United States Patent

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[54] **INFORMATION DISPLAY MODULE**
6 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** ..... **340/334,** 40/28 C, 40/130 F
[51] **Int. Cl.** **G09f 7/18**
[50] **Field of Search** ..... 340/324, 334, 336, 337, 339, 154, 147; 40/28 C, 130 E, 65, 143; 317/99, 118, 119

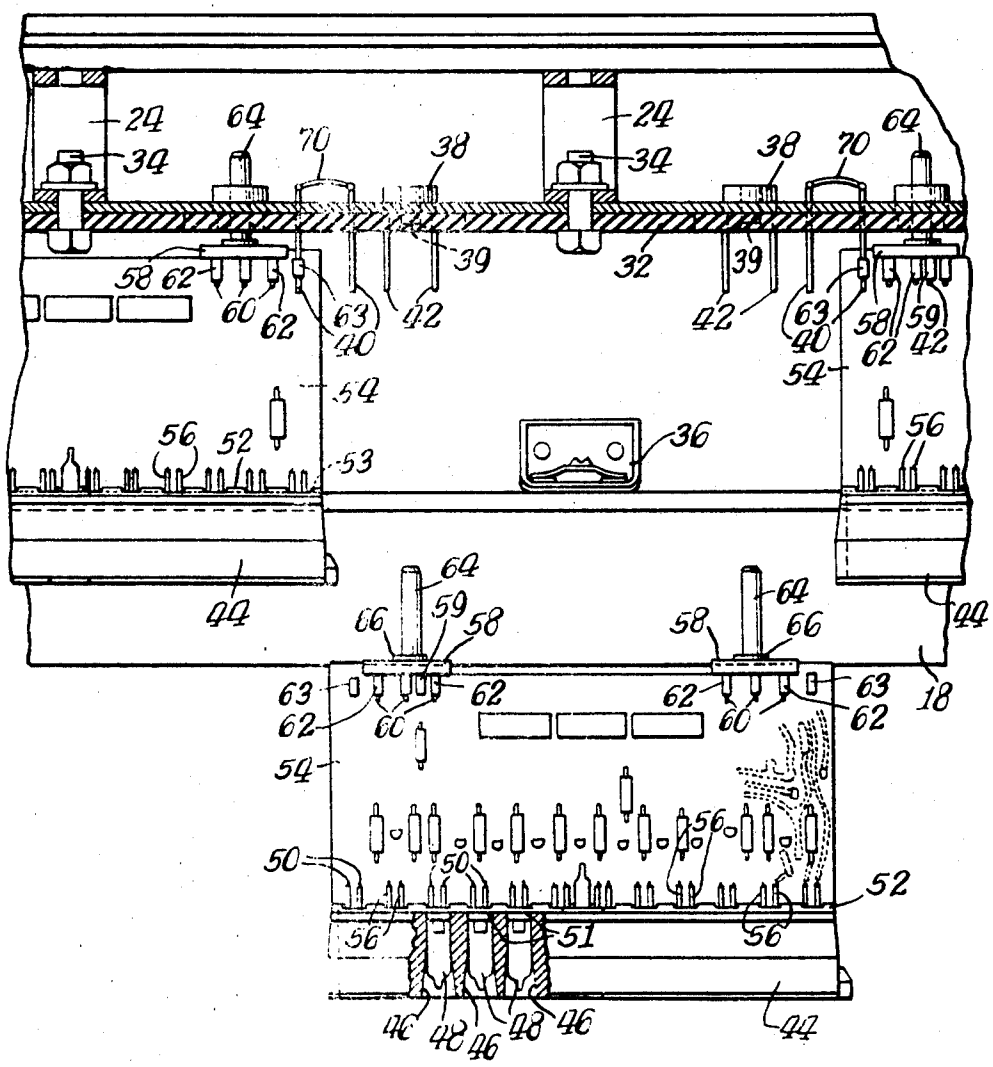
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ABSTRACT: Information display apparatus including a plurality of information display modules removably mounted side-by-side in an elongated housing. Each module comprises a faceplate, display elements arranged within the faceplate, a plurality of parallel printed circuit boards extending normal to the faceplate, tie bar means extending transversely of the printed circuit boards remote from the faceplate, and post members projecting through the tie bar means and secured in the faceplate whereby the printed circuit boards are maintained in assembled relation between the face plate and the tie bar means.



