

Sept. 26, 1944.

F. HUDSON ET AL

2,359,110

CONTROL APPARATUS

Filed July 12, 1941

2 Sheets-Sheet 1

Fig. 1.

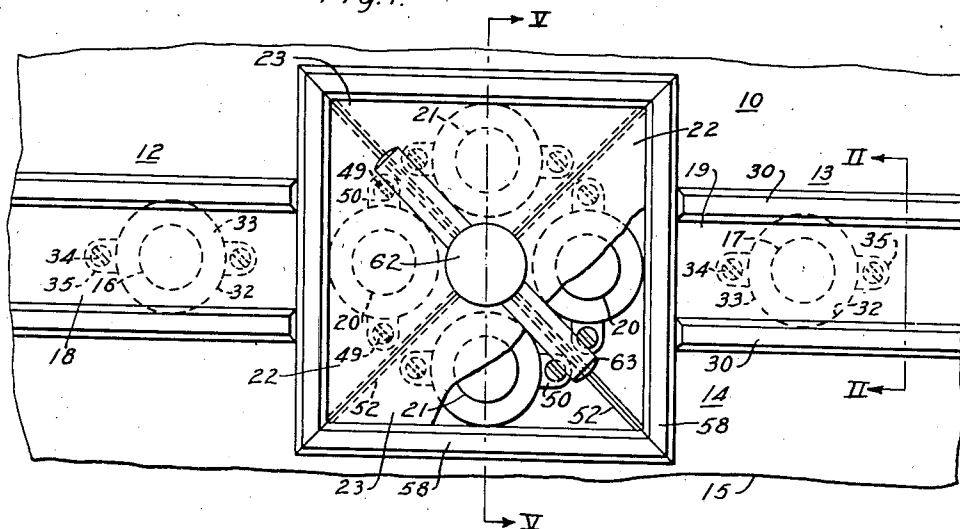


Fig. 2.

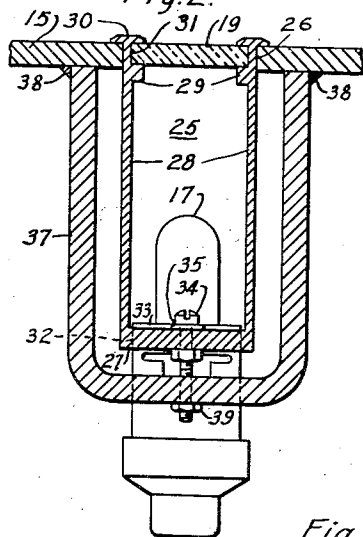


Fig. 3.

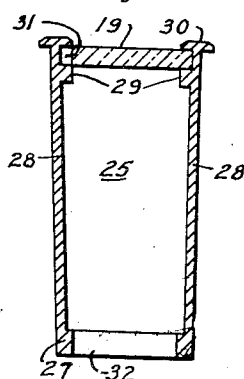


Fig. 7.

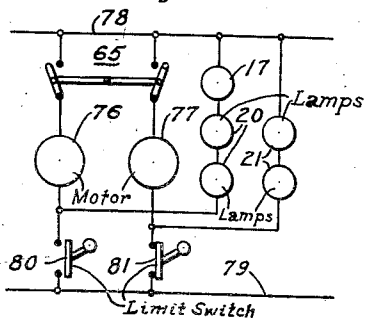
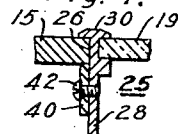


Fig. 4.



