March 6, 1928. 1,661,434

A. R. LOCKE

ELECTRIC SWITCH AND SYSTEM

Filed Aug. 14, 1922 3 Sheets-Sheet 1

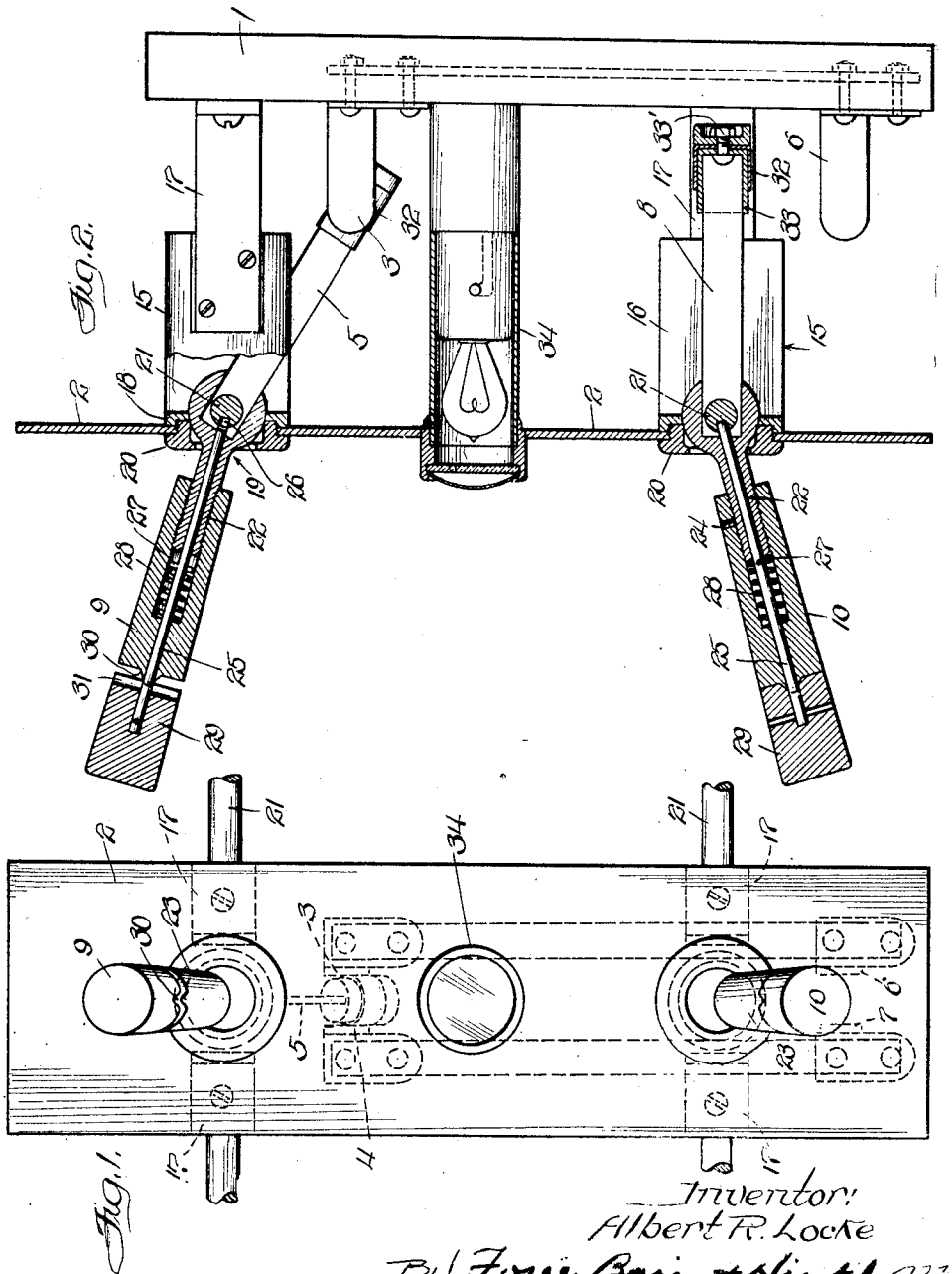


Fig. 2.