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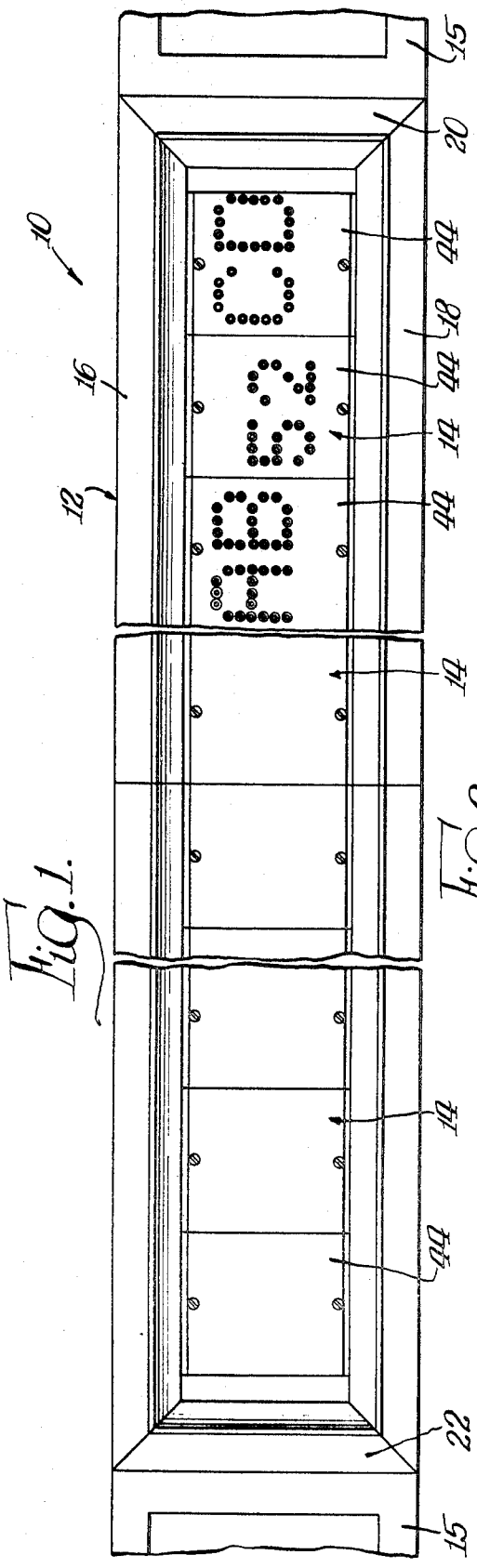


Fig. 1.

