United States Patent [19]

Raich et al.

[11] **3,762,085**

[45] **Oct. 2, 1973**

[54] **ALPHANUMERIC DISPLAY DEVICE**

[76] Inventors: **Walter L. Raich,** 3024 W. Palmer; **James P. Garrity,** 5155 W. Agatite, both of Chicago, Ill.

[22] Filed: **Feb. 4, 1971**

[21] Appl. No.: **112,576**

[52] **U.S. Cl.** ..... **40/130 K,** 40/28 C, 40/130 E, 340/380

[51] **Int. Cl.** **G09f 13/18**

[58] **Field of Search** ..... 40/130 E, 130 K, 40/28 C; 340/380

[56] **References Cited**

UNITED STATES PATENTS

3,226,864	1/1966	Rehler	40/130 K
2,151,236	3/1939	Schwartz et al.	40/28 C
3,614,773	10/1971	Gordon	40/28 C X
3,481,062	12/1969	Du Bois et al.	40/130 E
2,880,536	4/1959	Sullivan	40/130 K

Primary Examiner—Robert W. Michell
Assistant Examiner—John F. Pitrelli
Attorney—Johnson, Dienner, Emrich, Verbeck & Wagner

[57] **ABSTRACT**

An alphanumeric display device employing translucent circular discs supported edgewise within slots in a support block. A light source is supported rearwardly of each disc such that selective energizing of the light source visually displays a numeric or alphabetic character on a filter cover positioned adjacent the outer edge portions of the discs.

12 Claims, 4 Drawing Figures

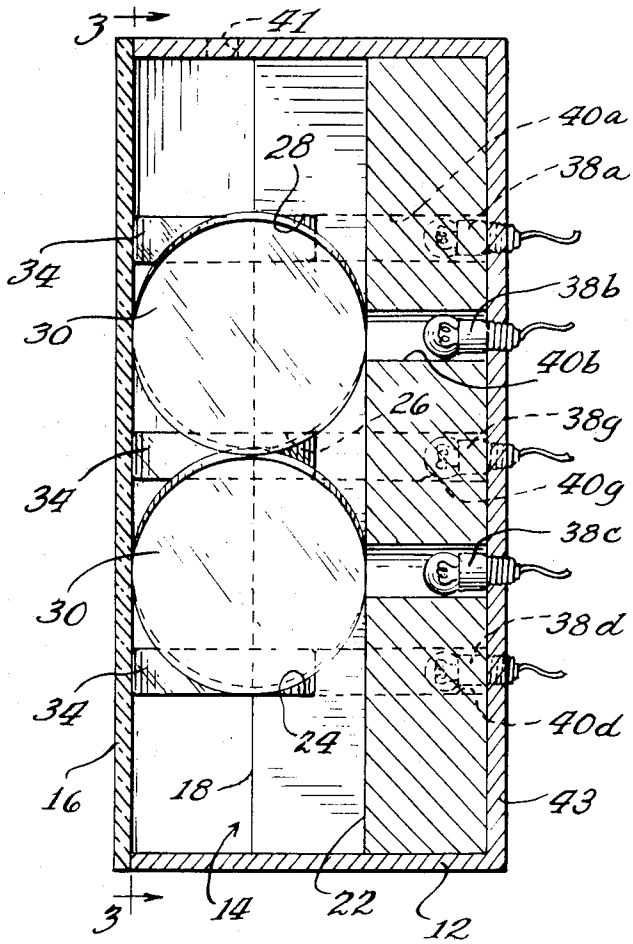


Fig. 1.

