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[54] ELECTRIC VISUAL DISPLAY

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[52] **U.S. Cl.** .....**40/52 R,** 35/54, 40/130 L

[51] **Int. Cl.**.....**G09f 13/00**

[58] **Field of Search**.....200/16 B, 16 E, 63; 340/365 R, 365 P, 365 E; 35/9 C, 54; 40/52, 130 L; 339/18 R, 18 B, 18 P, 19

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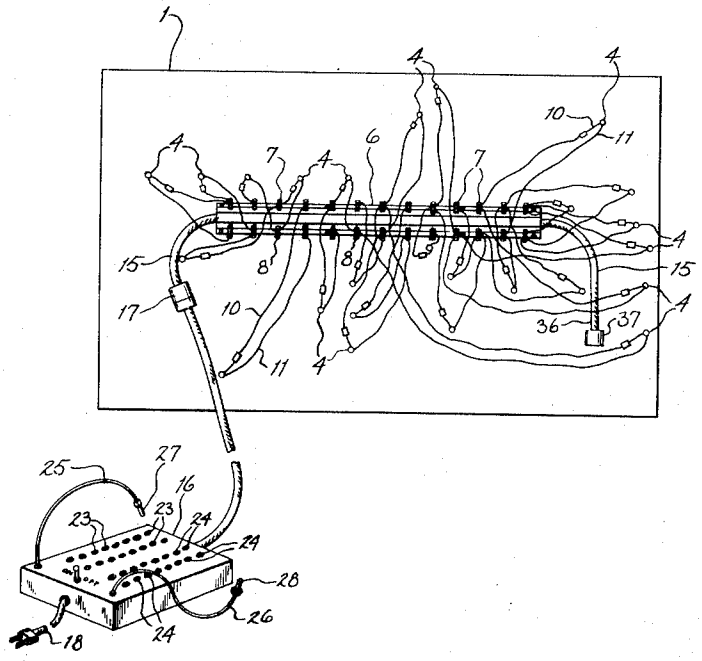
Primary Examiner—Wm. H. Grieb

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[57] **ABSTRACT**

An electric visual display device includes a chart board with display indicia and a separate light for each indicia. Each light is connected by a pair of leads to different coil spring terminals on a terminal bar on the back of the board, and the spring terminals are connected through a separable connector to a switching box having a plurality of female switch portions. A pair of male switch portions are connected to a low voltage DC power supply. Each light circuit is energized, one at a time, by selectively closing a pair of switches formed by said male and female portions. The circuitry provides that N pairs of female switch portions will control at least N^2 lights.

