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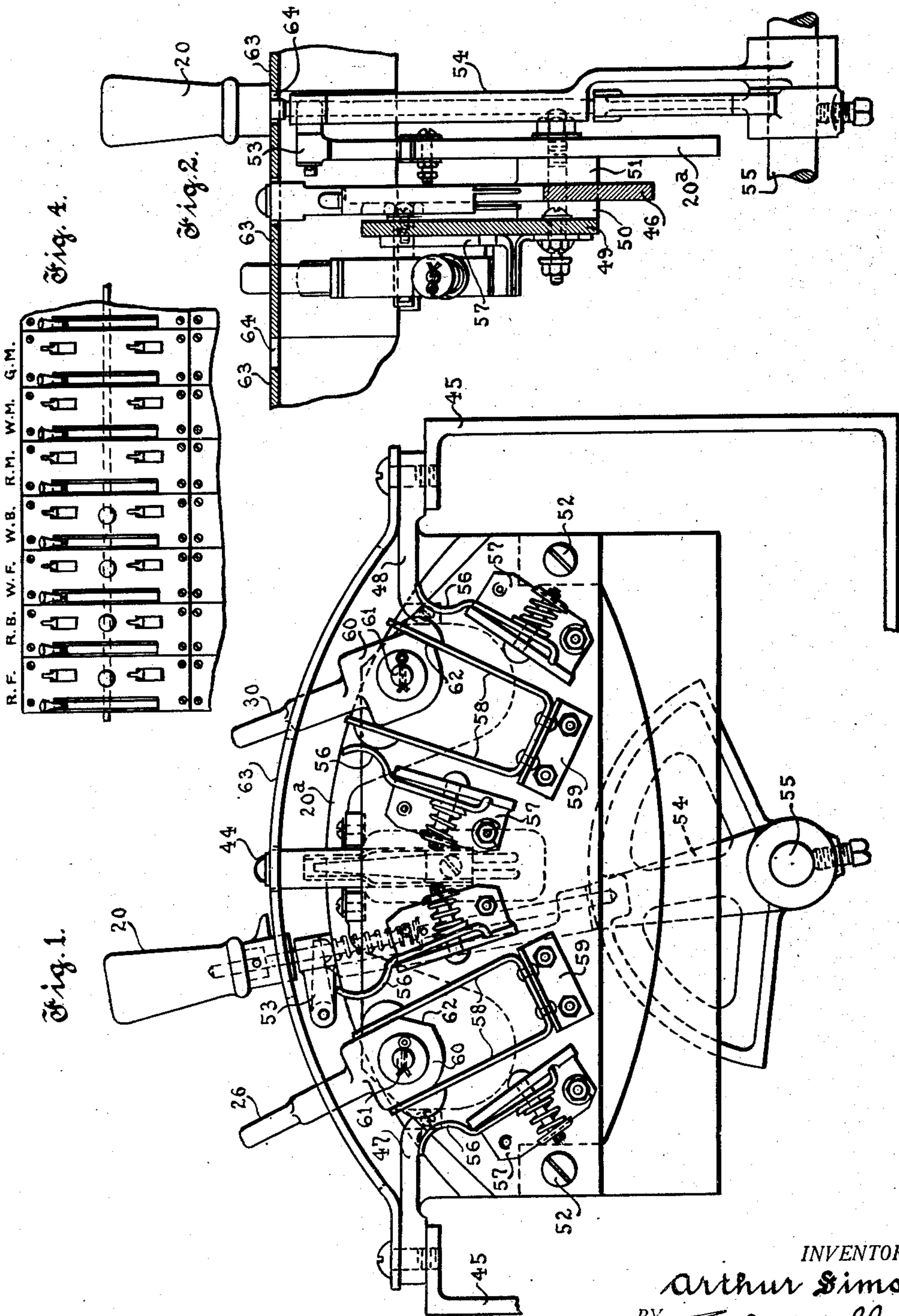
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ELECTRICAL CONTROLLER

