

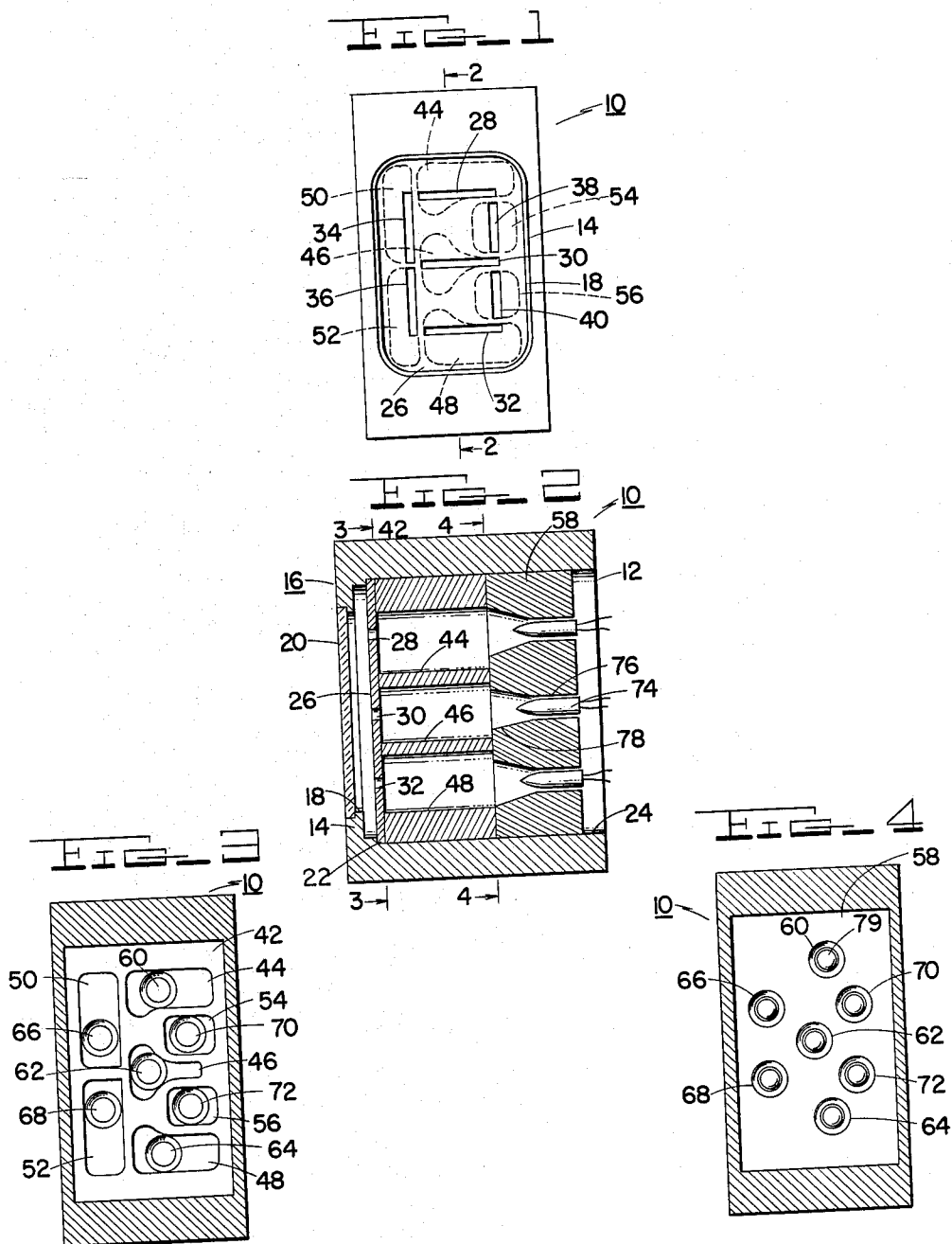
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MINIATURE CHARACTER DISPLAY DEVICE

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1

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MINIATURE CHARACTER DISPLAY DEVICE

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1 Claim. (Cl. 340-378)

This invention relates generally to devices for displaying characters, such as letters and numerals and more particularly to a miniature character display device.