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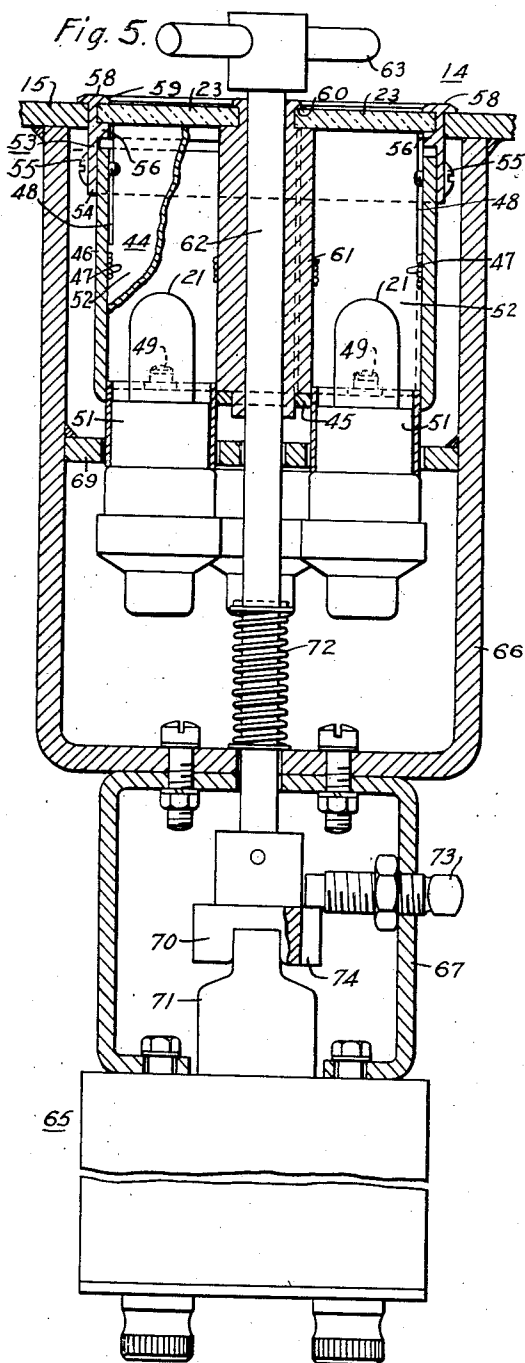
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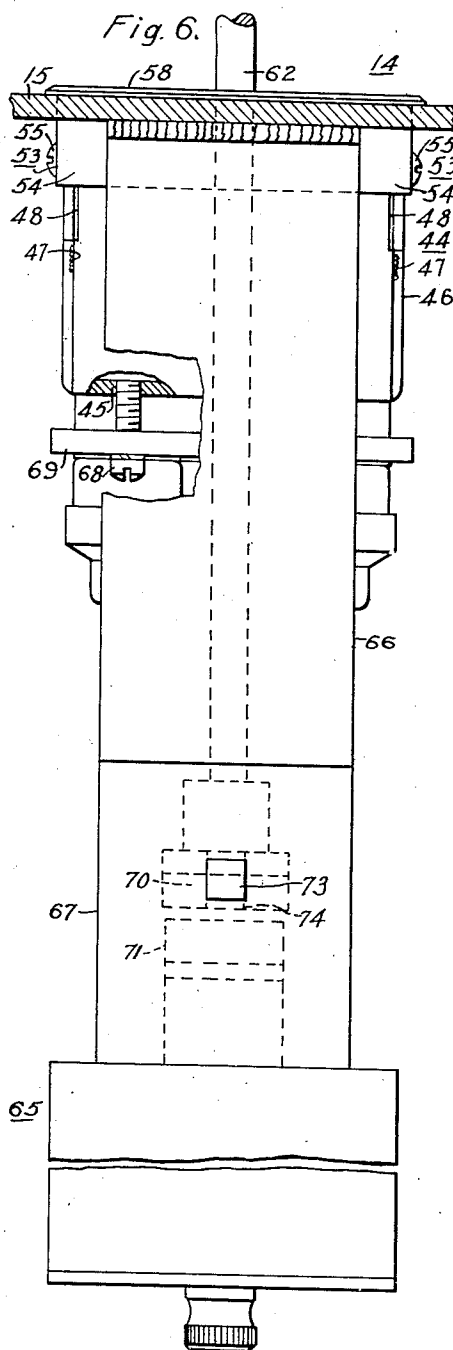
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2 Sheets-Sheet 2



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CONTROL APPARATUS

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Application July 12, 1941, Serial No. 492,180

8 Claims. (Cl. 177—311)

Our invention relates, generally, to control apparatus, and it has reference, in particular, to mimic system layouts or bus structures for control desks, switchboards, and the like.

