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(54) **APPARATUS USING LIGHT GUIDES AND FILTERS TO CREATE VISUAL ANIMATION EFFECTS**

VORRICHTUNG ZUR ERZEUGUNG VON VISUELLEN BEWEGUNGSEFFEKTEN UNTER VERWENDUNG VON LICHTLEITERN UND FILTERN

APPAREIL UTILISANT DES GUIDES ET FILTRES POUR LUMIERE POUR CREER DES EFFETS D'ANIMATION VISUELLE

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(73) Proprietor: **ROBERTS SYSTEMS, INC.**
Charlotte, NC 28273 (US)

(72) Inventors:
• **JUCHYMENKO, Victor, Y.**
Charlotte, NC 28226 (US)
• **HOWARD, J., Richard**
Oakville, Ontario L6N 3B3 (CA)

• **LACZYNSKI, Andrew, J.**
Toronto, Ontario M4L 3T8 (CA)
• **ANGUS, James, S.,**
c/o H Space Technologies, Inc.,
Toronto, Ontario M4M 2S1 (CA)

(74) Representative: **Howick, Nicholas Keith et al**
CARPMAELS & RANSFORD
43 Bloomsbury Square
London WC1A 2RA (GB)

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Description

This application is a continuation-in-part of application Serial No. 079,585 filed on June 22, 1993.

FIELD OF THE INVENTION

The present invention relates to light processing apparatus for creating visual effects with light from a light source, and to signs, display panels and other lighting products utilizing such processing apparatus.

BACKGROUND OF THE INVENTION

Various conventional decorative or display lighting devices utilize fibre optics or light guides. Typically, white light from a light source is passed through a colour wheel onto the circular common end of a harness of fibre optic light guides. The output ends or "tails" of the fibre optic light guides are then positioned on a display surface such as a sign in a pre-selected pattern to create a desired visual effect. The colour wheel may be rotated through a sequence of colours so as to create an end effect which simulates movement and flow.

Existing decorative lighting devices suffer from a number of drawbacks, including uneven illumination. When the colour wheel is rotated, a colour front initially illuminates only a few of the light fibres situated at the edge of the common end. As the colour front moves across the surface of the common end, an increasing number of light fibres are illuminated, but as the colour wheel continues its movement, fewer light fibres are illuminated. The net result is disproportionate illumination and uneven colour flow. Another problem with conventional lighting systems is the risk of heat damage to colour wheels caused by high intensity focused light, including discoloration, distortion and disintegration. This problem can be avoided by using colour wheels made from relatively robust and expensive materials such as glass, but glass colour wheels are heavy and require larger drive motors. Standard colour wheels are also incapable of utilizing the full spectrum of colour combinations. Furthermore, conventional systems are inefficient in that they do not facilitate the sequencing of fibre optic strands into pre-determined positions to create a desired end effect.

There is accordingly a need for a low cost light processing system which overcomes the problems associated with the prior art.

GB-A-2073930 describes a light transmission system comprising, in sequence, a light source, a collection and distribution device composed of optic fibres, an electro-optical variable transmission device, a second collection and distribution device also composed of optic fibres and a display device.

WO-A-8703408 describes an animated display comprising a plurality of light guides provided with means for illuminating the input ends of the guides, the

illuminating means being arranged to provide a variable illumination of the input ends. The output ends of the guides are arranged to provide a desired display image. A filter arrangement in the form of an endless photographic transparency film is provided to enable the display to change colour.

In accordance with the present invention, there is provided light-processing apparatus as defined by claim 1. The invention extends to a visual effects sign incorporating such light-processing apparatus.

In a preferred embodiment, the subject processing apparatus comprises light distribution means for distributing light from the light source into a multiplicity of light paths, comprising an input bundle of flexible fibre optic light guides having optically finished input ends for receiving light from the light source and optically finished output ends, input light path reconfiguring means for reconfiguring the output ends of the light guides into a plurality of separated input zones of selected shape, filtering means for filtering the light being emitted from the output ends of the input bundle of light guides having filtering areas to correlate with the input zones adapted to transmit light of pre-selected colours, filtered light distribution means for distributing the light transmitted through the filter means, comprising an output bundle of flexible fibre optic light guides having optically finished input and output ends, and filtered light path configuring means for configuring the input ends of the second bundle of light guides into output zones shaped to correlate with the input zones.

