United States Patent [19]

Koch

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[54] **BACK LIGHTED PANEL**

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[21] Appl. No.: **315,797**

[52] **U.S. Cl.** ..... **40/106.1**; 40/132 D; 240/2 AT

[51] **Int. Cl.** **G09f 13/10**

[58] **Field of Search** ..... 40/132 D, 130 E, 106.1, 40/31; 35/1; 240/2 AT; 101/382 MV

[56] **References Cited**

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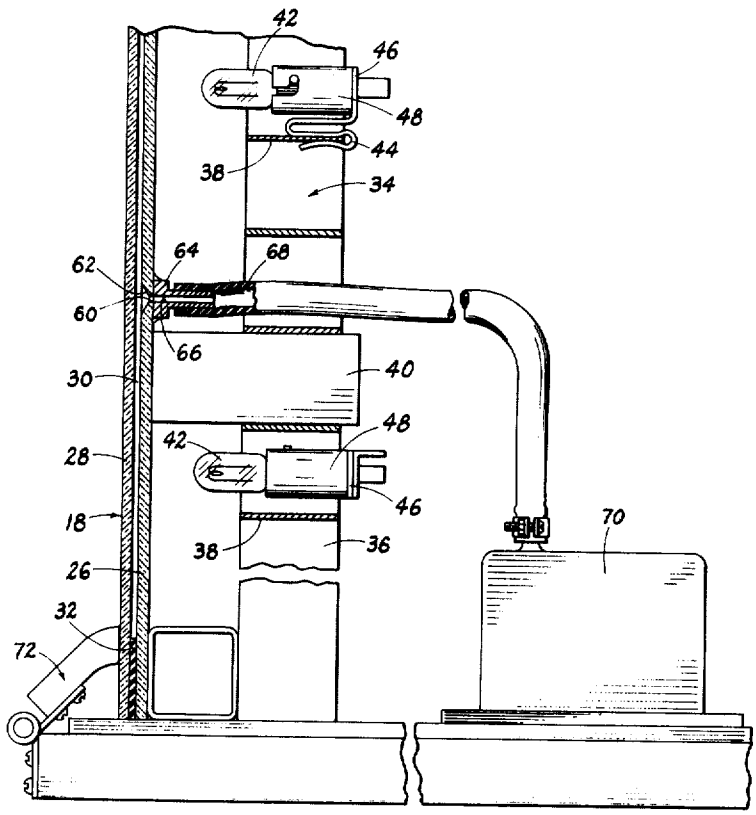
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Attorney, Agent, or Firm—William S. Dorman

[57] **ABSTRACT**

A back lighted display panel having a basic structure for projecting and/or channeling light onto an illustration face wherein the illustration face is selectively secured to the basic structure by means of a vacuum or suction system.