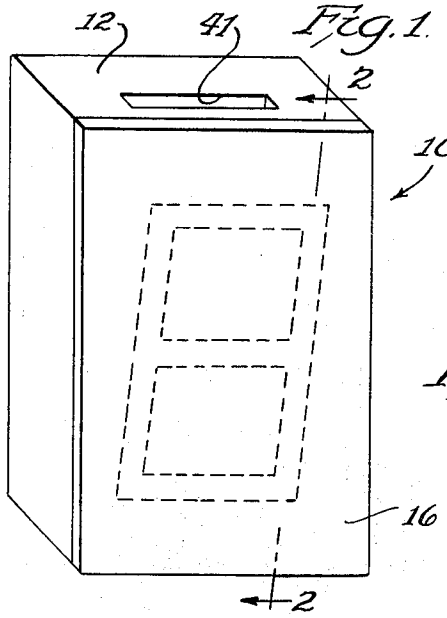


Fig. 2.

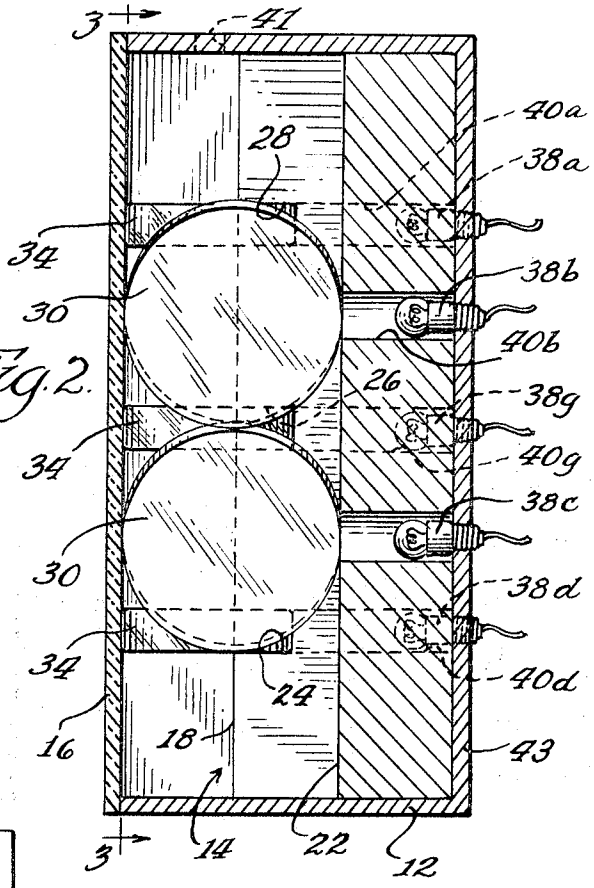


Fig. 3.

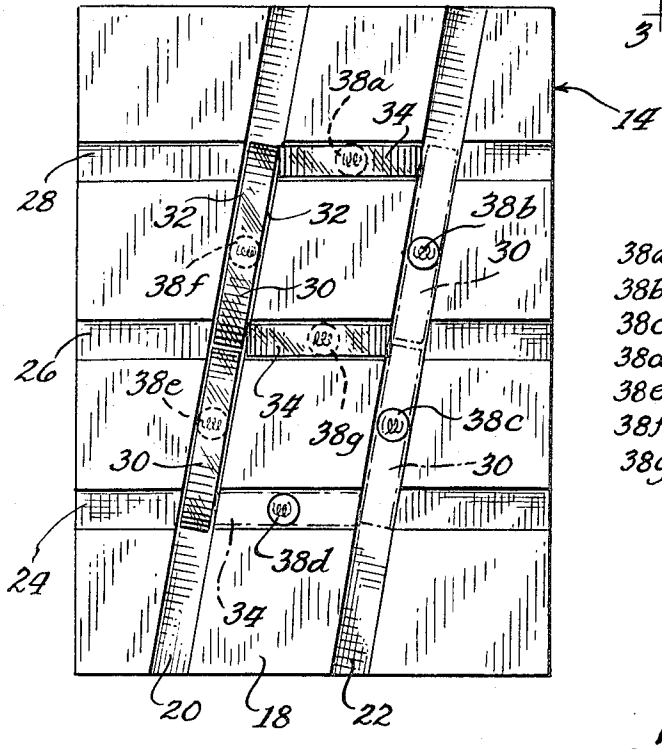
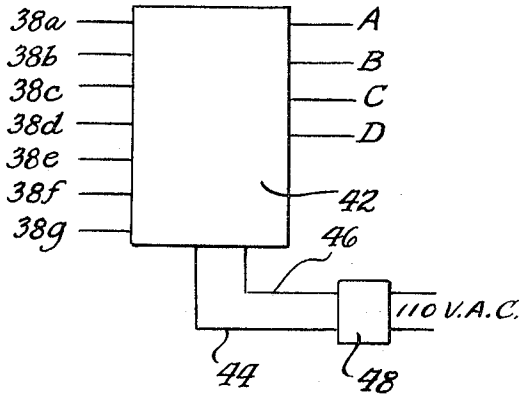