Filed Feb. 2, 1922

2 Sheets-Sheet 1



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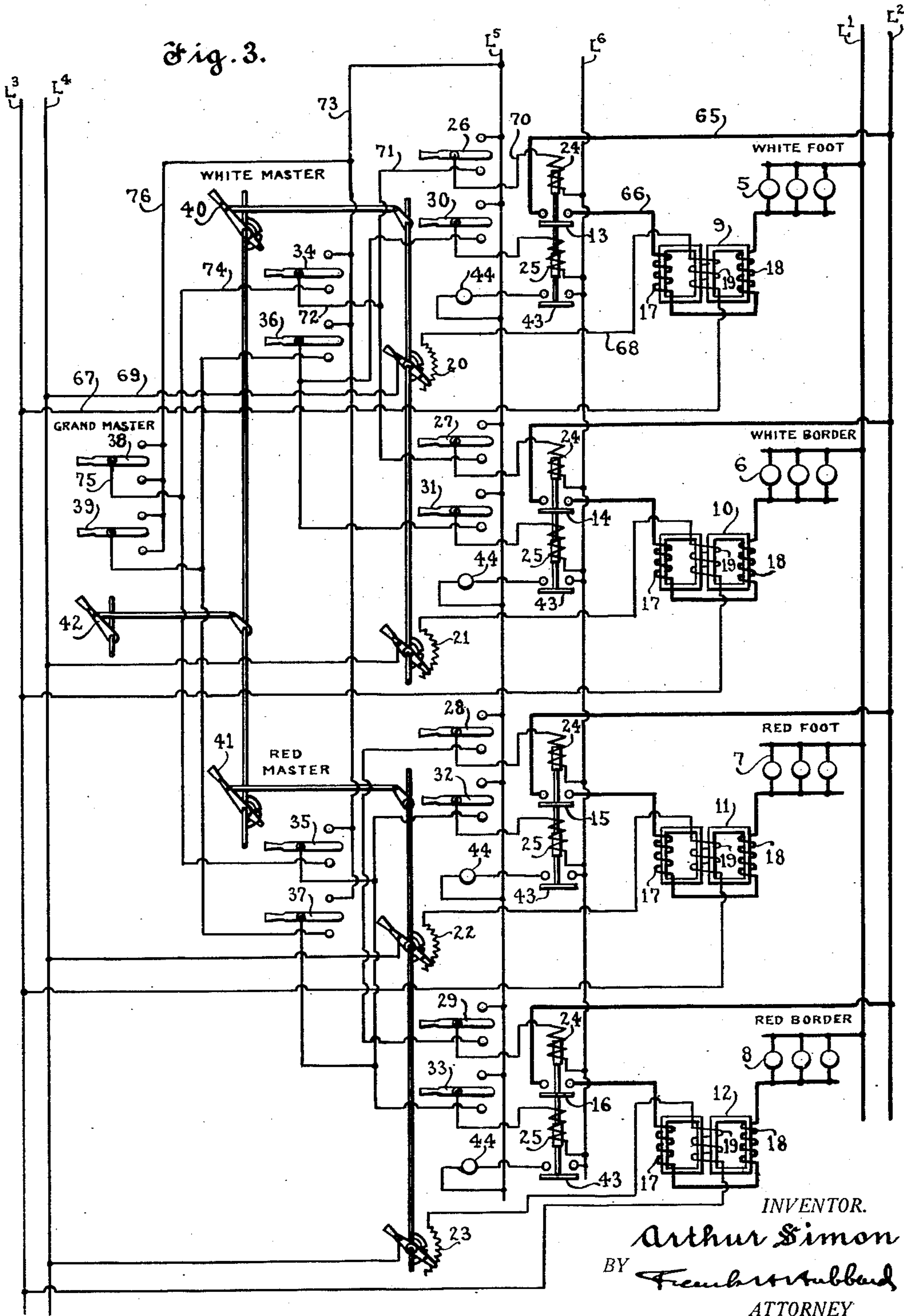
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE.

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ELECTRICAL CONTROLLER.

Application filed February 2, 1922. Serial No. 533,510.

This invention relates to electrical controllers, and while not limited thereto, is particularly applicable in illumination control systems for theatres and the like.