1 Claim, 4 Drawing Figures



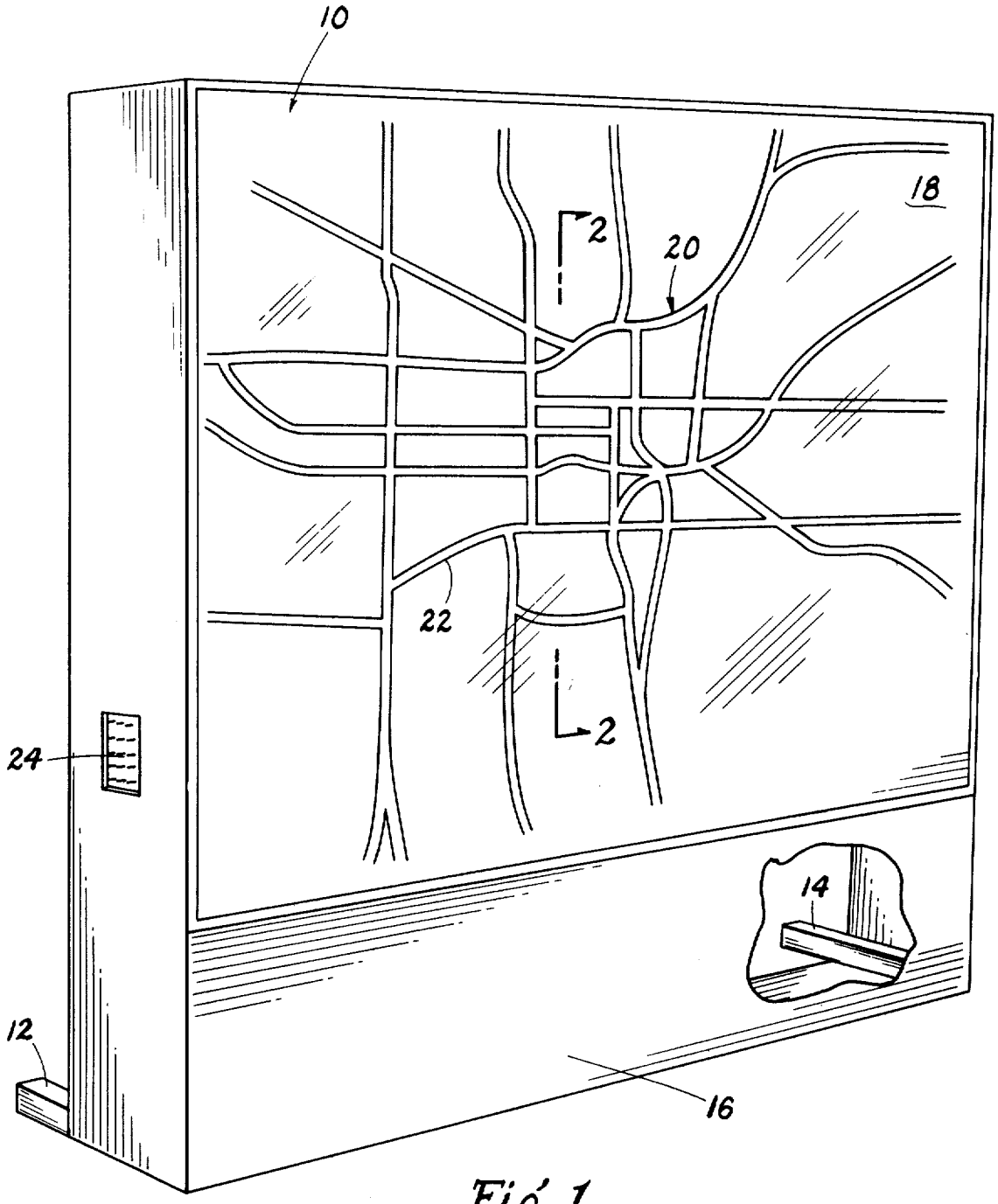


Fig. 1

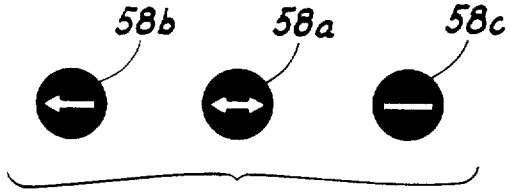


Fig. 4

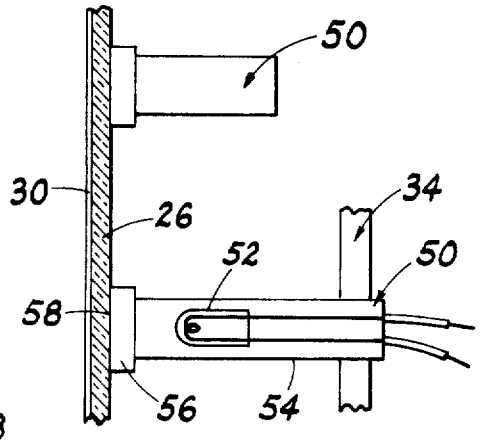


Fig. 3

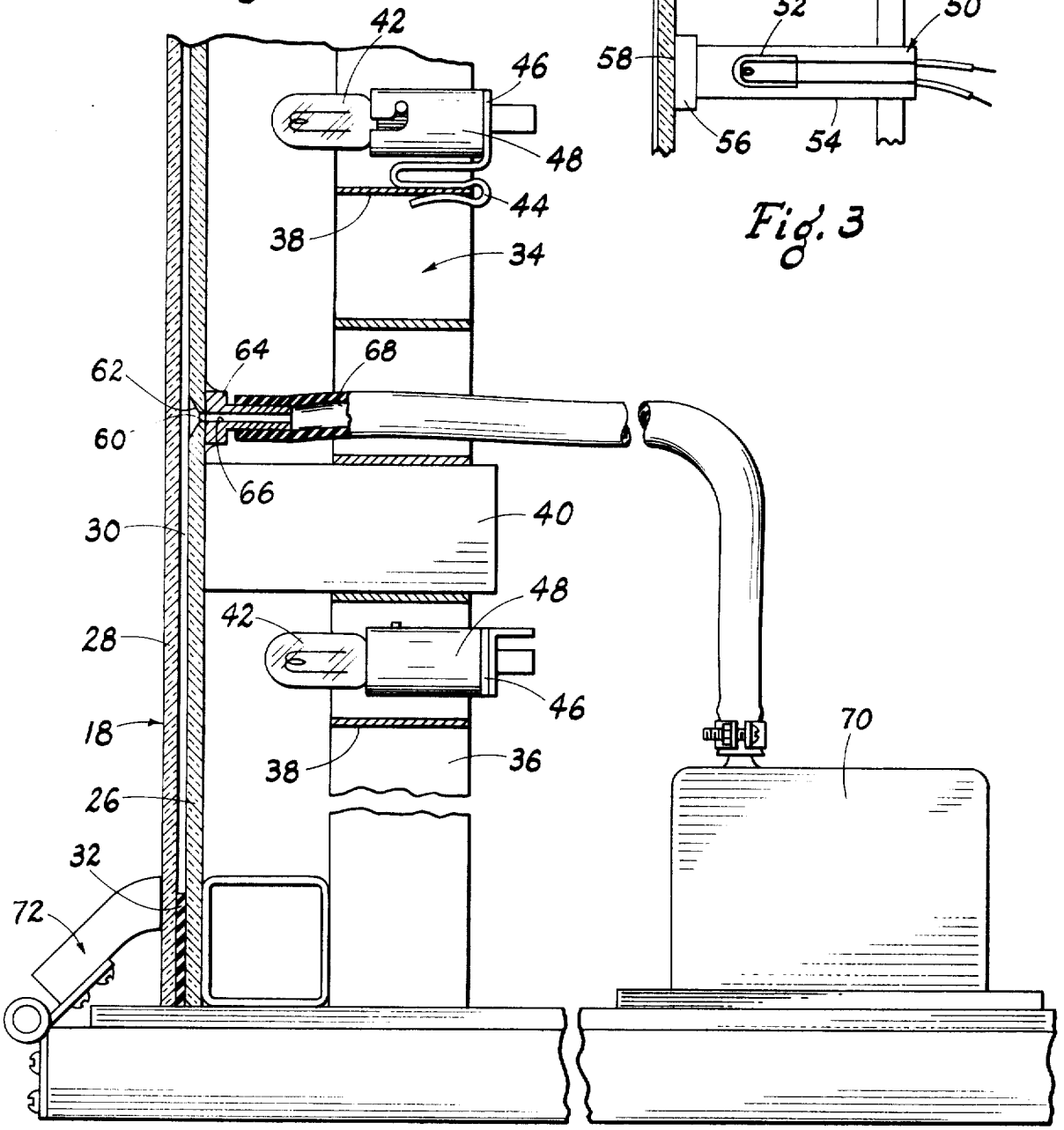


Fig. 2

BACK LIGHTED PANEL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to improvements in back lighted display panel devices and more particularly, but not by way of limitation, to a back lighted panel structure wherein the display panel or illustration face thereof is selectively maintained in tight position by means of a vacuum.

2. Description of the Prior Art

In back lighted panel structure, such as utilized in many traffic control systems and training courses, for display purposes or training and the like, it is the usual practice to support a lighting structure behind a display face or sheet in such a manner that light is channeled or directed to and through the display face. This display or illustration face is usually provided with an opaque surface having only those portions thereof open or transparent for letting light through which is necessary to provide the desired illustrative effect. The basic structure, or rear portion of the device for supporting the lights is frequently of a cellular structure of a generally egg crate configuration including a plurality of cells for receiving bulbs as required to provide the desired lighting effect, and of course, the display face must be secured to the egg crate structure in some manner.

My prior U.S. Pat. No. **3,608,222** issued Sept. **28, 1971**, and entitled "Back Lighted Panel" comprises the use of removable and shiftable post members which secure the panel to the basic structure in a manner for reducing any undesirable shadows on the display surface. Another method of securing a display face to a structure is shown in the J. W. Long U.S. Pat. No. **3,277,586**, issued Oct. **11, 1966** and entitled "Display Panel," wherein the display panel face is secured around the frame edge and held against vertical knife edge structure members. This has disadvantages because of vertical shadows cast by the structure members through the face sheet, and the inability to lamp or insert a light module in a shadow area because of the vertical structure. Further, the face of the panel is limited to opaque painting art work or illustrative material, thus making art work changes costly and difficult.