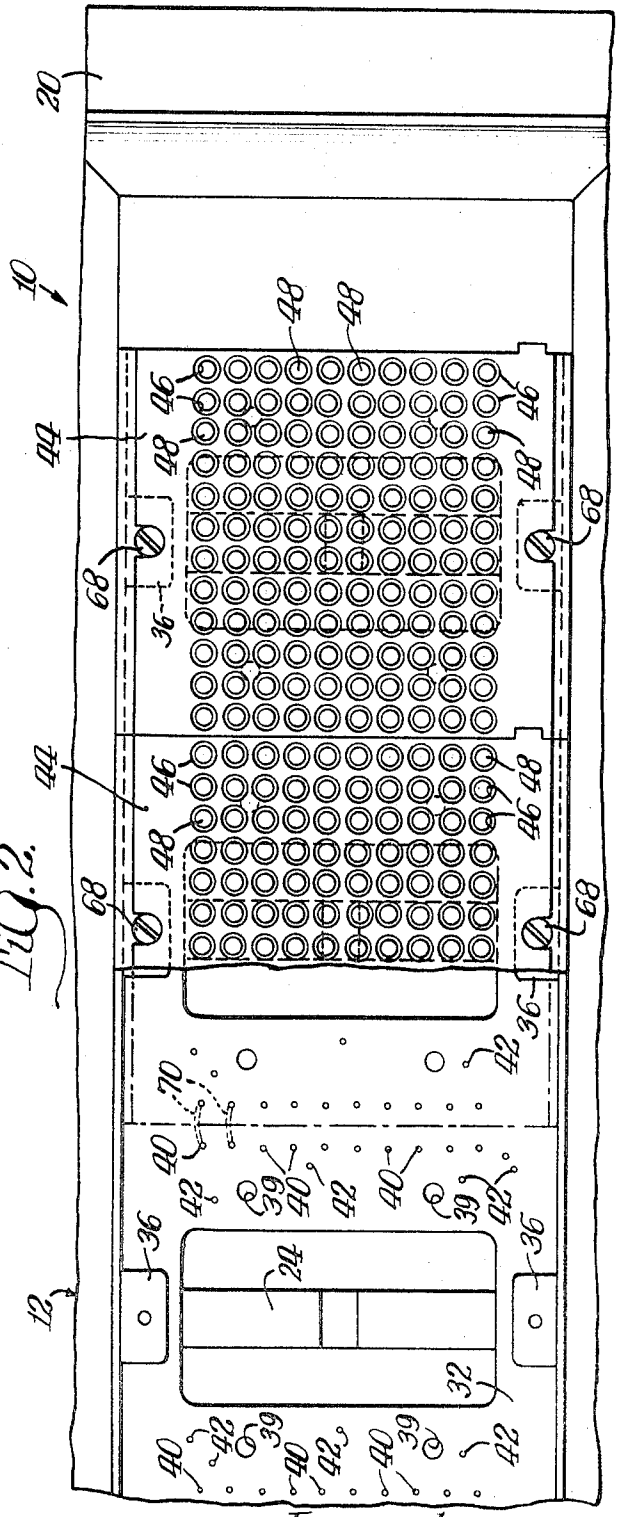


Fig. 2.

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Fig. 3.

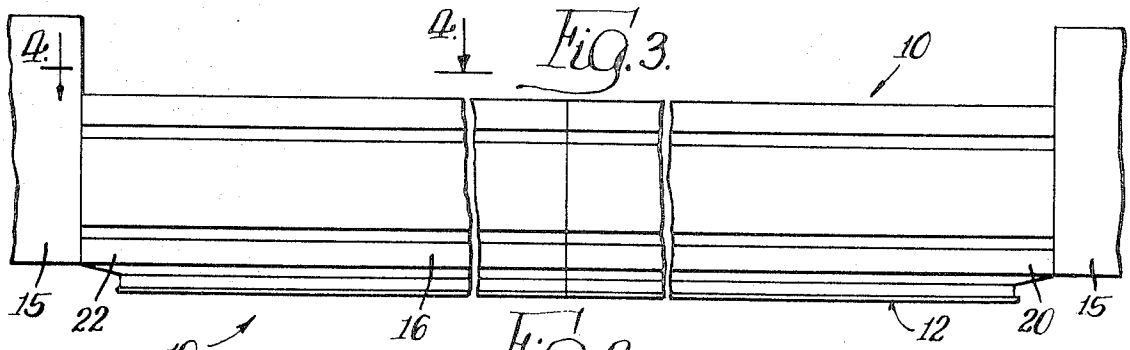


Fig. 4.