The input zones may comprise a series of concentric arcuate paths. The filtering means may comprise a rotatable circular colour wheel having coloured annular sectors, each of which is adapted to overlap respective arcuate paths on the input light point configuring means. The output zones of the filtered light path configuring means are preferably shaped to be mirror images of the concentric arcuate input zones.

Alternatively, the filtering means may be a computer-controlled active filter comprising a liquid crystal matrix having a series of filtering zones which change colour when the filter is activated. In this embodiment, the input and output zones comprise a series of paths which correlate with the filtering zones.

In its presently preferred embodiment, the subject invention is a light processing apparatus for creating a pre-selected number of special effects on a display surface which simulate movement, using light from a light source.

The colour changing means preferably has a plurality of discrete moveable coloured filter zones for transmitting light of various colours, wherein each of the filter zones is shaped to correlate with one of the receptor zones. As the filtering means moves, the respective filter zones register with and sweep across correlated receptor zones. This action periodically changes the colour of the light transmitted to the input ends creating special effects on the effects surface which simulate

movement.

The receptor zones may comprise a series of concentric arcuate sectors, and the colour changing means may comprise a rotatable circular colour wheel having filter zones in the shape of sectors of an annulus, each of which is adapted to overlap an arcuate receptor zone.

Alternatively, the colour changing means may comprise an endless flexible colour band filter having filter zones in the form of adjacent parallel linear sectors, each of which is adapted to overlap a parallel linear receptor zone.

In the further alternative, the colour changing means may comprise a rotatable colour cylinder having filter zones in the form of stacked, parallel sections of a cylinder, each of which is adapted to overlap a similarly-shaped receptor zone.

In the presently preferred embodiment, the subject invention comprises configuring means for configuring the input ends and the output ends of the light guides in pre-selected positions. The configuring means preferably comprises a foam body having separate surfaces for supporting and positioning the input ends of the light guides, and the output ends of the light guides. The configuring means also preferably encapsulates the light guides along the length thereof.

The subject light processing system may be incorporated into the housing of a display sign which includes display means for displaying light emitted from the output ends of the output bundle of light guides in pre-selected patterns. Pre-determined visual effects are displayed on the display means when the filter is activated.

The light processing apparatus of the present invention may also be utilized in a number of applications, including decorative signs, spot lights, directional panels such as those which display arrows and like moving symbols, information panels such as an interactive map showing bus stop locations, and other lighting products.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is an exploded diagrammatic view of the light processing apparatus of the subject invention;

Figure 2 is a perspective view of a sign embodying a preferred embodiment of the subject light processing apparatus, with the front panel partially broken away;

Figure 3 is a perspective view of the back of the sign shown in Figure 2, with the back panel mostly broken away;

Figure 4 is an exploded perspective view of the components of the preferred embodiment of the

subject light processing apparatus;

Figure 5 is a perspective view of the colour wheel assembly of the subject processing apparatus shown in its operating position;

Figure 6 is a sectional view taken along lines 6 - 6 in Figure 3;

Figures 7, 8 and 9 are plan views of components of the preferred embodiment of the subject apparatus;

Figure 10 is an exploded perspective view of a light management apparatus which does not constitute an embodiment of the present invention;

Figure 11 is a partially cut-away perspective view of a sign embodying the presently preferred embodiment of the subject invention;

Figure 12 is a partially cut-away perspective view of a portion of the presently preferred embodiment of the subject apparatus;

Figure 13 is a perspective view of an alternative embodiment of the subject light processing apparatus having a colour band filter; and

Figure 14 is a partially cut-away perspective of a sign embodying a further alternative embodiment of the subject invention having a colour cylinder filter.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 illustrates in a diagrammatic fashion the main elements of the light processing or management apparatus of the subject invention, shown generally as 10. Light processing apparatus 10 is used to generate visual effects on a sign front or display panel 12, with light from a light source 14, preferably focused into a circular pattern by lens 16. Processing apparatus 10 comprises common end plate 18, input bundle or harness of fibre optic light guides 20, input light path reconfiguration plate 22, colour filter assembly 24, output light path configuration plate 26, and output bundle or harness of fibre optic light guides 28.