Still other methods of securing a display face to a structure are shown in my prior art U.S. Pat. No. **2,952,079**, issued Sept. **13, 1960**, and entitled "Training Panel Assembly;" and No. **2,985,968**, issued May **30, 1961**, and entitled "Display Device and Method for Making Same;" and No. **3,040,444**, issued June **26, 1962**, and entitled "Display Panel Assembly." The structures shown in these patents also have a disadvantage in that they cast face sheet shadows. In addition, the face of the panel shown in my prior patents were again of the opaque painting illustrative art work, making art work changes costly and difficult. The shadows on the face sheet have been substantially completely eliminated by my aforementioned prior art U.S. Pat. No. **3,608,222.** However, the problem of opaque face painting makes modification of the illustrative material difficult.

In order to facilitate changes in the illustrative material, negatives or other art work sheets have been glued or otherwise fastened to the face sheet. The various attempts to place a negative on the face of the display panel in lieu of opaque painting at present results in a fuzzy line or symbol, however, since the heat of the

panel lamps affect the glue used for bonding the negative to the face sheet. Mechanical screws have also been used for holding a negative in place on the panel face, with the same poor results. Sharp lighted lines or symbols are only found around the screw. Fuzzy lighting between the screws resulted due to the heat from the lamps, causing expansion of the negatives and/or face sheet.

It is well known that suction has been used to hold photographic paper in position against a perforated plate for dark room processing. Suction is also used to hold paper in printing processes, and to dry wet mats. Suction is used to retain a suction cup to a flat surface, as in the lifting of metal plates, and the like. However, although the graphic panel industry has always had serious trouble securing a sharp lighted line or symbol (through a negative, or the like) for critical knowledge transfer of the subject matter displayed to engineers, students, and the like, there has been no attempt to use suction in a solution to the problem. The problem is acute in that the viewing of this type of panel or display substantially always takes place at great distance from the display itself, and substantially always at some angle to the display panel face. The sharpness of symbology could only be done through costly painting of the opaque areas.

SUMMARY OF THE INVENTION

The present invention contemplates a means for tightly maintaining a negative or separate, easy to remove art work sheet in place against a flat surface by suction whereby "sharp" lighting is provided over the entire panel surface at an economical cost. The negative or art work plate is held with suction against the base structure plate as tightly as the presently used painted opaque methods.

The present invention provides an improved method of obtaining extremely fine, sharp back lighted symbols and lines from any back lighted display surface, thereby permitting reading of the symbology at great distances, and at substantially any angle to the face. The face sheet or display face is selectively secured to the flat plate by means of a vacuum or suction created between the adjacent surfaces thereof. In this manner, the display panel or face sheet may be efficiently held in position, and may be readily removed and replaced when necessary for any reason.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a back lighted panel illustrating a generally typical structure in combination with which the present invention may be utilized.

FIG. 2 is a broken elevational view taken on line 2—2 of FIG. 1, with portions shown in section for purposes of illustration.

FIG. 3 is a broken elevational view of a portion of an egg crate structure showing a modified form of the invention.

FIG. 4 is a plan view of illustration markers which may be utilized in combination with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in detail, reference character **10** generally indicates a back lighted display or training panel such as may be utilized in combination with the invention. It will be apparent that the inven-

tion can also be wall mounted, bracket or roller stand mounted and the particular structure depicted herein is for illustrative purposes only. The panel structure **10** as shown in FIG. **1** comprises a pair of spaced support legs or braces **12** and **14** supporting a substantially rectangular housing **16** having a translucent or semitransparent construction and is mounted on or secured to the housing **16** in a manner as will be hereinafter set forth. Whereas the illustration or display depicted on the plate **18** may be of any desired or suitable type, that depicted in FIG. **1** broadly relates to a traffic control surveying or surveillance system generally indicated at **20** and comprising a representation of a plurality of interconnecting or otherwise related trafficways or streets **22**, which may be selectively lighted in accordance with the flow of traffic, or the like, through the traffic system for facilitating monitoring thereof, or illustration thereof for any other reason, as is well known. The lighting effects may be achieved from the back lighting of the panel face **18** in any suitable manner, such as shown in my aforementioned patents, or as will be hereinafter set forth. Of course, a suitable control panel **24** may be provided in the housing **16** for facilitating electrical control of the back lighted system. The lighting could also be controlled by a remote control panel (not shown), or light drivers and separate computer logic (not shown), if desired. All of these methods of lighting the lamps in a display panel are well known.