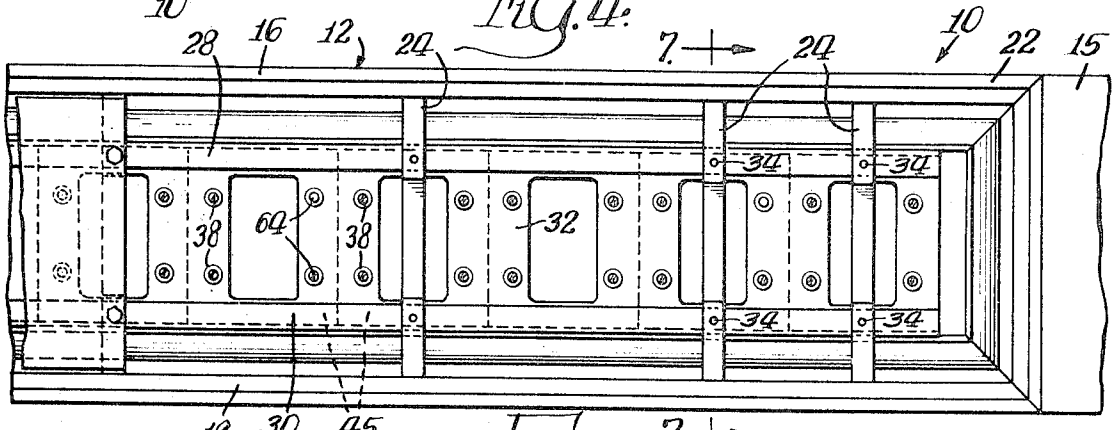
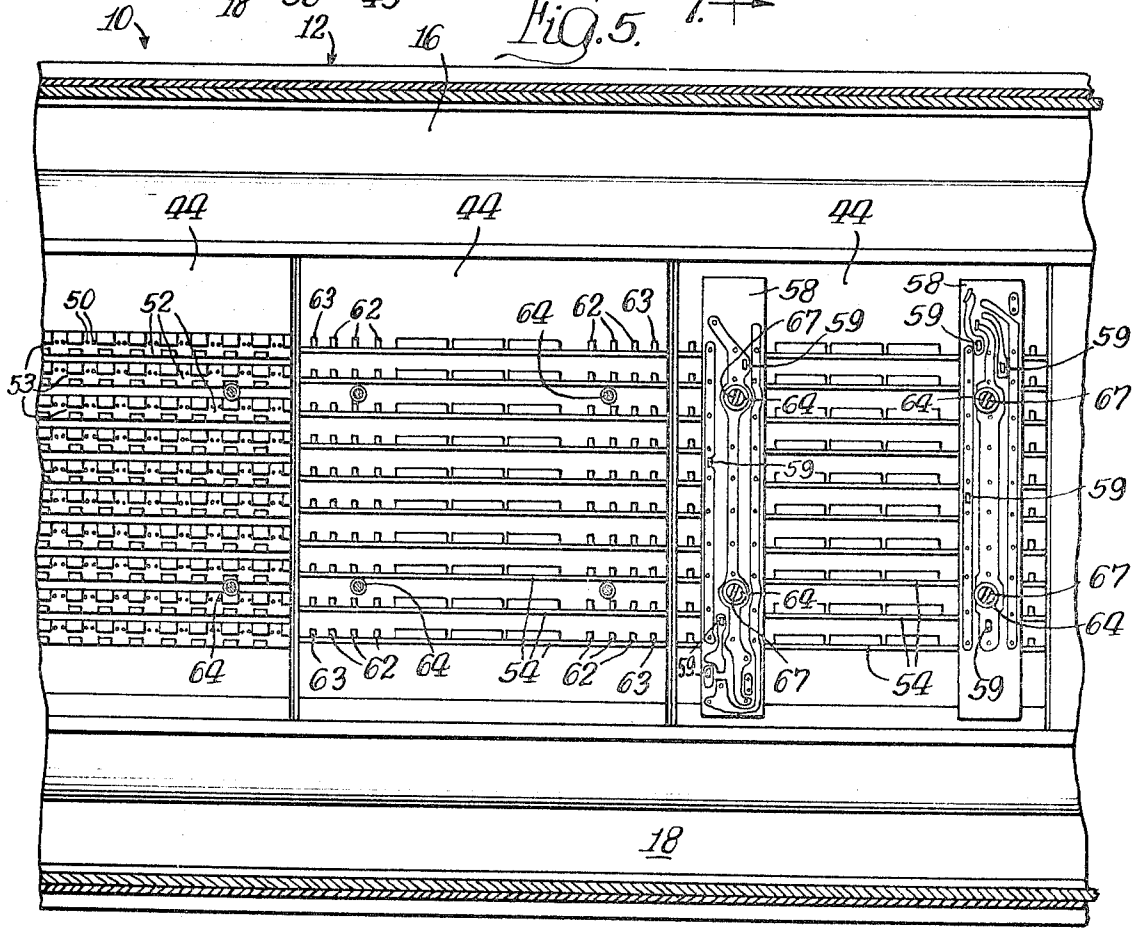


Fig. 5.