Common end plate 18 preferably has a large, central circular aperture for holding the input ends of input bundle of light guides 20, so as to form common end 29 which receives light from light source 14. Alternatively, a common end plate aperture could be square or rectangular, depending on the geometry of the light beam created by light source 14. Output light path configuration plate 26 has a series of slots 27 for holding the input ends of output bundle of light guides 28. Input light path reconfiguration plate 22 has a similar series of slots, which are preferably mirror-images of slots 27, for hold-

ing the output ends of input bundle of light guides 20. As shown in Figure 1, slots 27 are arcuate or curved, so as to be used in conjunction with an active filter assembly comprising a rotatable colour wheel having circular geometry. Alternatively, the filter assembly could be a computer-controlled active filter comprising a liquid crystal screen having coloured areas, as discussed in more detail herein below, in which case slots 27 may not be curved.

Processing apparatus 10 may be incorporated into a sign or other display means by mounting it within housing 30 between display panel 12 and sign back 32. The sign preferably includes transformer 34, terminal block 36, AC or DC motor 38 for activating colour filter assembly 24, and a lamp socket 39 for holding light 40. Output or effect ends 42 of guides 28 are mounted onto intermediate support panel 44.

Input and output bundles of fibre optic light guides 20, 28 are preferably low-cost plastic (polymethyl methacrylate) fibres, although they may be glass (silica) fibres. The input and output ends of both bundles of light guides 20, 28 are highly polished or otherwise optically finished to an optical quality standard so that maximum light transmission is achieved.

Light emitted from light source 14 is focused by lens 16 onto circular common end 29. Input bundle of light guides 20 distributes this light into a multiplicity of light paths separated into a plurality of input zones created by the output ends of the light guides held in the series of slots in input configuration plate 22. The light transmitted through these input zones is then filtered by colour filter assembly 24, and is received by corresponding output zones created by the input ends of the output bundle of light guides 28 held in slots 27 in output configuration plate 26. The light is then distributed by the output ends or "tails" 42 of light guide bundle 28 to pre-selected locations on support panel 44, so as to illuminate selected translucent areas of display panel 12. Special effects simulating movement and flow are created when colour filter 24 is activated.

Figures 2 - 9 illustrate a visual effects sign 50 embodying a preferred embodiment of the light processing apparatus of the subject invention. -As shown in Figure 2 and Figure 3, sign 50 comprises housing 52, front effect panel 54, intermediate support panel 55, back panel 56, light source 57, common end plate 58, input bundle of light guides 60, input light path reconfiguration plate 62, colour wheel assembly 64, output light path configuration plate 66, and output bundle of light guides 68.

Figure 4 is an exploded perspective view of the subject light processing apparatus comprising common end plate 58, input bundle of light guides 60, input light path reconfiguration plate 62, colour wheel assembly shown generally as 64, output light path configuration plate 66, and output bundle of light guides 68. Light source 57 includes light housing 70 having mounted therein light bulb 72 and lens 74.

Common end plate 58 has circular aperture 76 for

holding input ends 78 of input bundle of light guides 60. Input light path reconfiguration plate 62 has a series of arcuate slots 80 for receiving the output ends 82 of input bundle of light guides 60. Output light path configuration plate 66 has a series of arcuate slots 84, which are mirror-images of slots 80, for receiving the input ends of output bundle of light guides 68. The ends of the light guides are cut flush with the surfaces of plates 62, 66 and highly polished to an optical standard.

Plates 62, 66 are preferably blocks of brass, polyethylene or similar material, depending upon the nature of the fibre optics used for light guides 60, 68. Slots 80, 84 are preferably in the shape of a section of an annulus or ring. The width and length of slots 80, 84 are selected depending upon the desired end effect to be created. Most end effects will require their own slot, although it is possible to create more than one separate visual effect with the same slot by appropriate positioning of the tails of the light fibres held in such slot.