Referring now to FIG. **2**, the means for providing back lighting for the panel **18** and the manner in which the panel **18** is retained in position is shown in detail. Whereas the panel **18** may be of any suitable type construction, as shown in FIG. **2** the panel **18** is of a translucent or semitransparent construction comprising a translucent or transparent sheet or plate **26** constructed of Fiberglas, acrylic, glass, or the like, and a nonglare transparent face sheet **28** having a suitable art work sheet **30** interposed therebetween. The art work sheet **30** may be in the form of a film negative, or the like, having at least one apertures or pin hole (not shown) provided therein for transmitting suction to the plate **28.** The negative **30** is selectively opaqued and transparent at selected portions thereof as is well known whereby light is permitted to flow through the panel **28** only at those selected transparent portions. In addition, a suitable gasket **32** is interposed between the plates **26** and **28** and extends around the outer periphery thereof for a purpose as will be hereinafter set forth.

Of course, the face plate **28** may be eliminated or omitted, if desired, whereby the panel **18** consists merely of the plate **26** having the art work wheet or film negative **30** disposed thereagainst as clearly shown in FIG. **3.** The art work sheet **30** is selectively held adjacent the outer surface of the plate **26** by suction or vacuum pressure in a manner as will be hereinafter set forth.

A cellular support member generally indicated at **34** is disposed in substantially coplanar alignment with the panel **26** and is spaced therefrom in any well known manner in order to reduce unwanted shadows on the panel **18.** The cellular or "egg crate" member **34** may be of any suitable or well known construction, such as that shown in my aforementioned U.S. Pat. No. **3,608,222,** and as shown in FIG. **2,** comprises a plurality of substantially parallel spaced strips **36** extending in one direction and a plurality of similar parallel and spaced strips **38** arranged in perpendicular relationship with respect to the strips **36** to provide a plurality of substantially square or rectangular cells (not shown) having the opposite ends thereof open. The strips **36** and **38** are intersecting, as is well known, and may be secured together in any suitable manner (not shown).

The egg crate **34** may be spaced from the panel **18** in any suitable manner, such as shown in my prior art patent, but as shown herein, a plurality of post members **40** preferably of a substantially rectangular configuration may be selectively inserted in any desired cell of the cellular structure **34,** and secured therein in any well known manner. Of course, the posts **40** are disposed behind or in alignment with opaque portions of the panel **18** in order to reduce or preclude disturbance of the lighted illustrative portions, and the posts **40** may be disposed at substantially any desired spacing as required for firmly supporting the panel **26** and the posts **40** for facilitating securing of the panel **26** to the post. It is found that the cement may be readily broken or overcome by relatively slight manual pressure applied in an appropriate direction, as is well known, when it is desired to remove a post **40** or change the position thereof. Alternately, the post **40** may be secured to the panel **26** by means of a screw (not shown), or the like, if desired, in lieu of the cement. Of course, the post **40** may be of substantially any desired configuration rather than the square configuration shown herein.

Back lighting of the panel **18** may be provided by substantially any number of lamps or light bulbs, such as shown at **42,** may be removably secured to the cellular structure **34** as required to produce the desired light pattern on the panel **18.** Whereas the bulbs **42** may be secured to the structure **34** in any suitable manner, the means depicted in FIG. **2** comprises a spring clip member **44** adapted to snap over the upper or outer edge of any strip **36** or **38.** The outer end of the clip **44** terminates in a flange member **46** disposed in substantial planar alignment with the plane determined by the composite edges of the strips **36** and **38.** The flange **46** supports a bayonet type housing **48** which, in turn, receives the light bulb **42.** The bulb **42** is thus supported within one of the cells of the cellular structure **34,** and the flange **46** also supports the usual terminals, or the like (not shown) for facilitating the electrical connection (not shown) of the bulb with the electrical wiring system (not shown) of the panel **18.** A bulb may be thus disposed in substantially any of the desired cells as required for the desired lighting pattern for the panel **18.**