Generally stated, it is an object of our invention to provide a simple and effective mimic system layout which will be inexpensive to manufacture and easy to install.

More specifically, it is an object of our invention to provide for securing a translucent cover in an illuminated mimic bus structure which is positioned in an opening in a panel, and for securing the bus structure in the panel opening.

Another object of our invention is to utilize a common retaining means for securing a window or cover to a mimic bus structure and for positioning the bus structure relative to a panel.

It is also an object of our invention to provide an improved illuminated mimic system layout for a panel.

A further object of our invention is to provide for utilizing a mimic bus structure having deformable side portions adapted to secure a cover thereto and to position the bus structure in a panel opening.

Still another object of our invention is to provide a mimic bus structure having an illuminated light trough with projecting edge portions for securing a window or translucent cover relative to the trough when it is inserted in an opening in a panel.

Yet another object of the invention is to provide for securing a window in a mimic bus structure adapted to be recessed in an opening in a panel, by having resilient side portions thereof adapted to interlock with and retain the window when the side portions are biased towards each other by the edge portions of the opening.

Other objects will, in part, be obvious and will, in part, appear hereinafter.

In accordance with our invention a simple and effective mimic system is provided for representing on a panel an actual arrangement of switches, valves, or other such devices and the connections therebetween. A light trough having a transparent cover or window is recessed in an opening in the panel to represent the connections between the devices. Suitable illuminated control switches representing the switches, valves or other such devices, and provided with windows adapted to indicate the operating condition of the switch, valve, etc., represented, may be interposed between adjacent sections of the trough member at the appropriate locations. The translucent covers of the trough and control switches may be

retained by retaining means which also function to position the trough and control switches relative to the panel.

For a more complete understanding of the nature and scope of our invention, reference may be had to the following detailed description, which may be read in connection with the accompanying drawings, in which:

Figure 1 is an elevational view of a portion of a panel showing part of a mimic system layout; Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a cross-sectional view of the light trough shown in Fig. 2, before it is inserted in the panel opening;

Fig. 4 is a partial cross-section view showing a modification of the invention;

Fig. 5 is a cross-sectional view taken along the line V—V of Fig. 1 with the switch handle moved to the operating position;

Fig. 6 is a side view of the control switch taken at 90 degrees to Fig. 5; and

Fig. 7 is a diagrammatic view of a control circuit embodying the invention.

Referring generally to Figure 1, the reference numeral 10 may denote, generally, a portion of a mimic system layout representing an actual pipe system, switching system or the like, and comprising, for example, illuminated mimic bus sections 12 and 13 representing the pipes, or conductors, with an illuminated control switch 14 representing a valve or switch, interposed therebetween, mounted on a panel 15 forming a portion of a switchboard control desk or the like. The bus sections may be provided with lamps 16 and 17 and translucent covers or windows 18 and 19 to indicate the operating condition of the pipes, etc., and the control switch 14 may be provided with lamps 20 and 21 and windows 22 and 23 for indicating the operating condition of the valve, etc., represented by the switch.

Referring to Figs. 2 and 3, it will be seen that the bus section 12 may, for example, comprise suitable lengths of channel-shaped light troughs or housings 25 adapted to be recessed in an opening 26 in the panel and having a relatively flat base portion 27 with upstanding side walls 28 along the edges thereof. The light troughs may be extruded in a manner well known in the art or they may be formed in any other suitable manner.

In order to provide for securing the cover 19 between the upstanding side walls 28 of the trough, suitable retaining means may be provided adjacent the upper edges thereof, such as, for

example, the inwardly projecting shoulder portions 29.