Fig. 4.



Inventors
Walter L. Raich
& James P. Garrity

By Johnson, Dienner, Emrick, Verbeck & Wagner
Attys.

ALPHANUMERIC DISPLAY DEVICE

BACKGROUND OF THE INVENTION

The present invention relates generally to visual display devices, and more particularly to an alphanumeric display device employing novel display elements which require a minimum energy input to light sources associated therewith to provide a clearly defined numeric or alphabetic display.

It is a common practice to employ visual numeric or alphabetic character display devices in testing equipment, counters, amusement devices and the like. The known alphanumeric visual display devices take the form of Nixie lamps which have a number of internal conductive elements energizable to visually display numeral or alphabetic characters; mechanically rotatable wheels or discs having display characters about their peripheral surfaces such that selective rotation of aligned discs positions characters on a viewing or display line; and cut-out displays wherein a plurality of characters are displayed on a sheet and selectively covered and uncovered by mechanically controllable flaps or the like to visually present selected ones of the characters. These prior art visual display devices are relatively complex in construction, thereby requiring expensive servicing or part replacement with resultant down time of the associated machinery, and are expensive to manufacture and operate. The present invention provides a novel alphanumeric display device which presents characters of clear definition and which is relatively simple and inexpensive to manufacture and operate.

SUMMARY OF THE INVENTION

One of the primary objects of the present invention is to provide an alphanumeric display device which is relatively simple in construction and inexpensive to manufacture and which requires a low power supply with resultant economies in use.

Another object of the present invention is to provide an alphanumeric display device which provides display characters of improved clarity over the prior art devices such that the characters may be read from substantially greater distances than heretofore allowable.

Another object of the present invention is to provide an alphanumeric display device employing novel translucent discs associated with small power light sources, the light sources being selectively energized to present display characters having clear edge definition and appearing larger than their actual sizes.

A feature of the present invention is to provide an alphanumeric display device as described wherein the translucent discs are circular in configuration and are frictionally retained within slots in a support block, the discs and associated light sources being readily serviced with a minimum of service time required.

In carrying out the objects and advantages of the present invention, we have provided an alphanumeric display device which includes a support block having first and second sets of intersecting slots formed in a general planar surface of the support block. The first set of slots comprises two parallel slots which are disposed in generally transverse relation to the three parallel slots comprising the second set of slots. The slots are adapted to receive translucent circular discs therein with the edge surfaces defining the slots frictionally retaining the discs. A low power light source is supported

rearwardly and in light communication with each of the discs. The circular peripheral edges of the discs are unpolished to provide translucent light passage while the parallel side surfaces are opaque. The support block has an enclosure casing thereabout which supports an acrylic filter cover adjacent the outward edges of the discs to provide a display surface. The discs are positioned such that the light sources may be selectively energized to visually display an alphabetic or numerical character on the filter cover when viewed from the side opposite the discs. The alphanumeric display device in accordance with the present invention displays characters of improved edge definition which appear larger in size than the discs establishing the display characters, all without the use of complicated circuitry or high power input to the light sources.

Further objects and advantages of the present invention, together with the organization and manner of operation thereof, will become apparent from the following detailed description of the invention when taken in conjunction with the accompanying drawings wherein like reference numerals designate like parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an alphanumeric device in accordance with the present invention showing a numeral displayed on the front filter cover;

FIG. 2 is a sectional view taken substantially along the plane 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a vertical sectional view taken substantially along the line 3—3 of FIG. 2, but with the casing removed from the support block; and

FIG. 4 is a circuit diagram for use with the alphanumeric device in accordance with the present invention.