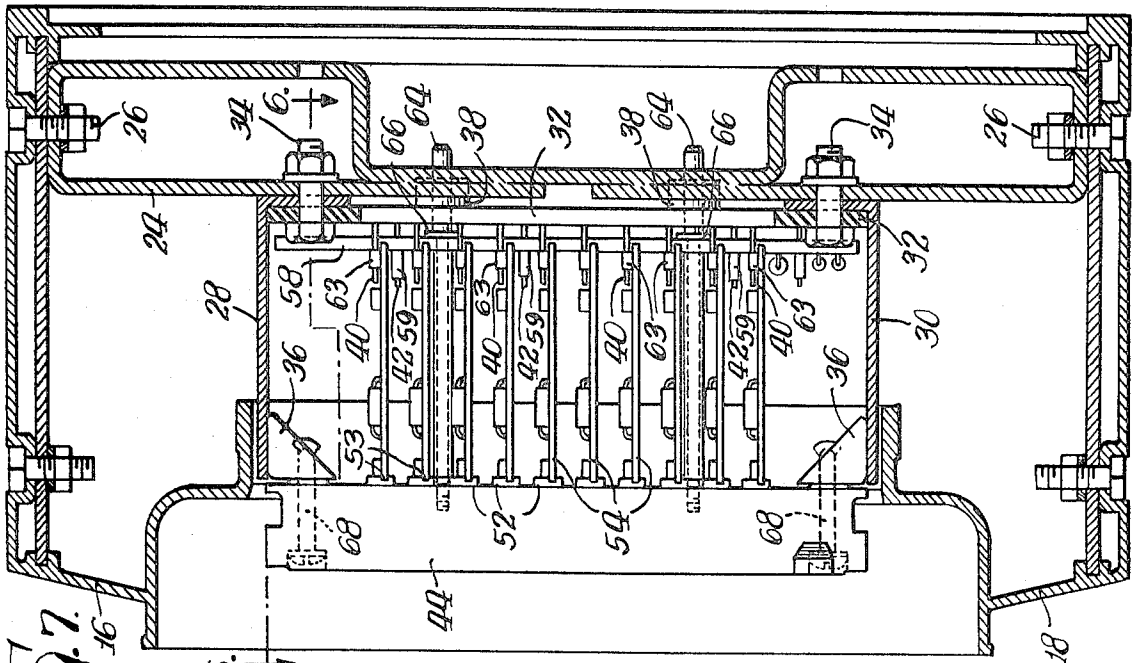


FIG. 7.