With a view to positioning the light trough 25 relative to the panel 15 and securing the window or cover 19 in position, retaining means may be provided, such as, for example, the laterally projecting trim or flange 30 which may extend along the upper edges of the side walls 28 and project both inwardly and outwardly, so as to define a groove 31 to receive the edge portions of the window or cover 19 and engage the edge portion of the panel 15 adjacent the opening 26.

As shown in Fig. 3, the side walls 28 of the light trough 25 may be initially inclined outwardly towards the upper edges. By making the light trough of a material such as brass, aluminum, aluminum alloy, steel or any other suitable material which may be deformed without fracturing it, and which retains a reasonable degree of resiliency under deformation, the cover 19 may be readily inserted between the flange 30 and shoulder portions 29 before the trough member is positioned in the opening 26 in the panel 15. The dimensions of the opening 26 in the panel, the space between the side walls 28, and the width of the cover or window 19 may be so selected that when the trough 25 is positioned in the opening 26, the side walls 28 are biased towards each other, so as to secure the cover or window 19 in the grooves 31 between the flanges 30 and shoulder portions 29. The outer portions of the flanges 30 engage the panel 15 adjacent the opening 26 and thus position the trough relative to the panel.

In order to illuminate the bus sections 12 and 13, and indicate the operating condition of the portions of the system they represent, the lamps 16 and 17 may be provided therealong at suitable intervals. The lamp 17 may, for example, be projected into the light trough 25 through an opening 32 therein and supported from the base portion 27 by means of a socket 33, which may be secured thereto by means, such as screws 34 and projecting ears 35, so that the lamps may be removed from the trough from the rear for inspection or replacement.

In order to secure the mimic light trough 25 in the panel opening 26 suitable means may be provided to draw the flange 30 inwardly against the front of the panel 15. For example, means such as the saddle member 37 may be provided which may straddle the light trough and may be attached to the panel 15 by welds 38. Where the length of the mimic bus section is short, the saddle members 37 may be relatively short and spaced at suitable intervals. Where, however, the particular section of mimic bus is relatively long, so that the opening 26 extends for some distance, the saddle member 37 may be made relatively long, so as to rigidly connect the edges of the panel adjacent the opening and reinforce the panel. Suitable connecting means may be provided between the trough 25 and the saddle member 37 to draw the flange 30 of the trough member inwardly against the panel. In this instance a nut 39 positioned on the screw 34 which extends through the saddle member is utilized.

The channel-shaped mimic trough 25 may be retained in operating relation with the panel 15 in any other similar manner. As shown in Fig. 4, retaining means in the form of a clip 40 may be detachably secured to the side wall 28 of the light trough 25 adjacent the upper edge by a screw 42 so as to bear against the rear surface

of the panel 15. The outer portion of the flange 30 of the side wall 28 may thus be held securely against the front face of the panel 15, so as to retain the light trough 25 in the desired operating position. The inner portion of the flange 30 and the adjacent shoulder portion 29 cooperate in the manner hereinbefore described, to secure the window or cover 19 in position between the side walls 28 when the trough is recessed in the panel opening 26.

Referring to Figs. 1, 5 and 6, it will be seen that the illuminated control switch 14 may comprise a substantially rectangular housing or receptacle 44 having a relatively flat base portion 45 with upstanding side walls 46 adjacent the edges. The side walls may be rigid, or may be made with a limited degree of resiliency so as to function in a manner similar to the side walls of the light trough. The housing 44 may, for example, be formed from sheet metal and partially joined at the corners by welds 47, leaving slots or openings 48 between the upper portions of the side walls, which may be initially inclined outwardly from each other. By reason of the slots 48 the upper portions of the side walls are free to move relative to each other and may be flexed inwardly for a purpose which will be explained hereinafter. The lamps 20 and 21 may be supported on the base portion 45 by means of sockets 51 secured thereto by means of screws 49 and ears 50. Partitions 52 may be provided between the lamps to divide the housing into quarters diagonally so that adjacent portions of the receptacle may be illuminated separately for indicating different operating conditions of the valve or other device represented by the symbol.