DESCRIPTION OF A PREFERRED EMBODIMENT:

Referring now to the drawings, and in particular to FIG. 1, an alphanumeric display device constructed in accordance with the present invention is indicated generally at **10**. The alphanumeric device **10** will be described as being adapted to display a numerical character or digit having a value of zero to nine. It will become apparent, however, that the alphanumeric device may be readily adapted to display alphabetical characters for visual reading while maintaining the basic inventive concepts. In addition, the inventive concepts underlying the alphanumeric display device **10** may be readily applied to a substantially larger unit than that illustrated in the accompanying drawing for the purpose of simultaneously displaying a plurality of numerical or alphabetical characters, the size of the overall unit being dependent upon its intended use.

The alphanumeric device **10** includes an outer cover or casing **12** of generally rectangular configuration which is open on one side so as to define a rectangular chamber therein. Noting FIG. 2, the casing **12** is adapted to receive support block means, indicated generally at **14**, therein and is further adapted to have a generally planar rectangular filter cover **16** suitably secured thereto in a manner to cover the open side of the casing **12** whereby to substantially enclose the support block means **14**. The filter cover **16** is made from a suitable light filtering material such as red acrylic resin and serves as a display surface for the numerals or digits displayed during operation.

Noting FIGS. 2 and 3, the support block means 14 is preferably made of a lightweight non-conducting material such as lightweight wood or a suitable synthetic material. The support block means 14 is generally rectangular in configuration to be received within the cavity of the casing 12 and has a generally planar surface 18 spaced rearwardly from the filter cover 16 as considered in FIG. 2. The support block means 14 has a first set of two parallel laterally spaced slots 20 and 22 formed therein which intersect the planar surface 18 of the support block means. The parallel slots 20 and 22 are illustrated as being slightly inclined to the right from vertical, when considered in FIG. 3, but may be formed in the support block means to extend vertically or may be inclined to the left of vertical depending upon the inclination desired for the characters to be displayed. The support block means 14 has a second set of substantially parallel slots 24, 26 and 28 which intersect both the surface 18 of the support block means and the first set of slots 20 and 22. The slots 24, 26 and 28 are horizontally disposed and vertically spaced generally equidistantly along the height of the support block means as shown in FIG. 3, with slots 24, 26 and 28 being generally transverse to the first set of slots 20 and 22. The first and second sets of slots are shown, respectively, as extending the full height and width of the support block means 14 but may be of shorter length to accomplish their intended purpose as will become apparent hereinbelow.

The edge surfaces of the support block which define the first set of slots 20 and 22 are spaced to receive and frictionally support generally planar circular plastic discs 30 within the slots. The plastc discs 30 have opaque parallel side surfaces 32 and unpolished circular peripheral surface areas which form translucent surfaces to diffuse light caused to impinge upon the unpolished peripheral surfaces as will be described below. The diameters of the discs 30 are such that the diametrically opposite peripheral edge surfaces thereof extend to the center lines of the horizontal slots 24, 26 and 28. The discs 30 are of a width sufficient to frictionally engage the surfaces defining the associated slots 20 and 22 when the discs 30 are inserted into the associated slots. The slots 20 and 22 have depths equal to substantially one-half the diameter of the associated discs 30 such that approximately one-half the side surface areas of the discs are engaged by the surfaces defining the slots 20 and 22.