6 Claims, 5 Drawing Figures



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SHEET 1 OF 3

Fig. 1

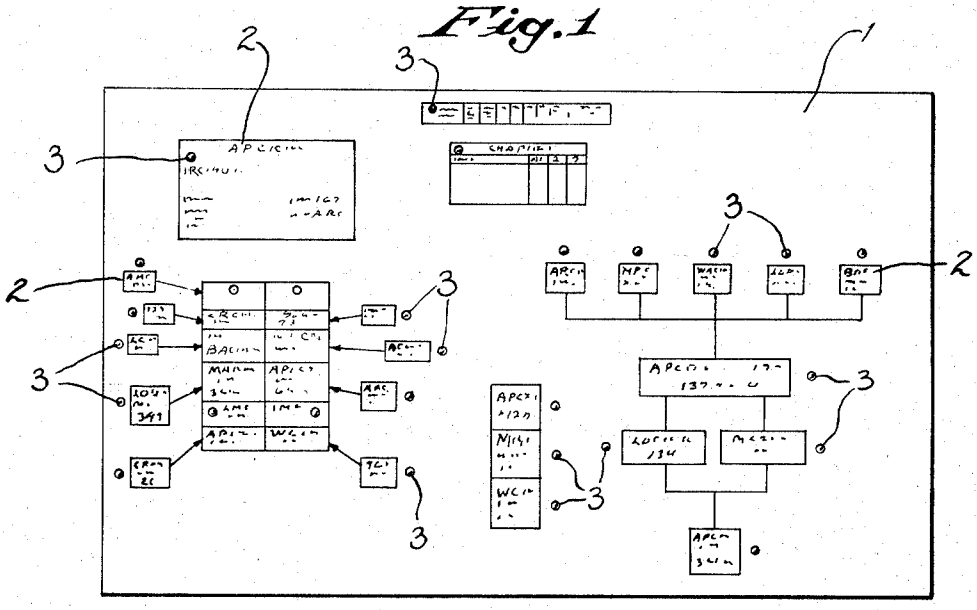
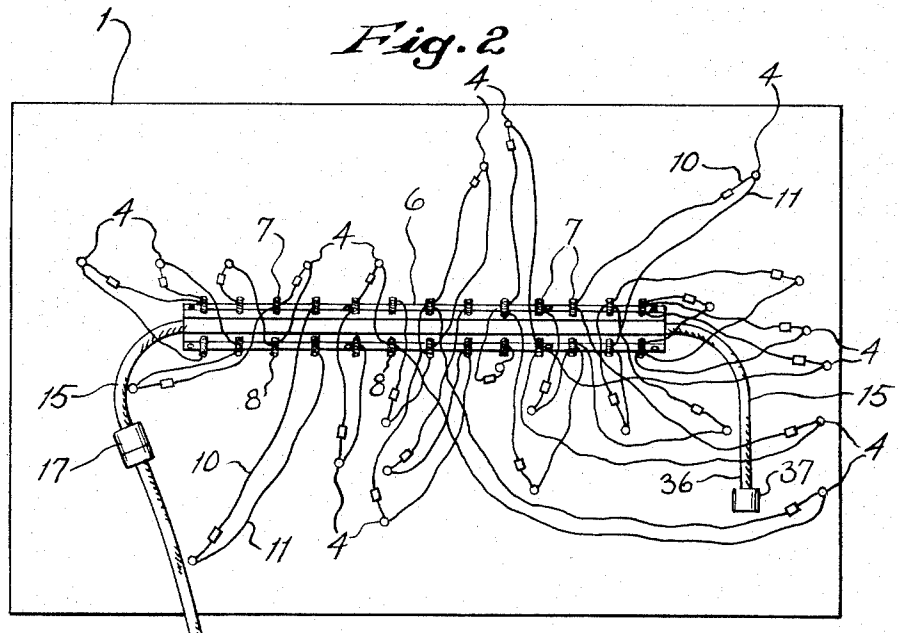
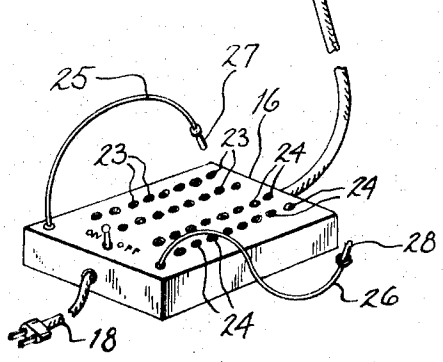