Fig. 1.

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3 Sheets-Sheet 2

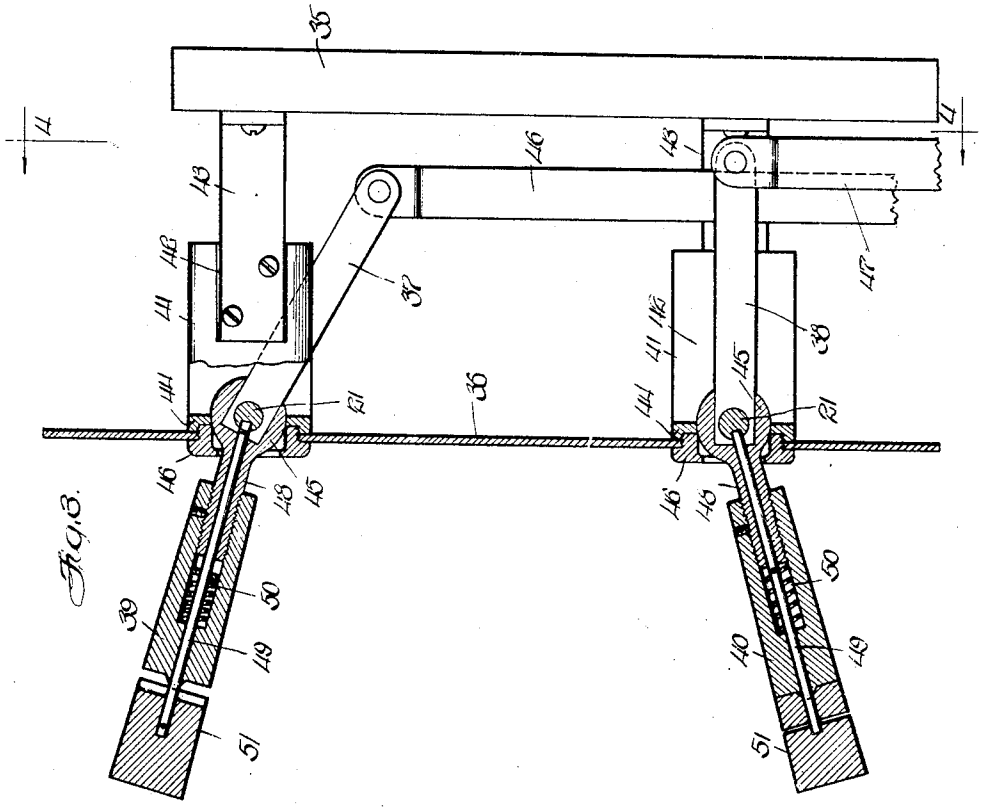


Fig. 3.

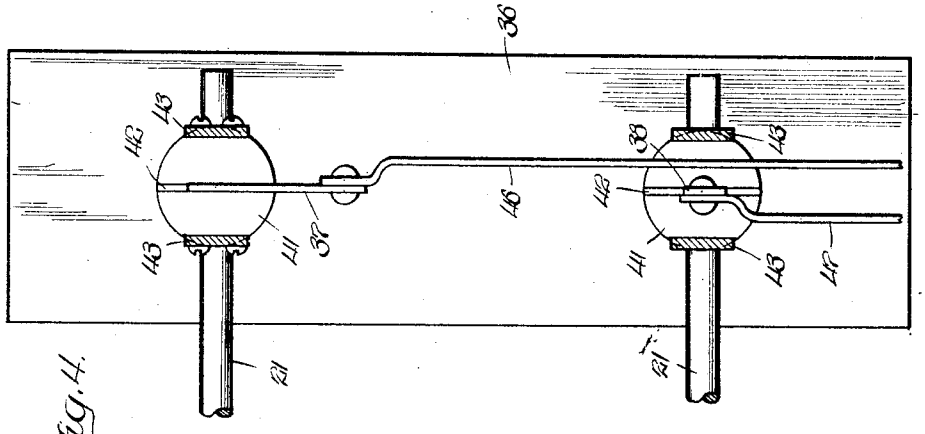


Fig. 4.