5 An object of the invention is that of concentrating, simplifying and generally improving the arrangement of the various voluntary control instrumentalities employed in such systems.

10 Another object is that of concentrating and improving the structure of such instrumentalities and promoting standardization and interchangeability thereof.

15 Another, and more specific object, is that of providing a simple, rugged and reliable unit embodying the instrumentalities necessary to control an individual load circuit and adaptable, without substantial modification, to the needs of other coordinate circuits.

Other objects and advantages will hereinafter appear.

In the accompanying drawing,

25 Figure 1 is a side elevational view of a control unit embodying features of the invention;

Fig. 2 is a vertical sectional view substantially at right angles to the plane of Fig. 1;

30 Fig. 3 is a diagrammatic view showing arrangement, circuit connections and functions of such unit; while,

35 Fig. 4 is also a diagrammatic view showing a proposed physical arrangement of the units.

Referring first to Fig. 3 of the drawing, the same illustrates diagrammatically and in simplified form a type of theatre dimmer to which the present structure has been particularly adapted, although it is to be understood that the physical elements of the controller are equally applicable to other types of dimmer and other control.

45 In said figure are illustrated lamp load circuits 5, 6, 7 and 8 typifying the various lamp circuits ordinarily employed in theatres and the like, and for convenience and clarity of description being designated respectively as white foot, white border, red foot and red border circuits. Said circuits are adapted to be energized from a suitable source, or sources, of alternating current indicated at $L' L^2$, subject to control by means of individual variable reactors 9, 10, 11 and

12 and relays 13, 14, 15 and 16 which latter 55 serve to control continuity of the respective load circuits.

The reactors 9 to 12 may be of known or conventional form each to comprise A. C. coils 17 and 18 and a control or pilot coil 19 60 to be energized from a source such as $L^3 L^4$ of unidirectional current or optionally of alternating current of lower frequency than that of lines $L' L^2$. Said coils are related in a known manner such that variation in 65 an electrical condition such as current or voltage of the energization supplied to the coil 19 serves to vary the inductance of the coils 17 and 18 and thereby to vary the intensity of illumination of the lamps controlled by the reactor, whereas the degree 70 of energization of the coil 19 required to effect such control may be exceedingly small as compared to the value of energy carried in the load circuits, whereby such coil 19 75 and the parts directly associated therewith may be of much reduced size and capacity and of simplified construction.

Rheostats 20, 21, 22 and 23 provide for control of the energization of the respective 80 coils 19 associated with the several reactors whereby each rheostat serves to control the value of energization of the lamps of a particular circuit.

The relays 13 to 16 are each provided with 85 a closing coil 24 and an opening coil 25 to be energized from supply lines L^5 and L^6 and each of said relays is further adapted to remain in either closed or open position until positively actuated to the other 90 position.

The closing coils 24 of the respective relays are provided with individual voluntarily operable switches 26, 27, 28 and 29, whereas the opening coils are controllable 95 individually by similar switches 30, 31, 32 and 33. Each of said switches 26 to 33 is movable to two on positions selectively and serves in one on position to connect its associated coil directly across supply lines L^5 100 L^6 and when moved to the other on position to subject the circuit of its particular coil to control jointly with other similar coils by means of the color master switches.

Said color master switches comprise 105 groups of voluntarily operable switches, one group being provided for each color of the illumination to be controlled, in the present

instance two, the white color master group comprising an on switch 34 and an off switch 36 and the red color master group similarly comprising an on switch 35 and an off switch 37. Said color master switches are each structurally and functionally similar to the individual control switches just described, each serving in one on position to connect each of the coils whose control circuit has been relayed thereto directly across the supply circuit and also serving in its opposite on position to further extend the control of such coils to the appropriate grand master switch. The grand master switches 38 and 39 may also be made structurally similar to those aforescribed. However, the same when moved to either on position serve simply to connect across the supply circuit the coil or coils whose control has been relayed thereto.

The control of the several rheostats 20 to 23 may be preferably relayed mechanically through the red and white color intensity control levers 40 and 41 to a master intensity control lever 42 substantially as illustrated although of course this feature is not absolutely essential.