In many data processing systems, character display devices are employed for providing a visual read-out of the decoded data. A common form of numeral display device employs a face plate having a plurality of elongated openings formed therethrough and arranged in a figure "8" pattern, each of the openings being selectively illuminated by a lamp immediately to the rear thereof. With this arrangement, predetermined ones of the openings are illuminated to form and display different numerals in response to selective illumination of the respective lamps. Such arrangements employing conventional miniature lamps have been satisfactory in applications where the characters to be displayed are not of extremely small size and where panel space is not at a premium. However, there are applications in which, due to panel space limitations, a highly miniaturized device is required. Subminiature lamps have become available which lend themselves to such highly miniaturized applications, however, mere substitution of such tiny lamps in conventional display device constructions does not provide the requisite uniform illumination of the character-defining openings nor the required wide field of view.

It is therefore desirable to provide a miniature character display device of the type in which a plurality of different characters may be formed and displayed by selective illumination of a plurality of openings or bars arranged in a geometrical pattern, such as a figure "8," which can employ sub-miniature lamps but which nevertheless provides the requisite uniform illumination of the openings and wide field of view.

It is accordingly an object of the invention to provide an improved character display device.

Another object of the invention is to provide an improved highly miniaturized character display device.

A further object of the invention is to provide an improved miniature character display device employing sub-miniature lamps with uniform illumination of the character-forming bars and a wide field of view.

Further objects and advantages of my invention will become apparent by reference to the following description and the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claim annexed to and forming a part of this specification.

In accordance with the broader aspects of this invention, a miniature character display device is provided of the type in which a plurality of different characters may be formed and displayed by selective illumination of display means defining a plurality of lines or bars arranged in a predetermined geometrical pattern. A plurality of miniature lamps is provided corresponding in number to the lines and disposed in a geometrical pattern which lies in a plane axially spaced from the display means. Means are provided having a plurality of channels formed therein respectively communicating between the lamps and the lines for transmitting light thereto and illuminating the same in response to selective illumination of the lamps, the interior walls of the channels having light-reflecting properties whereby the lines are uniformly illuminated.

In the drawing:

FIG. 1 is a view of the display end of an embodiment

2

of the invention with the light-diffusing plate removed; FIG. 2 is a cross-sectional view taken along the line

2-2 of FIG. 1;

FIG. 3 is a cross-sectional view taken along the line 3-3 of FIG. 2; and

FIG. 4 is a cross-sectional view taken along the line 4-4 of FIG. 2.

Referring now to the figures of the drawing, an elongated tubular housing member 10 is provided which is open at its end 12 and which has an inwardly extending flange portion 14 formed at its end 16. Flange 14 has an inwardly extending shoulder 18 formed thereon providing a seat for the light-diffusing plate 20 preferably formed of suitable translucent material, such as glass etched on one side.

A shoulder 22 is formed on the interior wall 24 of housing 10 axially spaced from flange 14 and a mask plate 26 is arranged abutting shoulder 22 and extends transversely across housing 10. In the illustrated embodiment, plate 26 is formed of opaque material and has a plurality of elongated openings or slots 28, 30, 32, 34, 36, 38 and 40 formed therethrough. Reference to FIG. 1 will readily reveal that these elongated openings or slots are arranged in a figure "8" pattern, the openings 28, 30, 32 being horizontally extending and vertically spaced-apart to define the three horizontal bars of the figure "8," the vertically extending, vertically spaced-apart pair of bars 34, 36 being spaced from the ends of the three bars 28, 30, 32 to define one side of the figure "8," and the vertically extending, vertically spaced-apart pair of bars 38, 40 being disposed between the other ends of the three bars 28, 30, 32 to form the other side of the figure "8." While mask plate 26 has been shown as being formed of opaque material with the numeral-defining bars being formed by elongated openings therein, it will be readily understood that the mask plate 26 may be formed of transparent material, such as glass, with areas thereof being rendered opaque thereby to define transparent bars.

An intermediate member 42 is provided in the housing 10 having one end abutting the side of mask plate 26 remote from the face plate 20. It will be seen that intermediate member 42 has an axial thickness substantially greater than that of the mask plate 26. A plurality of elongated channels or cavities 44, 46, 48, 50, 52, 54 and 56 are formed in the intermediate member 42 extending axially between its opposite ends and respectively communicating with the character-forming openings 28, 30, 32, 34, 36, 38 and 40 in the mask plate 26. It will be seen that in the illustrated embodiment the axially elongated channels in the intermediate member 42 respectively have cross-sectional areas greater than that of the respective mask plate openings. It will further be seen by particular reference to FIG. 3 of the drawing that the axially extending channels in the intermediate member 42 are respectively nested so as to provide channels of the largest possible cross-sectional area consistent with requisite wall thickness between adjacent channels.