Fig. 2



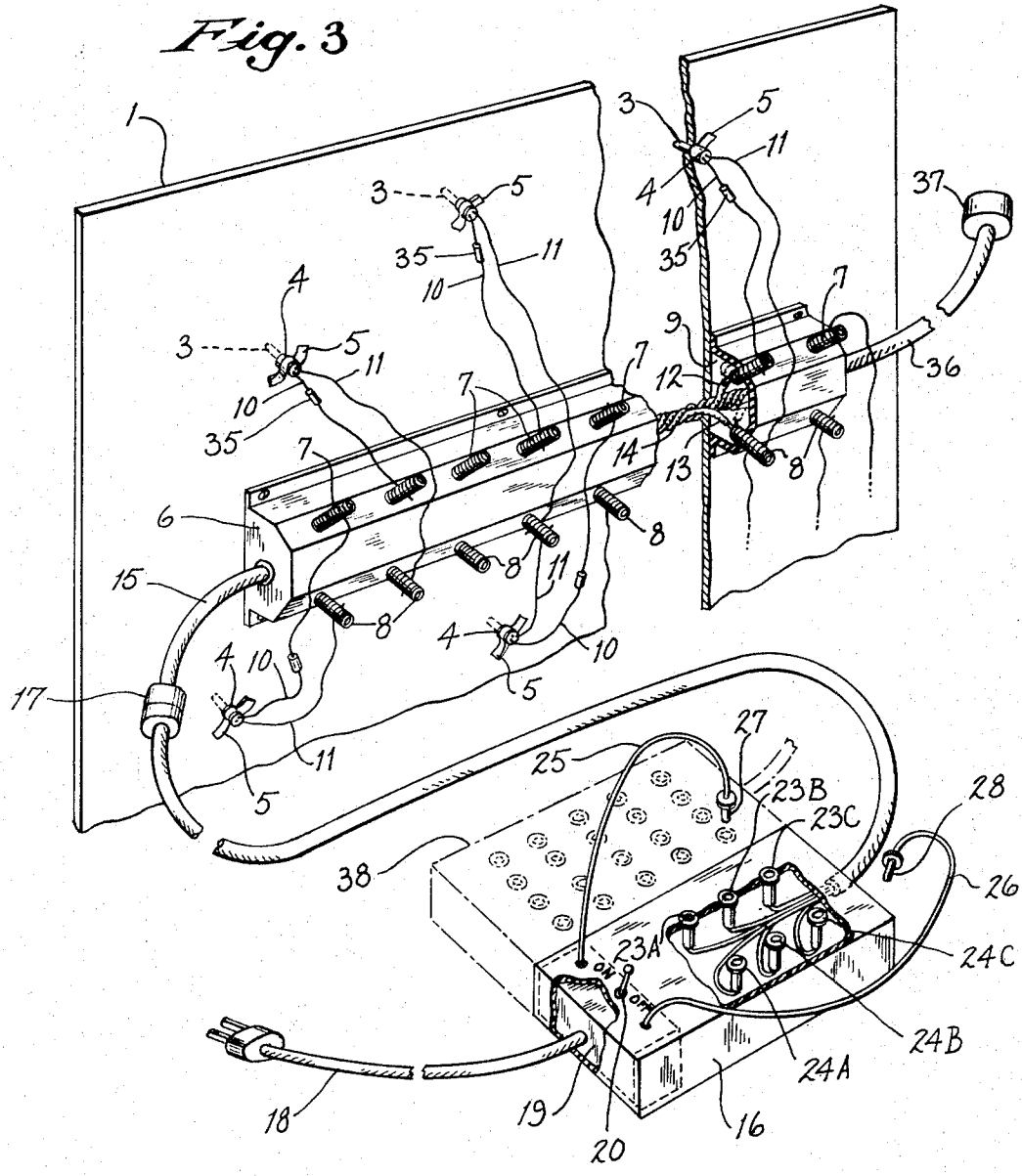


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Fig. 3



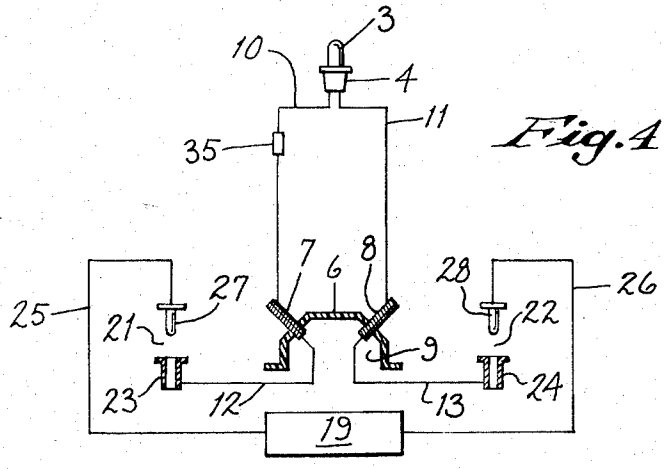


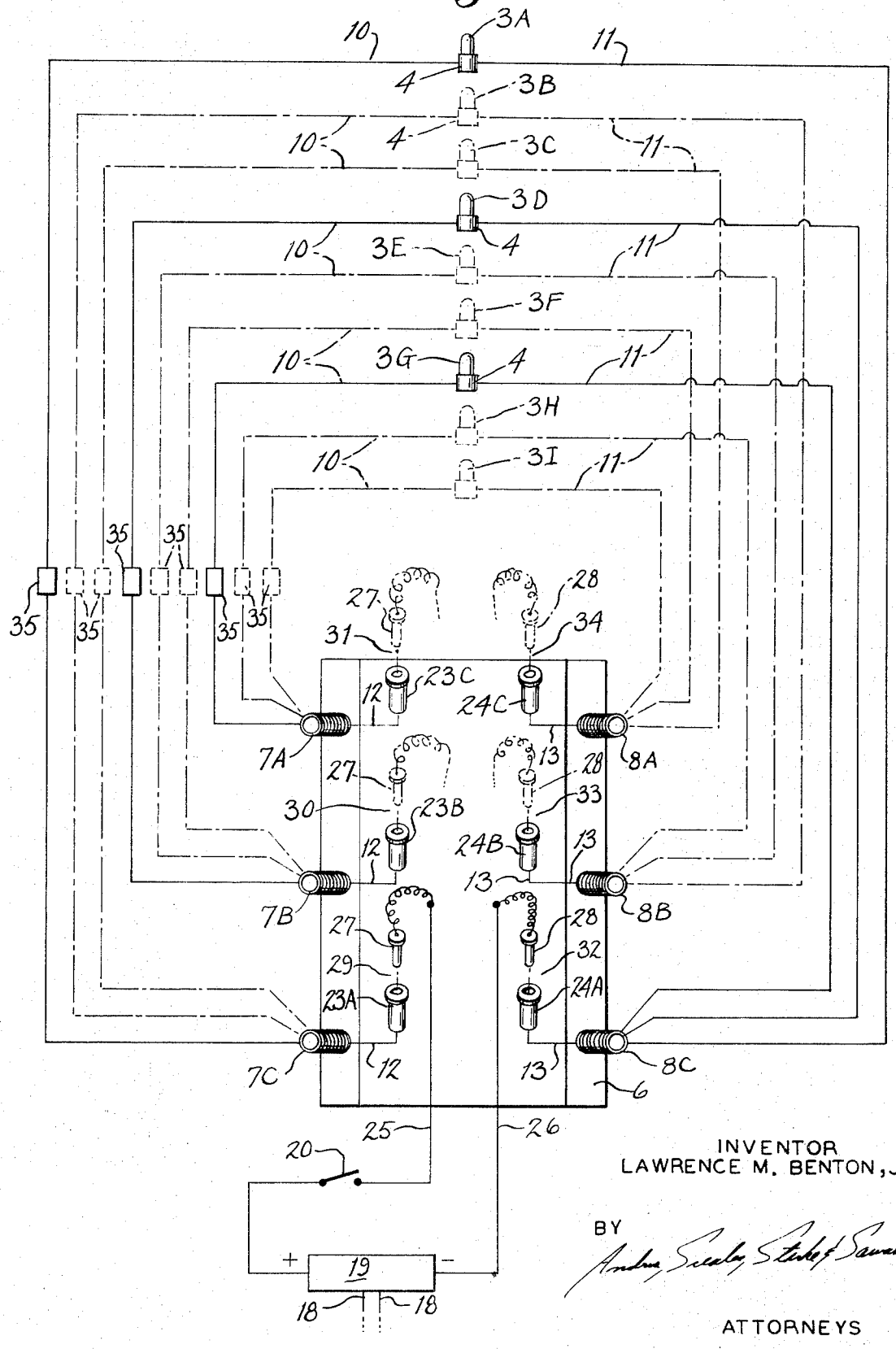
Fig. 4

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Fig. 5



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ELECTRIC VISUAL DISPLAY

BACKGROUND OF THE INVENTION

This invention relates to an electric visual display.

Charts and pictures have been widely used for thousands of years to convey concepts which may be difficult to convey by spoken or written words. Many times a lecture or book is accompanied by charts or other pictorial displays, and the lecturer or book text refers to particular portions of the display for purposes of clarity. Such reference is often to a specific display portion, such as to reference numerals in patent drawings.

It has been found helpful when presenting large display material to use a pointer to refer to specific display portions. It is also sometimes desirable to provide a plurality of small lights at the portions to be referred to, these lights replacing manual pointing and being switched on by the operator.