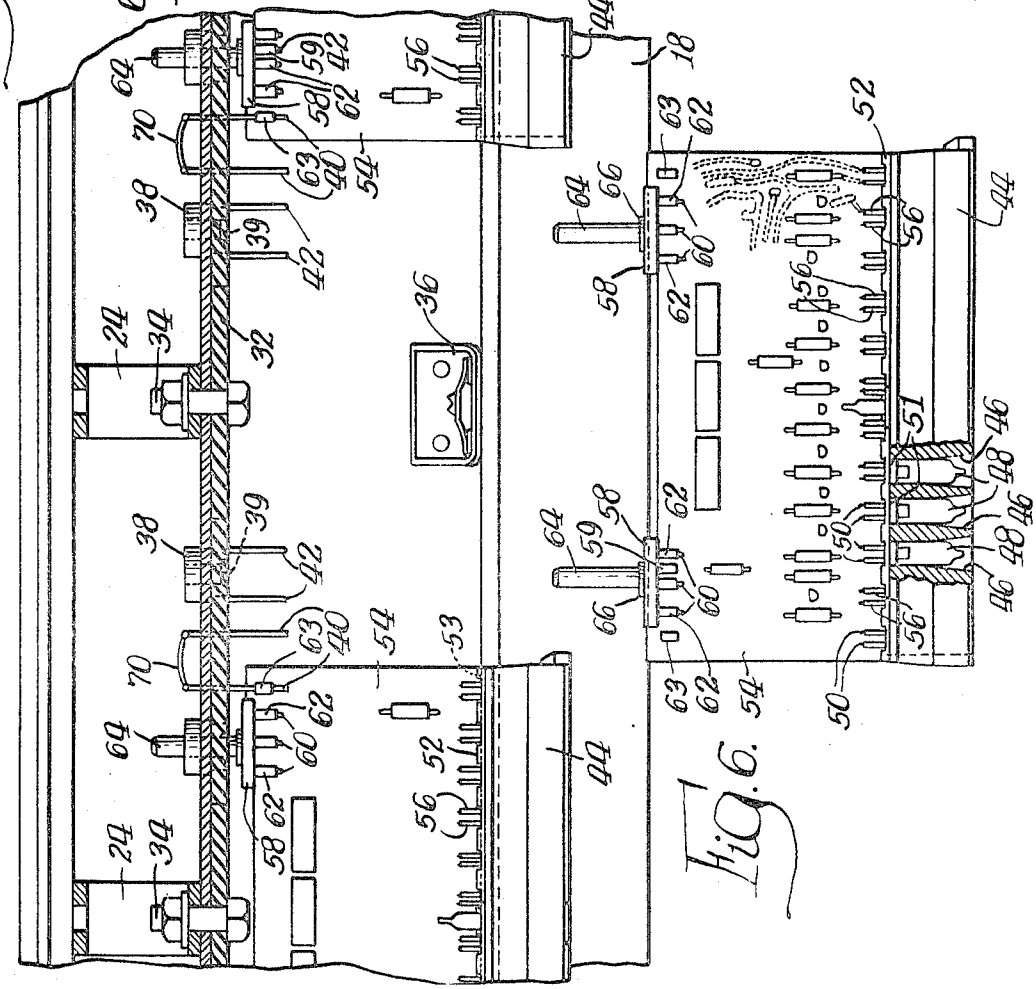


FIG. 6.

INFORMATION DISPLAY MODULE

FIELD OF THE INVENTION

The present invention pertains to information display apparatus in which a message display is caused to travel across a matrix of display elements therein to present a continuous flow of information in a natural reading manner. This apparatus is especially adaptable for use in stock brokers' offices, or the like, to display stock market prices and quotations as information is received from the stock ticker wire service. A system for which this invention is readily adaptable is disclosed in U.S. Pat. application Ser. No. 703,057, filed Feb. 5, 1968.

SUMMARY OF THE INVENTION

The information display apparatus of the present invention includes a plurality of information display modules removably mounted side-by-side in an elongated housing. Each module comprises a faceplate with display elements or bulbs arranged therein in equidistantly spaced vertical columns and horizontal rows. The display elements of the plurality of modules compositely define a matrix of display elements across which a message display is caused to travel to present a continuous flow of information.

Actuation of the display elements is electronically controlled by means, in the form of printed circuit boards and printed circuit tie bars, embodied in each module, and also by complementary electronic circuitry arranged exteriorly of the modules. With respect to each module, the printed circuit boards extend normal to the faceplate, the tie bars extend transversely of the printed circuit boards remote from the faceplate, and post members project through the tie bars and are releasably secured in the faceplate whereby the printed circuit boards are maintained in assembled relation between the faceplate and the tie bars. Also, releasable interconnections are provided between the display elements and the printed circuit boards and between the tie bars and the circuit boards. By reason of the foregoing construction, the module may be readily assembled and disassembled as required.

Additionally, the back plate of the housing is provided with guide sleeves that serve to releasably receive the post members of the modules whereby the latter are properly located and aligned in the housing. In order to join the modules with the complementary electronic circuitry, releasable interconnections are provided between the back plate of the housing and the printed circuit boards and tie bars. With this arrangement, each module may be individually inserted in or removed from the housing without disturbing the remaining modules.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of an information display board incorporating the principles of the present invention;

FIG. 2 is an enlarged partial front elevational view of the information display board of FIG. 1, with portions of one module being broken away, and with another module removed;

FIG. 3 is a plan view of the information display board of FIG. 1;

FIG. 4 is a partial rear elevational view of the information display board, taken generally along the plane 4–4 in FIG. 3, looking in the direction indicated by the arrows;

FIG. 5 is an enlarged partial rear elevational view of the information display board, with the back plate of the housing removed, with the tie bars of the center module removed, and with the printed circuit boards of the left-hand module removed;

FIG. 6 is an enlarged sectional view taken substantially along the line 6–6 in FIG. 7, looking in the direction indicated by the arrows, with one module shown in a removed position; and

FIG. 7 is an enlarged sectional view taken substantially along the line 7–7 in FIG. 4, looking in the direction indicated by the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

REferring now to FIGS. 1 and 3, there is indicated generally by the reference numeral 10 an information display board comprising a main elongated housing 12 and a plurality of information display modules 14 removably mounted side-by-side in the housing. Auxiliary housings 15 are mounted at the ends of the main housing 12 for containing the system logic and the power supply.

