridged and the relay coil D is deenergized permitting the room light to go on again. When "off" switch SW9 is operated, the bridging of contacts 1 and 2 of this switch also applies 12 volts to node 50. As described previously, this results in turning off light 11. The lamp associated with switch SW9 is illuminated by the bridging of the other pair of contacts in this switch.

When "dimmer" switch SW8′ is operated by the movement of the rotary arm on this switch from contact 2 to contact 1 12 volts are applied across lamp L8 of this switch, across relay coil X associated with this switch and across lamp L8′ of remote dimmer switch SW8″. The energization of coil X closes normally open contacts *x* applying 12 volts across relay coil C. This has the effect of opening normally closed contacts *c* and switching in dimmer switch SW11 in series with socket S6 thus permitting the intensity of the light of lamp 11 to be controlled by knob 11. When the contact arm of diammer switch SW8′ is returned to engagement with contact 2, the 12 volts is removed from each of the lamps in switches SW8′ and SW8″ as well as from relay coil X. The ambient lighting is thus returned to its initial condition.

In the event the examiner is stationed at the remote location, and the movable contact arm of switch SW8″ is rotated from engagement with contact 1 to engagement with contact 2 while the movable arm in switch SW8′ remains engaged with contact 2, 12 volts will also be applied across lamps L8 and L8′ and across relay coil X. Thus, the room light may be dimmed by operation of either switch SW8′ or SW8″; and in either instance of operation, the lamp in each switch will be illuminated to indicate that the intensity of the room light is under the control of the dimmer switch SW11.

When "projector" switch SW7′ is operated by rotating the movable contact arm from engagement with contact 2 to contact 1, 12 volts will be applied across lamp L7, relay coil B, and lamp L7′ in remote switch SW7″. In this case, the two lamps will be illuminated indicating that the projector switch has been operated and contacts *b* will be closed applying 110 volts A.C. across socket S8. The operation of remote switch SW7″ can also be used to apply 12 volts across the relay coil B by changing the position of the moveable switch arm. The switches SW3′, SW4′ and SW5′ are operated to power sockets S3, S4, and S5, in a similar manner. These sockets may also be powered by the operation of remote switches SW3″, SW4″, and SW5″.

In summary, the embodiment of the invention shown in FIGS. 8 and 9 permits the examiner to control all of the sockets from either panel 21 or from a remote location. Operation of the switches available at both locations will illuminate a lamp associated with the switch at the remote location as well as the corresponding switch at the main location indicating that one of the switches has been operated.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

What is claimed is:

1. In an eye examination room illuminated by a room light, and having a plurality of portable electrical instruments for conducting eye examinations, a hanger panel in said room having a hanger associated with each instrument for holding the same when not in use, circuit means associated with each hanger for causing the associated instrument to be powered only when it is removed from its hanger, first circuit means for supplying power to said room light but operable to disconnect power from said room light, circuit means associated with a first of said hangers including first contact means operated in response to removal of the first instrument from said first hanger, said first circuit means being operable in response to operation of said first contact means whereby removal of the first instrument from said first hanger powers the first instrument and turns off the room light.

2. Apparatus according to claim 1 including a first fixation light at one end of the room, and second circuit means operable to supply power to said first fixation light, said second circuit means being operable in response to operation of said first contact means whereby removal of the first instrument from said first hanger also turns on said first fixation light.

3. Apparatus according to claim 2 including a dimmer circuit associated with said first circuit means and operable to control the amount of power supplied to said room light, and a manually operable first switch for simultaneously operating said dimmer circuit and de-operating said first circuit means when said first circuit means is operated whereby operation of said first switch while the first instrument is removed from said first hanger turns on the room light at a controlled intensity.

4. Apparatus according to claim 3 wherein the circuit means associated with a second of said hangers includes second contact means operable in response to removal of the second instrument from said second hanger, said dimmer circuit being operated in response to operation of said second contact means whereby removal of the second instrument from said second hanger when said first instrument is held by said first hanger, powers said second instrument and turns on the room light at a controlled intensity.

5. Apparatus according to claim 4 including a second fixation light, and third circuit means operable to supply power to said second fixation light, said third circuit means being operable in response to operation of said second contact means whereby removal of the second instrument from said second hanger also turns on said second fixation light.

6. Apparatus according to claim 5 including a manually operable second switch cooperable with said first switch for selectively operating said first circuit means and turning off the room light when all of the instruments are held in their respective hangers, operation of said first switch subsequent to operation of said second switch causing de-operation of said first circuit means whereby the room light is turned on at a controlled intensity by operation of said first switch subsequent to operation of said second switch.

7. Apparatus according to claim 6 including a bench-type instrument for examining eyes having a control switch manually operable to turn-on the instrument, and means responsive to operation of said control

switch for operating said first circuit means whereby turning on said bench-type instrument turns off the room light.

8. Apparatus according to claim 5 including a third manually operable switch for operating said second circuit means independently of the operation of said first contact means.

9. Apparatus according to claim 7 including a fourth manually operable switch for operating said third circuit means independently of the operation of said second contact means.

10. In an eye examination rool illuminated by a room light, and having a plurality of portable electrical instruments for conducting eye examinations, a hanger panel in said room having a hanger associated with each instrument for holding the same when not in use, circuit means associated with each hanger for causing the associated instrument to be powered only when it is removed from its hanger, first circuit means for supplying power to said room light but operable to disconnect power from said room light, the circuit means associated with a first of said hangers including first contact means operated in response to removal of the first instrument from said first hanger, said first circuit means being operable in response to operation of said first contact means whereby removal of the first instrument from said first hanger powers the first instrument and turns off the room light, a first fixation light at one end of the room, and second circuit means operable to supply power to said first fixation light, said second circuit means being operable in response to operation of said first contact means whereby removal of the first instrument from said first hanger also turns on said first fixation light, a dimmer circuit associated with said first circuit means and operable to control the amount of power supplied to said room light, a manually operable first switch for simultaneously operating said dimmer circuit and de-operating said first circuit means when said first circuit means is operated whereby operation of said first switch while the first instrument is removed from said first hanger turns on the room light at a controlled intensity, said circuit means associated with a second of said hangers including second contact means operable in response to removal of the second instrument from said second hanger, said dimmer circuit being operated in response to operation of said second contact means whereby removal of the second instrument from said second hanger when said first instrument is held by said first hanger, powers said second instrument and turns on the room light at a controlled intensity, a second fixation light, and third circuit means operable to supply power to said second fixation light, said third circuit means bieng operable in response to operation of said second contact means whereby removal of the second instrument from said second hanger also turns on said second fixation light, a manually operable second switch cooperable with said first switch for selectively operating said first circuit means and turning off the room light when all of the instruments are held in their respective hangers, operation of said first switch subsequent to operation of said second switch causing de-operation of said first circuit means whereby the room light is turned on at a controlled intensity by operation of said first switch subsequent to operation of said second switch, a bench-type instrument for examining eyes having a control switch manually operable to turn-on the instrument, means responsive to operation of said control switch for operating said first circuit means whereby turning on said bench-type instrument turns off the room light, a third manually operable switch for operating said second circuit means independently of the operation of said first contact means, and a fourth manually operable switch for operating said third circuit means independently of the operation of said second contact means.

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