Each of relays 13 to 16 is also provided with an auxiliary contact 43 serving, when its associated relay is closed, to effect energization of a pilot light 44 thereby providing visible indication as to the open or closed condition of the individual lamp load circuits.

From the foregoing it is apparent that the individual control for each lamp circuit may consist of but two double throw manual switches, a rheostat and a pilot lamp, whereas the various groups of master switches may comprise fewer but not more elements whereby a unit embracing the aforementioned elements is entirely adequate to the needs of any individual switch group, whereas in certain instances, as in the color and grand master switches, the pilot lights may be omitted. Also since such instrumentalities are required to handle only pilot or control currents of small magnitude as compared with that of the load currents, such parts may all be of reduced size and capacity and of compact and simplified construction.

Referring to Figs. 1 and 2, the same illustrate such a switch unit comprising a pair of double throw switches such as 26 and 30, a rheostat such as 20 and a pilot light 44.

A suitably flanged support indicated generally at 45 serves to sustain and also preferably to house any desired number of such units, the necessary or desired number of supports together with their associated units constituting the controller switch board.

A switch plate 46, which in practice may comprise a single casting or the like is adapted to have the aforementioned parts of the unit bolted or otherwise secured there-

to for support thereby. Said plate 46 is provided with projecting flanges 47 and 48 to rest upon and be secured to the corresponding flanges of the housing 45 substantially as shown.

More particularly, the rheostat base 20^a, having its resistor coiled thereabout or otherwise suitably associated therewith, is bolted to one side of the switch plate 46, while an insulating base 49, adapted to serve as a support for the switch elements, is similarly secured to the opposite side of said plate, the latter being provided with suitable raised portions or bosses 50 and 51 serving to space said rheostat base and also the base 49 laterally from the main body of said plate and thereby afford access to the adjacent surfaces of said two bases. If desired the foregoing parts may preferably be so designed and proportioned as to provide for securement thereof in assembled relation by common means such as the bolts 52 illustrated.

The rheostat contactor 53 and its operating means may be of conventional construction, the contactor being preferably carried by the usual operating lever 54 and spring biased to engage the various turns of the resistor substantially as shown in a usual manner. The operating lever 54 is itself mounted preferably upon a shaft 55 and movable with reference thereto but provided with conventional means such as those illustrated for locking the same to said shaft.

The pilot lamp 44 which may also be of known construction, is preferably carried by and within a suitable socket provided in the switch plate 46 as shown.

The switches 26 and 30 are preferably of similar construction, each comprising a pair of similar spring pressed fixed contacts 56 each carried by an angle bracket 57 bolted to the base 49 to provide opposed positioning and suitable spacing of the respective pairs of contacts as shown. Similar flexible contactors 58, 58, which in practice may be constructed of integral U-formation as shown, are supported preferably by angle brackets 59, the latter being also secured to the base 49 in a relation such as to provide for co-operation of said contactors selectively with their respectively associated fixed contacts.

Said pairs of contactors are provided with similar operating means comprising a double faced cam element 60 mounted for oscillation upon a suitable staff 61 projecting from the base 49. A suitable operating handle is formed integral with or otherwise suitably secured to each cam element. Further, said element is particularly designed, preferably substantially as shown, whereby upon movement of the switch handle in one direction, as to the right, for closure of the right hand contacts the resiliency of the latter is maintained effective for causing opening of the switch automatically when released. How-

ever, upon movement of the switch handle to the left the active cam projection tends to become cocked, whereas the flat portion 62 of the cam element comes into register with the unactuated contactor whereby the resiliency of the latter serves, in conjunction with the aforementioned cocking action to maintain the closed contacts in closed relation until positively released. Also the resiliency of both contactors serves to bias the operating members to their intermediate or neutral position wherein both switches are open. In practice the right hand contactors of each switch which thus require holding in closed relation are preferably so connected in circuit as to control the connection of their associated relay coils directly to the supply circuit, whereas the left hand contacts, which do not require such holding, are arranged to control the connection of the coil to the master switches.