In similar fashion, a plurality of planar circular plastic discs 34, having opaque parallel side surfaces and unpolished circular peripheral edge surfaces similar to the discs 30, are received and frictionally retained within the horizontal slots 24, 26 and 28. Noting FIG. 3, the discs 34 are positioned within their associated slots 24, 26 and 28 so as to be interposed between the slots 20 and 22 with the diametrically opposed edge surfaces of the discs 34 being adjacent opaque side surfaces of the discs 30. In this manner, the discs 34 have smaller diameters than the discs 30. The depths of the slots 24, 26 and 28 are sufficient to partially receive the discs 30 such that the outermost peripheral surfaces of the discs 30 and 34 lie in a common plane spaced adjacent the inner surface of the filter cover 16. The discs 30 and 34 may be made of clear plastic with the circular peripheral edge surfaces unpolished to provide translucent light transfer edgewise of the discs, and with the side surfaces being covered with a nontransparent adhesive covering to prevent the transfer of light through the side surfaces.

Light source means comprising low power incandescent lamps 38*a–g* are supported by the support block means 14 with one lamp rearwardly of each of the discs 30 and 34 such that selective energizing of the lamps effects edge surface illumination of the associated plastic discs. To this end, the lamps 38*a–g* are received and supported within suitable bores 40*a–g* which are formed in the support block means 14 to intersect the slots 20, 22, 24, 26 and 28 centrally rearwardly of the corresponding discs. The bores 40*a–g* are thus in light communication with the peripheral edge surfaces of the corresponding discs 30 and 34 such that energizing of the lamps 38*a–g* provides light communication directly against the rearwardmost edge surface of the associated disc. The lamps 38*a–g* may be retained within their associated bores 40*a–g* through threaded connections within a rear wall 43 of the casing 12 and are connected in a control circuit through suitable conductors. The lamps 38*a–g* are characterized by low current and voltage requirements as, for example, commercially available lamps having ratings of 17 milliamperes. The casing 12 has a ventilation opening 41 formed in the upper surface thereof to prevent heat build-up within the device from the lamps 38*a–g*.

FIG. 4 illustrates a control circuit for use with the alphanumeric display device 10. The control circuit is adapted to selectively energize individual or combinations of the lamps 38*a–g* to display desired numerical digits on the filter cover 16 through connection of the lamps to conventional low power source. The control circuit includes a binary to seven segment decoder 42 such as is commercially available from Texas Instruments Corporation under their Model No. TI SN7446. The converter 42 has a plurality of outputs 38*a* – 38*g* which are connected directly to the corresponding lamps 38*a* – 38*g* for selectively energizing individual or combinations of the lamps. The converter 42 is adapted to receive binary input control signals through conductors A, B, C and D which are effective to enable energizing of combinations of the lamps 38*a* – 38*g* in response to the particular binary input signal selected to effect visual display of a numerical digit on the filter cover 16 in a known manner. A power supply to the converter 42 is provided through conductors 44 and 46 which are connected to a conventional 110 volt A.C. power source through an A.C. to D. C. converter 48. An important feature of the present invention is the use of the binary to digital converter 42 with the low power lamps 38a-g which make it possible to energize the alphanumeric device 10 with a 500 millivolt power supply.

In operation, selectively energizing the low power lamps 38*a–g* is effective to display the desired numerical digit on the filter cover 16. For example, energizing all of the lamps 38*a–g* will illuminate the edge surfaces of all seven of the discs 30 and 34 and display the numeral 8 on the filter cover 16 as shown in phantom in FIG. 1. It has been found that the unpolished circular peripheral surfaces of the plastic discs 30 and 34 present extremely clear edge definition when displayed on the filter cover 16 so as to be easily read from distances substantially removed from the alphanumeric device 10. In addition, the displayed characters appear to the observer to be substantially greater in vertical and horizontal dimension than the actual size and spacing of the

discs forming the particular numerical or alphabetic character displayed. The light impinging on the edge surface of any of the discs **30** or **34** from its associated lamp will not bleed over onto the next adjacent discs with resulting blurring of the character displayed on the filter cover **16**. The alphanumeric display device **10** requires no special power supply and can be operated from a conventional low power 500 millivolt D.C. battery power source or through a converter connected to a conventional 110 volt A.C. power supply. The display device **10** in accordance with the present invention lends itself to basic inexpensive manufacturing procedures.