Colour wheel assembly 64 comprises colour wheel 86 having a square central aperture 88 sized to fit square boss 90 on the drive shaft of motor 91 mounted on block 92. A pair of spaced rails 94 extend laterally from block 92 and are slidably received in apertures in output light path configuration plate 66. In Figure 4, block 92 is shown in its extended position, allowing for colour wheel 86 to be conveniently removed from drive shaft 90. In Figure 5, block 92 is shown in its operating position in which colour wheel 86 is shown in place covering arcuate slots 84 of plate 66. Alternatively, the colour wheel assembly could be fixed in place or mounted on a hinged block which would allow the colour wheel to be removed conveniently by swinging the front portion of the block outwardly.

Referring to Figure 6 and Figure 2, mounted within housing 52 is an intermediate support panel 55, for supporting the various components of the subject decorative lighting control apparatus. Support panel 55 also holds the output ends or "tails" of the light fibres contained in output bundle of light guides 68. The tails of some light fibres 100 may be mounted directly in apertures 98 in support panel 55 to form the letters of the "Message" 99 shown in Figure 2. Other light fibres 101 may be mounted in apertures 102 in block 103 mounted onto the front surface of support panel 55 to bring the tails of fibres 101 closer to the translucent design such as the representation of an automobile 104 on the front surface 54 of sign 50. Still other light fibres 105 are mounted on thicker block 106 secured to support panel 55 to create a brighter visual effect such as the headlight 107 of automobile 104.

Referring now to Figures 7 and 8, shown therein are plan views of common end plate 58 and input light path reconfiguration plate 62, respectively. Input ends 78 of input bundle of light guides 60 are securely held in the central aperture of common end plate 58. The output ends 82 of input bundle of light guides 60 are reconfigured and mounted in curved or arcuate slots 80 of input

light point configuration plate 62, as shown in Figure 7. Preferably, each arcuate slot 80 is wide enough to hold the output ends of two light fibres. The length of arcuate slots 80 depends upon the particular optical effect to be created. Alternatively, some, or all of the apertures in plates 62, 66 could take the form of radially extending slots or circular apertures depending upon the desired end effect.

As shown in Figure 9, colour wheel 86 is preferably a circular disc of acetate film, created either by printing from a computer program using a QMS system or the like, or by a film process such as Cibachrome or similar film transfer process. Colour wheel 86 includes a plurality of coloured zones 87A, 87B, 87C, etc. in the shape of annular sectors of a circle, which correspond in width to arcuate slots 80, 84 to prevent light cross-over from one zone to another. Coloured zones may be of one or more colours or transparent in whole or in part. The length of colour zones 87 depends upon the duration of the desired visual effect. In the case of each annular sector 87, the portion of the annulus which is not coloured is opaque to prevent light from being transmitted through such portion.

In operation, light emitted from light 72 of light source 57 is focused by lens 74 onto common end 76 of common end plate 58. First bundle of light guides 60 then distributes this light into a multiplicity of light paths separated into a plurality of light zones created by the output ends 82 of input bundle of light guides 60 held in arcuate slots 80. Light from output ends 82 of input bundle 60 is then transmitted through colour wheel 86 and is received by input ends 84 of output bundle of light guides 68. As the input zones 80 are mirror images of output zones 84, all of the light in a particular input zone 80A is received by corresponding output zone 84A. This light is then distributed by output bundle of light guides 68 to pre-selected locations behind display panel 54. As colour wheel 86 is rotated by motor 91, various colour zones 87 periodically register with arcuate slots 80, 84, resulting in the periodic transmission of filtered light.

As the leading edge of each coloured zone 87 crosses the front end of fibre optically filled slots 80, 84, the coloured light is transmitted through such fibres to display panel 54, creating the effect of movement and flow. Different designs require different colour wheels and plates 62, 66 having an appropriate number of slots of appropriate length. A "painting with light" effect can be created by proper sequencing of the output ends of the output bundle of light guides 68 on the display panel, i.e. by placing the light fibres located in the front of the arcuate slot at the beginning of the design, such as the first letter of a word, and so on.