As best shown in Figs. 1 and 5, the windows or covers 22 and 23 of the receptacle or housing 44 may be triangularly shaped so as to cover the sections of the housing between the partitions 52. These covers may be secured to the housing or receptacle by retaining means which may be integral therewith as in the light trough 25, or which may be separate therefrom, such as, for example, the retaining members 53 secured to the upstanding side walls 46 of the housing or receptacle. The retaining members 53 may, as illustrated, comprise relatively flat strips 54 secured to the side walls 46 by means of screws 55, and having inwardly projecting shoulder portions 56 on the inner side adjacent one edge, with a relatively flat flange portion 58 projecting inwardly and outwardly along the upper edge so as to provide a groove 59 for receiving an edge of a cover or window when the side walls are flexed inwardly. The other edge of the cover may be positioned in a groove 60 provided adjacent the upper end of a central bushing 61 which provides a bearing for the shaft 62 of the switch handle 63 of the control switch 14 for operating a switch device denoted, generally by the numeral 65 and which may be supported to the rear of the receptacle by means of bracket members 66 and 67 for controlling the actual valve (not shown), represented by the control switch.

In order to secure the housing 44 relative to the panel 15, means may be provided to draw the flange 58 against the front of the panel. For example, the housing may be connected to the U-shaped saddle or bracket member 66 by means of screws 68 which may be threaded into the base portion 45 of the housing and pass through a cross member 69.

Means such as the clutch members 70 and 71 may be provided for effecting connections between the handle 63 and the switch 65. A spring 72 may be utilized to bias the clutch member 70 to the disengaged position. Stop means may be provided for preventing rotation of the handle 63 from the neutral or "off" position in which it is shown in Figs. 1 and 5, until it has first been pushed inwardly, such as, for example, the set screw 73 which may be positioned in a slot 74 in the clutch member 70 in the disengaged position, and which clears the slot when the handle is pushed inwardly to the operating position shown in Fig. 5, so that the switch device 65 may be operated to effect operation of the valve or other device controlled thereby, to the open or closed position.

Referring to Fig. 7 it will be seen that the switch device 65, which is shown in the neutral or off position, may be utilized to control the energization of operating means for a valve or other device in a system (not shown) such as, for example, the solenoids 76 and 77, which may be energized from conductors 78 and 79 to operate the valve or other device to the "open" and "closed" positions, respectively. Limit switches 80 and 81 which are shown in their respective positions for the closed or "off" position of the valve or other device controlled, interrupt the energizing circuits for the respective solenoids when the valve or other device reaches its maximum "open" or "closed" position. In intermediate positions both limit switches are closed.

The lamp 16 may be energized from a suitable source and its energization controlled to indicate the operating condition of that portion of the system represented by the bus section 12. The lamps 20 and 21 may be energized from the conductors 78 and 79 through the limit switches 80 and 81, respectively, so as to indicate the operating condition of the switch, valve, or other device, represented by the control switch 14. The lamp 17 may be connected for energization with the lamps 20, so that when the switch, valve, etc., represented by the control switch 14 is closed, the windows 22 and 19 will be illuminated to indicate a through connection with the portion of the system represented by the bus 12. When the switch, valve, etc., represented by the control switch 14 is opened, the lamps 20 and 17 will be deenergized and the lamps 21 will be energized, as shown, indicating that the switch, valve, etc., represented by the control switch 14, is closed and the portion of the system represented by the bus section 13 is deenergized.

From the above description and the accompanying drawings, it will be apparent that we have provided in a simple and effective manner for securing a cover or window in an illuminated mimic bus member positioned in a panel opening. The cover may thus be secured relative to the bus member, and the bus member may be positioned relative to the panel by a common retaining means so as to provide a substantially flush panel mounting which is simple and inexpensive to manufacture, easy to install, and neat in appearance.

Since certain changes may be made in the above description, and different embodiments of the invention may be made without departing from the spirit thereof, it is intended that all the matter contained in the above description or shown in the accompanying drawings shall be considered illustrative, and not in a limiting sense.