While a preferred embodiment of the present invention has been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made therein without departing from the invention in its broader aspects. Moreover, it will be appreciated that the basic concepts underlying the present invention may well be adapted to alphanumeric display devices adapted to simultaneously visually display a plurality of aligned numerical or alphabetic characters.

We claim:

1. An alphanumeric display device comprising support means, a plurality of circular discs supported by said support means such that arcuate viewing edge surface portions of said discs present light display surfaces, said discs being translucent when considered edgewise thereof, and light means supported by said support means rearwardly of the arcuate light display surface portions of said discs and energizable to illuminate light receiving surface portions of said discs, thereby effecting edge surface illumination of uniform brightness over the entire area of the viewing edge surface portions of said discs, the area of the light receiving portion of said discs being small relative to the area of the viewing edge surface portions of said discs, said discs and associated light means being positioned such that selective energizing of said light means produces a visual display character when said discs are viewed from a position opposite said light means.

2. An alphanumeric display device as defined in claim **1** wherein said discs are made of plastic and have unpolished peripheral edge surfaces.

3. An alphanumeric display device as defined in claim **1** including a filter cover plate supported adjacent the forward edge surfaces of said discs.

4. An alphanumeric display device as defined in claim **1** including circuit means for energizing selected of said light means upon receipt of a predetermined input command signal.

5. An alphanumeric display device as defined in claim **4** wherein said circuit means effects selective energizing of said light means upon receipt of a binary coded signal.

6. An alphanumeric display device as defined in claim **1** wherein said support means comprises a support block having slots selectively formed in a common surface thereof, and wherein said discs are received edgewise into said slots and supported therein, said light means being supported by said support block rearwardly of each of said discs and in light communication therewith.

7. An alphanumeric display device as defined in claim **6** wherein said discs have parallel opaque side surfaces with each of said discs having a width sufficient to be frictionally received and retained within its associated slot in said support block.

8. An alphanumeric display device as defined in claim **6** wherein said slots comprise first and second sets of slots, said first set of slots intersecting said second set of slots in generally transverse relation thereto, and wherein said discs are supported within said slots such that each discs is disposed between two slots disposed generally transverse to the plane of the disc.

9. An alphanumeric display device as defined in claim **6** including casing means disposed about said support block, said casing means being open on one side thereof opposite said common surface of said support block, and a filter cover secured to said casing means to cover said opening thereof and overlie said common surface of said support block, said filter cover establishing a display surface upon which a character is displayed upon selective energizing of said light means.

10. An alphanumeric display device comprising support block means having at least two substantially parallel laterally spaced slots formed in a first outer surface of said block means and disposed in a first direction, said block means having at least three vertically spaced, substantially parallel slots formed in said first outer surface and intersecting said two laterally spaced slots in a direction generally transverse thereto, a plurality of circular disc members supported edgewise within said slots such that each disc is positioned between two slots disposed transverse to the plane of the disc, each disc being translucent when considered edgewise thereof and having an arcuate viewing edge surface portion which presents a light display surface, and opaque side surfaces, light means supported within said housing means rearwardly of each of said discs, and circuit means for selectively energizing said light means to illuminate light receiving portions of said discs thereby effecting edge surface illumination of uniform brightness over the entire viewing edge surface portions of said discs, the area of the light receiving portions of said discs being small relative to the area of the viewing edge surface portions of said discs, said discs being positioned to present a visual numerical digit display ranging from zero to nine upon selective energizing of said light means when viewed from the arcuate viewing edge portions of said discs in a direction normal to said first surface of said block means.

11. An alphanumeric device as defined in claim **10** including a casing adapted to receive said support block means therein, and a filter cover supported by said casing in overlying relation to the arcuate viewing edge surfaces of said discs such that energizing of selected of said light means effects the character display on said filter cover as viewed from the side thereof opposite said discs.

12. An alphanumeric device as defined in claim **10** wherein said discs have parallel side surfaces, each of said discs being frictionally received and retained within its associated slot, said slots having depths equal to substantially one-half the diameter of the corresponding disc received therein.

* * * * *