The main housing 12 includes a top wall section 16, a bottom wall section 18, and end wall sections 20 and 22. As shown in FIGS. 4, 6 and 7, a plurality of longitudinally spaced vertical strap members 24 are secured by bolts 26 to the top and bottom wall sections 16 and 18. Longitudinally extending upper and lower channel members 28 and 30, and a longitudinally extending vertical back plate 32, are secured by bolts 34 to the front faces of the strap members 24. At each module position, the upper and lower channel members 28 and 30 are provided with latch brackets 36 adjacent the forward edges thereof. Also, at each module position, the back plate 32 is provided with a set of four rearwardly projecting guide sleeves 38 surrounding apertures 39 in the plate, and, as shown in FIG. 2, with a pair of vertical columns of male pin terminals 40 constituting one series of terminals, and with additional male pin terminals 42 constituting a second series of terminals.

Each information display module 14, as shown in FIGS. 2 and 6, comprises a vertical faceplate 44 provided with a plurality of openings 46 arranged in equidistantly spaced vertical columns and horizontal rows. Disposed in the openings 46 are display elements 48 which are preferably low transient reacting devices such as gas discharge lamps or, more particularly, ordinary cold cathode two-element neon bulbs. Each display element or bulb 48 has a pair of wire leads 50. As shown in FIGS. 5, 6 and 7, horizontal guide strips 52 of plastic or the like extend across each row of openings 46 at the rearward side of the faceplate 44. The guide strips 52, on one side, have projections 51 seating in the openings 46 and, on the other side, are formed with longitudinal slot means 53. Additionally, the guide strips 52 are suitably apertured to permit the wire leads 50 of the display elements 48 to project therethrough.

A plurality of parallel printed circuit boards 54, one for each row of display elements 48, extend normal to the faceplate 44 with the inner edges thereof being seated in the longitudinal slot means 53 of the guide strips 52. In a conventional manner, the circuit boards 54 are each provided with a printed circuit pattern on one side, and with transistors, resistors, integrated circuits and other electronic components on the other side. The components on each printed circuit board 54 form a shift register and drive circuits for the associated row of display elements 48 as disclosed in the aforementioned patent application. The printed circuit boards 54 along the inner edges thereof are provided with female connectors 56 which releasably receive the leads 50 of the display elements 48 for establishing an electrical interconnection between the printed circuit boards and the display elements. A pair of elongated printed circuit tie bars 58, each having a printed circuit pattern, transistors, resistors, and other electronic components, extend transversely of the printed circuit boards 54 at the outer edges thereof. Each tie bar 58 is provided with a group of female connectors 59 and with three columns of male terminals 60. In cooperation with the latter, the printed circuit boards 54 at the outer edges thereof adjacent the tie bars 58 are provided with female connectors 62 which releasably receive the male terminals 60 for establishing an electrical interconnection between the tie bars 58 and the printed circuit boards 54. The printed circuit boards 54 are also provided with sets of female connectors 63. Four post members 64 project through the tie bars 58 and are threaded into the faceplate 44. The post members 64 intermediate of their ends are pro-

vided with shoulder means **66** which are engaged with the tie bars **58** whereby the printed circuit boards **54** are maintained in assembled relation between the faceplate **44** and the tie bars **58**.

In assembling a module **14**, the display elements **48** are disposed in the faceplate openings **46**, and the guide strips **52** are positioned across the rows of openings **46**. Then, the printed circuit boards **54** are seated in the slot means of the guide strips **52** with the leads **50** of the display elements **48** entered into the female connectors **56**, and the printed circuit tie bars **58** are positioned across the printed circuit boards **54** with the male terminals **60** entered into the female connectors **62**. Finally, the post members **64** are inserted through the tie bars **58** and releasably threaded into the faceplate **44**. The ends of the post members **64** are preferably slotted as at **67** (FIG. **5**) to receive a screw driver or like instrument which may be used to tighten the post members. The module **14** may be disassembled for repair or replacement of components by removing the post members **64**.