The interior surfaces of the channels 44, 46, 48, 50, 52, 54 and 56 are provided with reflective properties, as by forming the member 42 of material having reflective properties, such as aluminum, or by deposition of suitable reflective material therein as is well known to those skilled in the art.

A lamp mounting member 58 is provided in the housing 10 extending transversely thereacross and having one end abutting the end of the intermediate member 42 remote from the mask plate 26. Lamp mounting member 58 has a plurality of lamp mounting holes 60, 62, 64, 66, 68, 70 and 72 formed therethrough for respectively accommodating subminiature lamps 74. It will be seen that the lamp mounting holes in the lamp mounting member 58 respectively communicate with the axially elongated

channels in the intermediate member 42 and in turn with the character-defining slots in the mask plate 26. Each of the lamp mounting holes in the lamp mounting member 58 is flared outwardly from a point adjacent the end 76 of the respective lamp 74 to the respective channel in member 42 as at 78, however, reference to FIG. 3 will reveal that the cross-sectional area of the respective lamp mounting openings adjacent member 42 is smaller than that of the respective light-transmitting channels in member 42. The interior surfaces of the openings 60, 62, 64, 66, 68, 70 and 72 are likewise preferably provided with reflective properties, as by forming lamp mounting member 58 from material having reflective properties such as aluminum, or by deposition of suitable reflective material therein.

It will now be seen that by virtue of the axial spacing of the lamps 74 from the character-defining slots in the mask plate 26 and the reflective properties of the interior walls of the axially extending channels communicating between the lamps and the slots, and further by virtue of the fact that the axially extending channels are larger in cross-section than either the lamps or the slots, the light produced by the subminiature lamps 74 is transmitted to the character-defining slots uniformly illuminating the same, the diffusing face plate 20 further providing the requisite wide field of view of the thus selectively illuminated character-defining slots. It will be seen that the numerals 0-9 are formed by selective illumination of the lamps 74, which in turn illuminate the respective slots in the mask plate 26. Thus, illumination of the lamps in openings 66, 68 will illuminate slots 34, 36 to form the numeral "1," illumination of all of the lamps except that in opening 62 will illuminate all of the slots except slot 30 to form the numeral "0," and so on.

While I have illustrated and described a specific embodiment of my invention, further modifications and improvements will occur to those skilled in the art and I desire therefore in the appended claim to cover all modifications which do not depart from the spirit and scope of my invention.

What is claimed is:

A miniature character display device comprising: a housing open at least at one end thereof; a relatively thin opaque plate in said housing extending transversely across

said opening adjacent said one end, said plate having a plurality of elongated slots formed therein arranged in a figure "8" pattern; a relatively thin translucent plate closing said one end of said housing and spaced outwardly from said opaque plate; an intermediate member in said housing extending transversely thereacross and having one end abutting the side of said opaque plate inwardly from said translucent plate, said intermediate member being relatively thick relative to said plates, said intermediate member having a plurality of spaced-apart elongated inwardly extending cavities formed therethrough respectively communicating with said slots, each of said cavities having a cross-sectional area from one end of said intermediate member to the other which is greater than that of the respective slot and a lamp mounting member in said housing extending transversely thereacross and having one end abutting the other end of said intermediate member, said mounting member having a plurality of spaced-apart lamp openings extending outwardly therethrough; a plurality of miniature lamps respectively positioned in said lamp openings, each of said lamp openings having a portion extending outwardly from the respective lamp toward said one end of said mounting member, said lamp opening portions respectively communicating with said elongated cavities, each of said lamp opening portions having a cross-sectional area at said one end of said mounting member smaller than that of the respective elongated cavities and flaring outwardly from the respective lamp to said one end, the interior walls of said elongated cavities and lamp openings having reflective properties for uniformly transmitting light from said lamps to the respective slots whereby predetermined ones of said slots are illuminated to form and display different characters in response to selective illumination of said lamps.

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