Sometimes, the operator can turn on a group of lights at the same time, as in U.S. Pat. No. 2,159,925 entitled "Sales and Service Equipment." More usually, however, the operator prefers to normally turn on only one light at a time. One way of accomplishing this is to provide a single separate switch for each light. This is satisfactory if a relatively small number of lights are involved. However, in relatively large or complex displays, hundred of display lights may be desired, and the cost, size and complexity of using an equal number of separate switches may make such a device undesirable to build and use.

SUMMARY OF THE INVENTION

The present invention solves the aforementioned and other problems involving multi-light visual displays.

In accordance with the invention, a display board is provided which is adapted to have a suitable visual display thereon. A plurality of small lights are mounted on the board and are connected between terminals of a terminal bar mounted on the board. The terminal bar is, in turn, connected to a suitable switching box wherein a pair of switches must be selectively closed to light the desired light. The light circuits are in parallel and the arrangement is such that the total number N of switch pairs on the switching box can selectively and individually control at least N^2 number of lights, normally one at a time. This substantially reduces the number of switches needed.

It is contemplated that the capacity of the system may be readily expanded by a modular system, wherein additional terminal bars and switching boxes may be plugged together.

In addition, the circuit of the invention is such that a back-current may occur and light up one or more unwanted lights when a pair of switches are closed. The invention provides means to prevent this back current.

DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

FIG. **1** is a front elevation of a display chart for use in connection with the concept of the invention;

FIG. **2** is a rear elevation of the chart, showing in a generally schematic manner the terminal bar and related wiring connections, as well as the switching box;

FIG. **3** is an enlarged perspective view of the terminal bar and switching box and related connections, and showing the manner of mounting the lights to the display chart;

FIG. **4** is a schematic showing of a circuit for a single light; and

FIG. **5** is a schematic showing of a circuit for controlling **9** lights.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As best shown in FIG. **1** of the drawings, the concept of the invention is primarily intended for use with a display chart board **1** which may be constructed of any suitable material and which has numerous display indicia **2** arranged over the face thereof. The indicia are adapted to be lit at specific desired portions thereof by suitable light means. In the present embodiment, and as best shown in FIG. **3**, the light means comprises a plurality of bulbs **3** extending forwardly through chart board **1** and with each bulb secured in an electric socket **4** which is suitably mounted to the rear of the board, as by masking tape **5**.

As shown in FIGS. **2** and **3**, an elongated hollow terminal bar **6** is mounted on the rear of chart board **1** and serves as a connector for the light means. For this purpose, a plurality of longitudinally spaced opposed rows of coil spring terminals **7**, **8** are mounted along bar **6** and extend outwardly through the bar from the tunnel-like interior **9** thereof. A pair of lead wires **10**, **11** extend from each socket **4** and their bare ends are slipped between the coils of a selected pair of spring terminals in opposed rows.

The concept of the invention includes switch means for controlling the lights. For this purpose, the inner end of each spring terminal **7**, **8** is connected to a control wire **12**, **13** which forms a cable **14** with the other similar control wires and extends through bar interior **9** and into a cable sheath **15**.

Cable **14** extends from terminal bar **6** to a control panel or switching box **16**, but the ease of assembly and disassembly of the display and its controls, is interrupted by a suitable multi-pronged plug and socket connector **17**.

Switching box **16** is adapted to be positioned on a table or the like adjacent to the chart board **1** for use by the operator. Box **16** includes a suitable line cord **18** for connection to a AC electric power supply and a suitable converter **19** for changing to DC and for reducing the input voltage to safe levels. An on-off switch **20** of any well-known type provides the primary control of power to converter **19**.

In accordance with the invention, switching box **16** is provided with N number of switch pairs which are utilized for separately controlling the on-off function of at least N^2 number of lights on chart board **1**. To accomplish this, and as illustrated in FIG. **4**, each light circuit must include two switches **21**, **22** which must be closed in order to light the respective bulb **3**.

Assuming in the present embodiment that nine bulbs are to be controlled, three switch pairs (or six switches) are used. FIG. **3** shows box **16** having six open female

receptacle switch portions **23** A, B, C and **24** A, B, C. Portions **23** A, B & C are shown as positive and are connected to separate individual light wires **10**, while portions **24** A, B & C are shown as negative and are connected to separate individual light wires **11**.

The output of converter **19** comprises positive and negative lead wires **25**, **26** which are provided with respective male plugs **27**, **28**.