An alternate type of lighting element is generally and schematically indicated at **50** in FIG. **3.** The element **50** comprises a suitable bulb **52** mounted in a housing **54** and connected with the wiring system (not shown) of the panel **18** in any suitable manner (not shown). One end of the housing **54** is provided with a head member **56** which is preferably removably secured thereto in any well known manner (not shown), but not limited thereto. The head member **56** is provided with an outer surface **58** which may be selectively opaqued and transparent, as particularly shown in FIG. **4,** for permitting the passage of light therethrough only at the transparent portions thereof. For example, in a traffic control or monitoring system, the surfaces **58** may be provided with transparent portions corresponding to travel direction arrows as shown at **58a** and **58b,** or a bar as shown at **58c** for use in combination with similar head

members for providing a lighting pattern corresponding to trafficways. The element **50** may be clipped or otherwise secured to the egg crate **34** in such a manner that the surface **58** of the head **56** is disposed adjacent the inwardly directed surface of the plate **26**. Alternately, the surface **58** of the head **56** may be glued to the inwardly directed surface of the plate **26**. Thus, the light pattern on the panel **18** may be achieved by a proper preselected positioning of the elements **50** in the panel **10**.

As hereinbefore set forth, the panel **18** comprises a flat plate **26** and a corresponding face plate **28** having an art work sheet **30** interposed therebetween. Of course, it will be apparent that the illustrative material may be applied directly to the outer face sheet **28** by selective opaqueing, if desired, or, as hereinbefore set forth, the art work **30** may be retained against the plate **26** without the use of the outer face plate **28**. In any event, the face plate **28** and/or the negative or art work sheet **30** are retained in the proximity of or against the plate **26** by means of suction or vacuum. As particularly shown in FIG. **2**, at least one aperture or port **60**, which may be beveled or flared as shown at **62**, is provided in the plate **26** to provide communication between the opposite faces thereof. A suitable flanged fitting **64** having a passageway **66** extending longitudinally therethrough is cemented, glued, or otherwise secured against the inwardly directed surface of the plate **26** whereby the passageway **66** is in substantial alignment with the aperture **60**. A flexible conduit or other similar tube **68** is secured to the fitting **64** in any well known manner and extends into communication with a suction pump **70**, which may be of any well known type.

When the pump **70** is actuated, a vacuum or suction is created in the tube **68** and is transmitted through the fitting **64** and aperture **60** to the space between the plates **26** and **28**. The gasket **32** provides a seal between the plates **26** and **28** around the outer periphery thereof whereby the suction in the tube **68** will evacuate the air from the space between the plates **26** and **28**. If desired, a spring loaded foot **72** may be secured to the housing **16** for engagement with the panel **18** in order to facilitate retaining of the plate **28** in position, particularly during periods when the pump **70** is not in service, such as during assembly of the panel **18**, or when replacing the plate **28** or the art work **30** for any reason. Of course, it will be apparent that a plurality of the ports **60** may be provided as desired or as necessary for providing the required vacuum or suction, with the ports **60** being in communication with the pump **70** through proper conduiting and the like, as is well known.

Of course, in the event the art work sheet **30** is utilized without the screen or outer plate **28**, as shown in FIG. **3**, the suction transmitted through the aperture **60** will hold the negative against the plate **26** until such time as it is desired to replace the art work **30**. The art work **30** may be easily removed for replacement, or any other reason, by exerting manual force in a proper direction for overcoming the force of the suction.

From the foregoing it will be apparent that the present invention provides a novel back lighted display panel wherein the illustrative panel is retained in tight position on the structure in a manner for providing a sharp image and for facilitating removal of the illustrative material for replacement or any other reason. The display material is retained in position by means of a vacuum or suction which secures the material to the back lighted structure in a manner providing efficient sharp clear lighted symbology from the display panels. The symbology can thus be interpreted at great viewing distance.

Whereas the present invention has been described in particular relation to the drawings attached hereto, it should be understood that other and further modifications, apart from those shown or suggested herein, may be made within the spirit and scope of this invention.

What is claimed is:

1. A back lighted display device comprising a translucent panel, a support structure spaced from said panel and provided with lighting means for transmitting light to the panel, said panel comprising a first substantially flat translucent plate secured to the support structure, a second substantially flat translucent plate disposed adjacent said first flat plate on the opposite side thereof from said lighting means, art work sheet means interposed between said first and second flat plates and having selective opaque portions and selective transparent portions thereon for selectively transmitting light through said second flat plate for providing a lighted pattern, suction means communicating with the space between said flat plates for releasably securing said second flat plate to said first flat plate, said art work sheet means being responsive to said suction means for releasably adhering to one of said flat plates, said panel including sealing means extending around the outer periphery thereof between said two plates, said suction means comprising aperture means provided in said first flat plate, pump means, and conduit means connected between the pump means and the aperture means for transmitting suction thereto upon actuation of the pump means.

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