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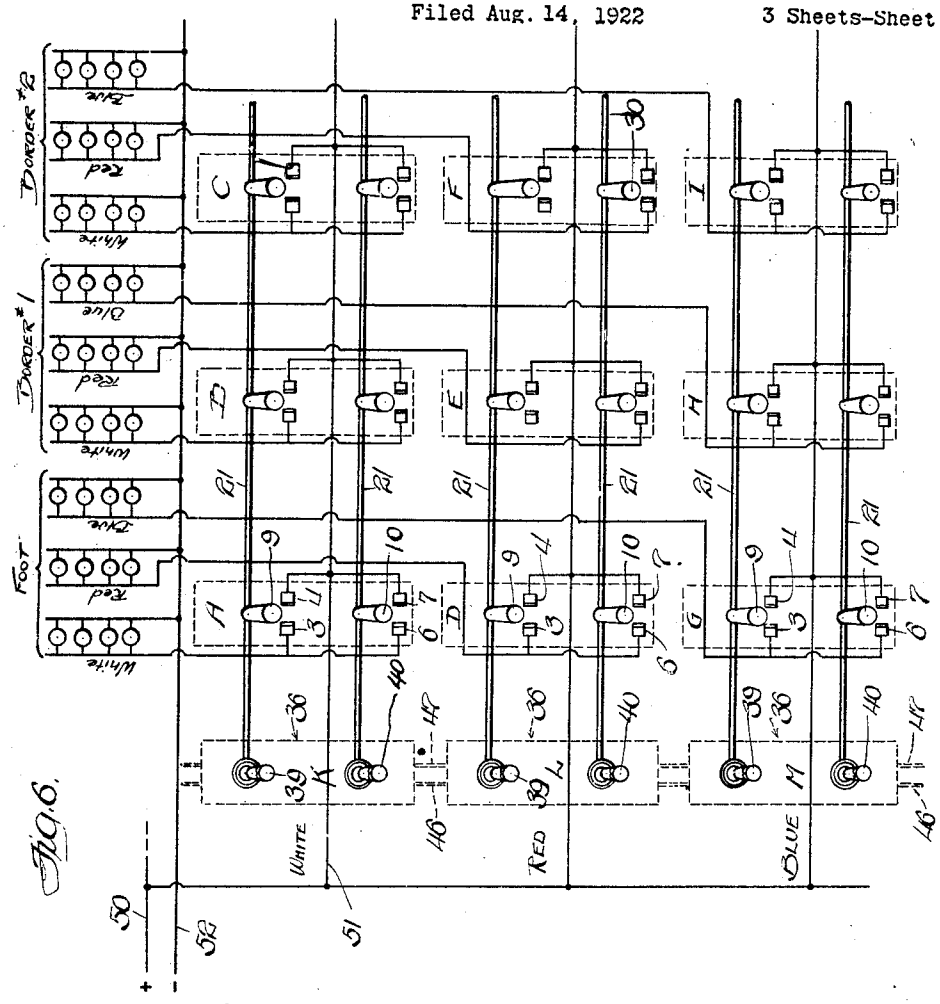


Fig. 6.

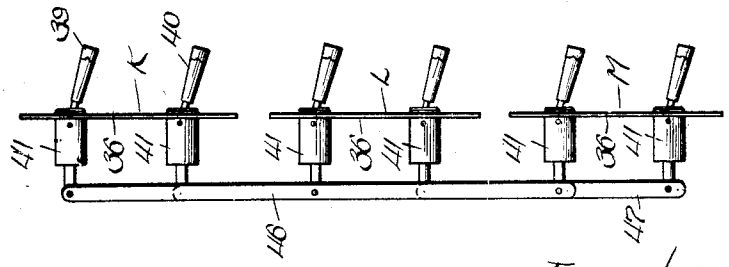


Fig. 5

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UNITED STATES PATENT OFFICE.