Plug **27** can be inserted into any one of the receptacles **23** A, B or C, while plug **28** can be manually inserted into any one of receptacles **24** A, B or C to provide nine different circuits to light any one of nine different lights.

While the present embodiment discloses only three switch pairs and nine lights, the invention contemplates the use of any number of switch pairs and lights, the relationship always being at least N^2 lights to N switch pairs. For example, if there are 25 switch pairs (50 switches) at switching box **16**, at least 625 lights on chart board **1** could be individually controlled. If additional light circuits are connected between the same spring terminals, more lights can be controlled from the same switch pair.

FIG. **5** shows a physical circuit for energizing nine lights through switches **29**, **30**, **31** and switches **32**, **33**, **34**. The light bulbs are in parallel and are designated as **3**A through **3**I. Selective actuation of any opposed pair of switches will light the corresponding light connected therebetween.

The direct current flows from positive to negative. Thus, if switches **29** and **32** are closed, current will flow from converter **19** through switch **20**, hence through bulbs **3**A to switch **32** and back to the converter. However, at the same time there may be set up a back-current from switch **32** through bulb **3**D to terminal **7**B, and hence through bulb **3**F to terminal **8**A, and hence through bulb **3**C and back to switch **29**. When required, blocking means are provided to prevent this back current, and in this embodiment comprises a diode **35** in the positive lead wire **10** for bulbs **3**A – **3**I.

If it is desired to control lights on more than one chart board **1** with a single switching box **16** and assuming that box **16** has the capacity to do so, this can be easily accomplished by providing additional chart boards with their own terminal bars and lights, and connecting box **16** to the additional terminal bar (or bars) via wires which also extend through sheath **15**, bar interior **9**, and through a second sheath **36** to a second plug and socket connector **37** to the next bar, not shown. See FIGS. **2** and **3**.

In addition, if switching box **16** does not have the switch capacity desired, additional female switch receptacles may be added in modular units **38**. See FIG. **3**.

The concept of the invention provides an electrical visual display which is highly valuable in teaching, either with or without an instructor, and for lectures of various types. The capacity of the device is very large and is of substantially less size and complexity as compared to prior units of this type.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. An electrical visual display device comprising, in combination:

a. a chart board having a plurality of display indicia thereon,

b. a separate light mounted on said board at at least some of said plurality of display indicia,

c. a control panel including a power supply connections means and a first plurality of selectively operable switching means connected to one side of said power supply connection means and a corresponding second plurality of selectively operable switching means connected to the opposite side of said power supply connection means for lighting said lights individually,

d. and a unidirectional conducting circuit means connected in series with said lights between selected pairs of said first and second plurality of switching means and blocking circulating current except through the associated light whereby N pairs of first and second switching means controls at least N^2 lights.

2. An electrical visual display device comprising, in combination:

a. a chart board having a plurality of display indicia thereon,

b. a separate light mounted on said board at at least some of said plurality of display indicia,

c. a pair of wire leads connected to and extending from each light,

d. a control panel including a plurality of switches connected in pairs to a common power connection means,

e. circuit means connecting each lead of each said pair of leads to a different open switch portion and including current inhibiting means to effectively block circulating current except through the associated light,

f. and means for selectively closing at least one pair of switches at a time to actuate the respective light connected through said circuit means,

g. the construction and circuit connections being such that N pair of switches may control at least N^2 lights.

3. The display device of claim **2** wherein said circuit means includes:

a. a terminal bar mounted on the rear of said chart board,

b. a plurality of coil springs mounted on said bar,

c. the ends of each said pair of wire leads being secured between coils of different springs,

d. and leads connecting each of said last-named coil springs to a different pair of switch portions.

4. The display device of claim **2**:

a. which includes an electric current supply source,

b. wherein each said open switch portion comprises a female switch receptacle,

c. and a pair of male switch plugs connected to said source for engagement with a desired pair of switch portions to provide the said switch closing means.

5. The display device of claim **2**

a. which includes a power source of low voltage D.C. current adapted to be connected to said circuit means by said switches,

b. and wherein said isolating means includes means in one lead of each said pair of leads to block back-current therein.

6. The device of claim **5** in which said last-named means comprises a diode.

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