To mount a module **14** within the display board **10**, the module is moved forwardly into the housing **12** from a position such as shown in FIG. **6** (center module) to a position with the rearward face of the faceplate **44** in abutment with the latch brackets **36**. During this movement of the module **14**, the post members **64** are slidably entered into the guide sleeves **38** whereby the module is located and properly aligned with the housing **12**. At the same time, the one series of male terminals **40** are releasably received in the female connectors **63** on the printed circuit boards, and the second series of male terminals **42** are releasably received in the female connectors **59** on the printed circuit tie bars **58**. In this manner, an electrical interconnection is established between the printed circuit boards, the tie bars and the male terminals **40** and **42**. Latch elements **68**, which are carried by the faceplate **44**, are engaged with the latch brackets **36** for releasably holding the module in place. The module may be readily removed from the housing **12** by disengaging the latch elements **68** from the latch brackets **36**, and pulling the module forwardly away from the housing **12**.

With the modules **14** mounted within the housing **12**, the display elements **48** thereof compositely define a matrix of display elements across which a message display is caused to travel to present a continuous flow of information. Actuation of the display elements **48** is electronically controlled by electronic circuitry which includes the printed circuit boards **54** and the printed circuit tie bars **58**, and also by complementary electronic circuitry connected to the terminals **40** and **42** on the back plate **32** and arranged exteriorly of the modules along the back plate and within the auxiliary housings **15**. Jumper wires **70** interconnect adjacent terminals **40** to provide for the passage of electrical signals from the shift register for one row of display elements in a module to the shift register for the corresponding row of display elements in the adjacent module. The information travels across the board **10** from right to left, as viewed in FIG. **1**. As the appropriate display elements **48** are actuated, the columns of a character are successively formed at the right-hand most column of display elements, and the formed character is caused to move across the display board by sequential shifting of each column of character from one column of display elements to the next.

From the foregoing description, it will be appreciated that the information display board of the present invention incorporates a plurality of modules which may be individually mounted in and removed from the display board without disturbing the other modules, and which as separate units may be readily assembled and disassembled as required. This arrangement facilitates, and minimizes the costs of, assembly, repair and maintenance of the display board and the modules thereof.

While there has been shown and described a preferred embodiment of the present invention, it will be understood by those skilled in the art that various rearrangements and modifications may be made therein without departing from the spirit and scope of the invention.

We claim:

1. An information display module comprising a faceplate presenting forward and rearward sides, display elements arranged within said faceplate and being viewable from said forward side thereof, a plurality of parallel printed circuit boards extending normal to said faceplate with the inner edges thereof adjacent said rearward side of said faceplate, printed circuit tie bar means extending transversely of the planes of said printed circuit boards at the outer edges thereof in electrical and supportive engagement with each of said printed circuit boards, and post members projecting through and engaging said tie bar means and secured in said faceplate whereby said printed circuit boards are maintained in assembled relation between said faceplate and said tie bar means.

2. The information display module of claim **1** wherein said display elements are each disposed within an aperture in said faceplate and have a pair of leads, and said printed circuit boards along said inner edges thereof are provided with female connectors which releasably receive said leads of said display elements for establishing an electrical interconnection between said printed circuit boards and said display elements.

3. The information display module of claim **2** wherein said tie bar means comprises a pair of elongated printed circuit tie bars, said tie bars are provided with terminals, and said printed circuit boards at said outer edges thereof adjacent said tie bars are provided with releasable connectors which mate with said terminals for establishing an electrical interconnection between said tie bars and said printed circuit boards.

4. The information display module of claim **3** wherein said post members are releasably threaded into said faceplate and have shoulder means engaged with said tie bars.

5. The information display module of claim **4** wherein said faceplate is provided with a plurality of openings arranged in equidistantly spaced vertical columns and horizontal rows, and said display elements are disposed in said openings.

6. The information display module of claim **5** including guide strips extending across each row of said openings at the rearward side of said faceplate, said guide strips having projections seating in said openings, and said guide strips also having longitudinal groove means for seating the inner edges of said printed circuit boards.