ALBERT R. LOCKE, OF CHICAGO, ILLINOIS.

ELECTRIC SWITCH AND SYSTEM.

Application filed August 14, 1922. Serial No. 581,610.

This invention relates to electric switches and systems.

It relates more particularly to switches and circuits which may be manually and selectively operated and controlled individually or in groups.

The invention will be explained as applied to a multi-color lighting system such as used in theatre stages and auditoriums, although it is applicable to other uses.

One of the objects of the invention is to provide an improved switch particularly applicable for selective individual and group operation.

Another object is to provide a switch which may be associated with other switches to selectively control individual circuits and groups of circuits.

Another object is to provide a switch which may be associated with others so that the operation of any switch may be individual thereto or may simultaneously operate other switches.

Another object is to provide a switch panel whereby the capacity of a switchboard equipped with this type of switch may be varied readily.

Another object is to provide a switch which is simple, positive in operation and inexpensive.

Other objects and advantages will hereinafter appear.

An embodiment of the invention and one adaptation thereof are illustrated in the accompanying drawings, wherein

Fig. 1 is a front elevation of a switch panel mounting two switches.

Fig. 2 is a vertical section through the panel.

Fig. 3 is a vertical section of a master operating lever panel for cross or multi-group operation of switches.

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

Fig. 5 is a diagrammatic side elevation of a switchboard showing the arrangement of master operating levers for multi-group operation, and

Fig. 6 is a diagrammatic representation of a lighting system.

Figs. 1 and 2 will first be described.

The switch is shown mounted on a panel or unit for a switchboard of the "dead front" type.

The panel has a backboard 1 of suitable insulating material and a front plate 2 ordinarily of metal. The backboard supports the switches and terminals. The front plate is primarily for protecting the operator from coming in contact with the "live" parts of the switch.

The panel is shown mounting two similar switches, each of which may control the same circuit as will be hereinafter set forth. One switch has a pair of fixed contacts 3 and 4 and a movable bridging contact blade 5. The other switch of the panel has a pair of fixed contacts 6 and 7 and a movable bridging contact blade 8. Blade 5 is operated by a handle 9 and blade 8 is operated by a handle 10.

Since the two switches are alike they will be explained together.

Each switch has a cylindrical metal support 15 provided at its rear end with a diametrical axial slot 16 in which the associated switch blade may move. Support 15 is secured to backboard 1 by a pair of L-shaped feet 17. Support 15 fits thru an opening in front plate 2.

The front end of support 15 is provided with an annular internally threaded flange 18 forming a depression. At the bottom of this depression there is a substantially hemispherically shaped recess or socket for receiving the rounded head of a switch blade actuator 19. A threaded nipple 20, which screws into rim 18, holds actuator 19 in place in the socket of support 15. The head of actuator 19 has a rectangular recess for receiving the end of the switch blade and a hole therethrough for journalling a shaft 21. Shaft 21 passes thru a hole in the switch blade to hold the blade in place in the recess of the actuator.

Actuator 19 has a stem 22 which may be threaded into the enlarged bore of the operating handle. A set screw 24 maintains the handle in the proper position on stem 22. A small hole extends from the enlarged bore of the head of the actuator and axially thru stem 22. A plunger rod 25 is slidably mounted in this hole and projects beyond the outer end of the handle. Shaft 21 is provided with a socket 26 for receiving plunger rod 25. This socket and the plunger rod form a latch for selectively locking the actuator to the shaft.

Rod 25 has a pin 27 thereon and against which one end of a coil spring 28 rests. The other end of spring 28 rests against the end wall of the enlarged bore in the handle.