A suitable face plate 63 is arranged to cover the aforescribed instrumentalities, being secured to the switch plate 46 and the housing 45 preferably as illustrated, said plate having suitable openings for the switch operating members and for the lamp 44 and being further provided at its edge with an interrupted portion as illustrated at 64 to receive the rheostat lever 54 and permit operation thereof. By the foregoing arrangement the face plate may be removed laterally with reference to the rheostat lever, the projecting portions of the other levers being also shaped to permit such removal.

Also the general arrangement of the unit is such as to permit side by side mounting of any desired number of units with their several face plates abutting one another laterally as indicated in Figs. 2 and 4. Further, it is apparent that any necessary or desired number of such rows of units may be banked one above the other as illustrated particularly in Fig. 4. Thus the extreme compactness of arrangement to which the aforescribed system of units lends itself is strikingly apparent, whereas the individual units, being required to handle only pilot circuits, may be of minimum size, capacity and complexity.

Referring again to Fig. 3 of the drawing, the various circuit connections of the controller may be described as follows: The circuit of the lamps 5 extends from line L^2 by conductor 65 through relay 13 thence by conductor 66 through coils 17 and 18 of the reactor 9 and through lamps 5 to line L^1 . The other lamp circuits are precisely similar.

The control circuit for the reactor 9 extends from line L^3 by conductor 67 through coil 19 of said reactor, thence by conductor 68 through rheostat 20 and by conductor 69 to line L^4 , whereas the other control current circuits are also similar to that last traced.

The energizing circuit of the closing coil

24 of relay 13 extends from line L^6 through said coil 24, thence by conductor 70 to switch 26 and, assuming closure of said switch in its up position, thence direct to line L^5 . If said switch 26 be closed in its downward position the circuit of the coil extends through the switch by conductors 71 and 72 to switch 34 and through said switch in its upward position by conductor 73 to line L^5 , or assuming downward closure of said switch by conductors 74 and 75 to grand master switch 38 and through said latter switch when in either of its on positions by conductors 76 and 73 to line L^5 .

The remaining control circuits are either similar to that last traced or so obviously related thereto and associated therewith as to require no further description, whereas the circuits of the several pilot lights are likewise obvious.

What I claim as new and desire to secure by Letters Patent is:

1. In a controller for a plurality of lighting circuits, in combination, individual electromagnetic switches for controlling the continuity of such circuits, individual current control means for said circuits each including a rheostat, and a remote control switchboard comprising interchangeable sections each including an operating member for certain of said rheostats and a pair of double throw switches, certain of said double throw switches being arranged to directly control one of said electromagnetic switches or to extend the control of said electromagnetic switch to another of said double throw switches.

2. In a controller for dimmers and the like, the combination with a plurality of variable reactors to regulate the energy consumption of individual load circuits and individual control rheostats for said reactors, of individual electro-responsive switches for controlling continuity of the load circuits, voluntarily operable switches for the energizing circuits of said electro-responsive switches and voluntary control means, such voluntary instrumentalities being arranged in compact and interchangeable units each unit comprising those elements required to control a single load circuit and each of said elements being of lesser energy handling capacity than that of its associated load circuit.

3. In a controller for dimmers and the like, the combination with a plurality of variable reactors to regulate the energy consumption of individual load circuits and individual control rheostats for said reactors, of continuity control means for said load circuits comprising individual relays each having independent opening and closing coils, control means for said coils comprising individual double throw switches each adapted in one position to complete the

circuit of its associated coil directly and in a different position to extend the control of such coil to a master.

4. In an illumination control system the
5 combination with a plurality of lighting circuits and magnetic amplifiers associated with said circuits respectively, of a rheostat for controlling the magnetic amplifier of each of said circuits, individual electromagnetic
10 switches for control of the continuity of such circuits and a remote control switch board comprising interchangeable sections each having a rheostat operating lever and a pair of manually operated switches, certain of said manually operated switches being adapted to directly control one of said electromagnetic switches or to extend the control of such switch to a manually operated switch of another of said sections.

In witness whereof I have hereunto subscribed my name.

ARTHUR SIMON.