We claim as our invention:

1. The combination with a panel for a mimic diagram system having an opening therein, of a channel shaped member having upstanding side portions adapted to be recessed in the opening, a cover for the channel shaped member distinguishable from the panel, means associated with the side portions adjacent the upper edges thereof having flange portions projecting inwardly to engage the cover and outwardly to engage the face of the panel, and means to retain the outer flange against the face of the panel.

2. A bus structure adapted to be recessed in an opening in a panel comprising, a base portion recessed in the opening having upstanding side walls adjacent the edges of the opening, lighting means positioned between the side walls, a translucent cover positioned between the side walls over the lighting means, and retaining means on the side walls projecting inwardly over the edge of the cover to retain it relative to the body portion and outwardly over an adjacent portion of the panel to position the base portion relative to the panel.

3. The combination in an illuminated mimic bus adapted to be positioned in an opening in a panel, of a metal housing having a bottom portion with spaced apart upstanding side portions adapted to be recessed in the opening, a light source secured to the bottom portion to project into the housing, a translucent cover for the housing, a retaining flange projecting inwardly to engage the cover and outwardly to engage the panel secured to the side portions, and means secured to the housing behind the panel cooperative with the panel to retain the flange against the panel.

4. A mimic bus structure adapted to be supported in an opening in a panel comprising, a trough-like metallic body having yielding upstanding side walls so inclined outwardly as to be urged inwardly by the sides of the panel opening, a cover adapted to be positioned between the side walls, said cover being distinguishable from the panel, retaining means integral with the outer ends of the side walls including an inwardly projecting flange to retain the cover when the body is recessed in the opening and an outwardly extending flange to position the body in the opening, and means to retain the outwardly extending flange against the panel.

5. In a mimic diagram system, a trough adapted to be positioned in an opening in a panel comprising a base portion having resilient outwardly inclined upstanding side walls adapted to be biased inwardly by the sides of the opening when the trough is positioned therein, a cover for the trough distinct from the panel, a flange adjacent the edge of each side wall extending inwardly to retain the cover and outwardly to position the trough relative to the panel, the initial inclination of said side walls being sufficient to permit the cover to be inserted behind the flange, and means behind said flange projecting inwardly and cooperative with said flange to position the cover in the trough.

6. The combination with a panel in a mimic bus system having an opening therein, of a substantially channel-shaped member arranged to be positioned in the opening having resilient side walls with integral inwardly projecting spaced shoulder portions adjacent the outer edges, a cover adapted to be positioned between the shoulder portions when the channel shaped member

is free of the opening and secured between said shoulder portions when the side walls are urged towards each other by the sides of the opening, said cover being visibly distinguishable from the panel, outwardly projecting shoulder portions on the side walls to engage the front of the panel adjacent the opening, and means detachably attached to the side walls to the rear of the panel to retain the channel-shaped member in the opening.

7. An illuminated mimic bus for positioning in an opening in a panel comprising, a substantially channel-shaped member having a base portion with a plurality of spaced openings therein to provide for interior illumination of the member, and spaced apart outwardly inclined yieldable upstanding side walls, spaced apart inwardly projecting means integral with the side walls adjacent the edges, a translucent cover positioned between the inwardly projecting means, said side walls, cover and opening being so related that the side walls are biased towards each other sufficiently upon insertion of the channel member in the opening that the cover is retained between the inwardly projecting means, outward-

ly projecting means integral with the side walls to position the channel member relative to the front of the panel, and retaining means positioned behind the panel cooperative with the channel member and panel to retain them in operating relation.

8. The combination with a panel having an opening therein representing a bus system or the like, of a channel member recessed in the opening having a base portion with upstanding side walls, lamp means supported on the base portion to illuminate the interior of the channel member, a translucent cover for the channel member, positioning means including an outwardly projecting shoulder to engage the front of the panel adjacent to the opening and spaced apart inwardly projecting shoulder portions positioned on each side of the cover associated with a side wall adjacent an edge thereof, and means secured to the channel member behind the panel cooperative with the panel to retain the channel member in the opening.

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