This spring biases rod 25 toward the recess or socket in shaft 21. The end of rod 25 is secured to a locking button 29. The outer end of the handle has a beveled ridge 30 thereon. The inner end of button 29 has a notch 31 into which ridge 30 may fit when in alignment therewith. By turing button 29 the notch and ridge may be moved out of alignment and the button moved outward to withdraw rod 25 from socket 26 against the tension of spring 28. When the button is turned so that the ridge will fit into the notch, spring 28 can force rod 25 into socket 26 and lock the switch blade actuator and shaft together.

The switch panels may be mounted in horizontally aligned groups with the actuating shaft 21 common to a group. The switch actuators may be selectively locked to the shaft by their respective plunger rods 25 so that when a shaft is rotated the selected switches will be operated and the others will not be moved.

Each switch blade is provided with a generally cylindrical metal contact 32 which is insulated from the blade by an insulating sleeve 33 and secured thereto by a bolt 33'. Contacts 32 of the two switches of a panel are respectively adapted to be inserted between the pairs of contacts 3—4 and 6—7 to bridge the same and complete the circuit therebetween.

Each switch panel may be provided with a suitable pilot lamp mounting 34. The pilot lamp therein may be used to indicate the condition of the circuit associated with the corresponding switches.

Figs. 3 and 4 show a panel for master operating levers whereby cross or multi-group operation of switches may be accomplished.

The master lever panel has a backboard 35 and a front plate 36 which may be of similar construction and of the same size as the switch panels. Thus a switchboard may be built up of units, and additions and alterations in arrangement are made easy. The panel illustrated is provided with two similar operating levers 37 and 38 controlled respectively by master handles 39 and 40.

Each operating lever has a generally cylindrical support 41 which is provided with a vertical axial slot 42. Levers 37 and 38 lie in the slots of their respective supports. Support 41 is secured to backboard 35 by a pair of L shaped legs 43.

The front end of support 41 has a projecting internally threaded annular flange 44 which forms a depression. At the bottom of this depression there is a substantially hemispherically shaped recess or socket for receiving the rounded head of an operating lever actuator 45. A threaded nipple 46, which screws into rim 44 holds actuator 45 in place in the socket of support 41. The head of actuator 45 has a rectangular recess for receiving the end of the operating lever and a hole therethrough for journalling shaft 21.

Ordinarily a master panel is mounted in horizontal alignment with a group of switch panels so that one transverse shaft is common to a group of switches and corresponding master handle.

Shaft 21 passes through a hole in the operating lever to hold the same in place in the actuator. Lever 37 is pivotally connected to a link 46 and lever 38 is connected to a link 47. Links 46 and 47 are for connection to the operating levers of other master panels as will be hereinafter explained.

Actuator 45 has a stem 48 which screws into the enlarged bore of the corresponding master handle. A rod or plunger 49 slidably fits thru handle 40 and is adapted to be inserted into and withdrawn from a socket in shaft 21. Plunger 49 is biased to inward or locking position by a spring 50. A locking button 51 on the end of the master handle serves to withdraw and hold the plunger out of the socket in shaft 21 or allow the plunger to enter the socket thru the force of spring 50 in the same manner as previously described for the switches.

When a master handle is locked to its corresponding shaft and moved about its pivotal axis, the shaft is rocked and the corresponding link is raised or lowered depending upon the direction of movement of the handle.

Referring to Figs. 5 and 6 a plurality of lamps are shown arranged in groups as to location and color. For the purpose of illustration three locations and three colors of lamps for each location have been chosen. Of course the grouping may be increased or decreased or otherwise varied as desired.

The circuit for the white foot lamps is controlled directly by the two switches of panel A. The circuit for the white lamps of border No. 1 are controlled by the switches of panel B and the switches of panel C control the white lamps of border No. 2. In like manner the switches of panels D, E and F control the circuits of the red lamps of the foot, border No. 1 and border No. 2, respectively, and the switches of panels G, H and I control the circuits for blue lamps of foot, border No. 1 and border No. 2, respectively. The panels whose switches control lamps of the same color are arranged together in a horizontal group. The correspondingly located switches of each group of panels form color groups of switches.

Each of the switch panels may be like the panel shown in Figs. 1 and 2 hereinbefore described. Variable resistance dimmers and the switch panel pilot lamps may be connected in the circuits in the ordinary way.

A master panel K is associated with switch panels A, B, C of the white group,

a master panel L with switch panels D, E and F of the red group and a master panel M with switch panels G, H and I of the blue group. The master panels may be like the structure shown in Figs. 3 and 4 hereinbefore described. The master handles 39 of the master panels are interconnecter by link 46 and the handles 40 are interconnected by link 47.

The upper handles of master panel K and switch panels A, B and C are all associated as a group with the same common shaft 21. Similarly the lower handles of panels K, A, B and C are associated with a common shaft. Any combination of switches in the same group may be connected to their respective shafts for simultaneous operation by turning their control buttons so that the locking plungers may enter the sockets in the corresponding shafts. Then when any shaft is rotated by the operator moving one of the switch handles or a master handle, all of the switches of the group which have been connected thereto are simultaneously operated. The other switches in the group remain inactive. The interconnection of the master handles provide for the simultaneous operation of several groups of switches.

Briefly the operation is as follows:

Assume that the first scene requires the white foot and white border No. 2 lamps and the second scene requires red foot, white border No. 1 and blue border No. 2. The operator locks the upper handles of switch panels A and C to upper shaft 21 and the lower handles of master K, switch panel D, switch panel B and switch panel I to their respective shafts.

For the first scene the operator throws the upper handle of either panel A or panel C into circuit closing position. If desired, especially where the switchboard is long and it is necessary or advisable for the operator to stand near one end thereof, the upper handle of master K also may be locked to upper shaft 21. When this is done the operator may move the upper master handle of panel K. When the operator throws one of the switches the corresponding shaft is rotated carrying with it all of the other switches of the same group which have been locked thereto. Thus the operation of one of the upper switches of panels A or C, or master K if the same has been locked to the shaft, will simultaneously close the circuits for the lamps of the white foot and white border No. 2. The circuits are completed from conductor 50 through conductor 51, contacts 4, 32 and 3 of the upper switches of panels A and C through the white foot and border No. 2 lamps to conductor 52.

The second scene has been pre-set so that when the illumination therefor is required the operator merely throws out one of the upper handles of panels K, A or C and throws in master handle 40 of panel K. The throwing out of one of the upper handles simultaneously throws out the switches locked to the associated shaft and the white foot and border No. 2 lamps are extinguished. The throwing in of master handle 40 of panel K directly rotates the associated shaft 21 and, through link 47, rotates the shaft associated with the lower switches of the lower two horizontal rows of groups of switch panels. Thus the lower switches of panels D, B and I are simultaneously closed and the red foot, white border No. 1 and blue border No. 2 lamps are lighted.

The combinations of vari-colored lamps which may be produced and the pre-setting of the switches for subsequent effects may be varied to meet a wide range of conditions. The switches for individual circuits may be operated independently of other switches in the same group or other groups. They may be operated in groups and combinations of groups according to locations and colors desired. A switch may be closed individually or with others and may be subsequently opened with the same or a different grouping or individually. The switches may be preset for operation for several scenes in advance so that when the time for change arrives the work of the operator is reduced. The circuits are opened and closed directly so that the switchboard shows at a glance, because of the position of the handles, just which circuits are supposed to be opened and closed.

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

1. The combination with a fixed and a movable contact member supported by a mounting plate and switch blade respectively, said blade being pivotally secured by a shaft to a support mounted on said mounting plate, of a handle for the blade, and means mounted therein for connecting the handle to the shaft and disconnecting the same therefrom.

2. In a switch, the combination of a fixed and a movable contact member, the former supported by a mounting plate, an upstanding slotted member supporting the movable member, an actuator pivotally mounted in said slotted member, a shaft about which said actuator is movable and means for locking the actuator and shaft together.

In testimony whereof I hereunto subscribed my name.

ALBERT R. LOCKE.