Referring now to Figure 10, the light processing means illustrated, which is described to assist the understanding of the present invention but which does not constitute an embodiment thereof, comprises a square input reconfiguration plate 110, liquid crystal filter 114, and square output configuration plate 117. Reconfigu-

ration plate 110 has a series of aligned straight, elongated slots 116 of pre-selected lengths for holding the output ends 118 of input bundle of light guides 120. Liquid crystal filter 114 may be a microprocessor-controlled active or passive liquid crystal matrix having a series of linear, elongated colour zones 122 which when activated by the microprocessor periodically change colour. Output configuration plate 117 has a series of slots 124, which are preferably mirror images of slots 116, for holding input ends 126 of output light guides 128. Alternatively, while colour zones 122 and slots 116 and 124 as illustrated define a plurality of linear, elongated light paths, it should be understood that colour zones 122 could assume other shapes (e.g. circular, amorphous), in which case slots 116, 124 would be reshaped to correspond therewith. Light passing through slots 116 of input plate 110 is filtered by colour zones 122 as it passes therethrough. Preferably, when liquid crystal filter 114 is activated, colours flow across its surface in a predetermined fashion to create the effect of painting with colour.

The processing apparatus of the subject invention makes the input light more uniform, and provides more accurate illumination of an end effects panel, particularly in the case of animation. The reconfigured light paths created by the input harness of light guides and the reconfiguration plates reduce or eliminate light cross-over from one path to another, while at the same time maximizing the amount of light transmission through the colour wheel. The subject apparatus also reduces the risk of heat damage to the colour wheel, because it is placed farther away from the light source between the two configuration plates. As a result, light weight acetate colour wheels having a full range of colour combinations, may be used and rotated with a small, low torque motor.

While the subject light processing apparatus is illustrated as processing light used to produce visual effects on a display panel such as a sign, it should be appreciated that such control apparatus can also be used in many other lighting applications, such as moving light from one spot light to another in a pre-selected pattern, and holographic and other displays.

Further, while fibre optic light guides are the presently preferred means for distributing light into a plurality of input and output paths, other types of light guides, such as water-filled tubes, could be used to so distribute the light. Likewise, a casting of light guiding material of appropriate shape having an exterior coating with a suitable refractive index for reflecting light being transmitted therethrough, could be used instead of a plurality of light guides.

The presently preferred embodiments of the invention comprise the light processing apparatus shown in Figures 11-14.

Referring now to Figures 11 and 12, light processing apparatus 140 is shown as part of sign 141, which comprises housing 142, display panel 143, light source 144

and spacer 145. Light processing apparatus 140 comprises colour changer shown generally as 146, fibre optic light guides 148, and configuring means 150. Light from light source 144 is processed by light processing means 140, to create special effects on a display panel 143 which simulate movement, such as linear movement, spinning, sparkling or twinkling.

As best shown in Figure 12, configuring means 150 preferably comprises a rigid piece of molded foam such as polystyrene, having a top surface 153, a bottom effects surface 154, and an input surface 155. Top surface 153 supports chassis 157 in which is mounted light source 144. Input surface 155 as shown is orthogonal to top surface 153, and has apertures for holding and positioning input ends 152 of light guides 148 in receptor zones 160 of pre-selected geometry. Bottom effects surface 154 has apertures for holding and positioning output ends 162 of light guides 148 in a pre-selected pattern. Configuring means 150 also preferably encapsulates light guides 148 along the length thereof.

As shown in Figures 11 and 12, receptor zones 160 are arcuate or curved, so as to be used in conjunction with colour changer 146 comprising a rotatable colour wheel filter 156 having circular geometry. Alternative geometric arrangements of the colour filter changer and receptor zones will be discussed below. Light guides 148 are grouped into groups 163a, 163b, 163c, etc., each group being assigned to create a particular special effect. All of the input ends 152 of a particular group 163 are held in apertures in input surface 155 in the same receptor zone 160.

Display panel 143 may be spaced a pre-determined distance from the effects surface 154 of configuring means 150 by spacer 145, which is preferably made of a foam like material such as polystyrene. Spacer 145 has cut-outs 170 which allow light emitted from output ends 162 of light guides 148 to travel through spacer 145, thereby illuminating selected portions of display panel 143.

Colour changer 146 comprises colour wheel filter 156 and motor 164 having a drive shaft 166 sized to fit a central aperture in filter 156. Colour wheel filter 156 includes a plurality of discrete concentric coloured filter zones 172a, 172b, 172c etc. in the shape of sector of an annulus, so as to correlate with respective receptor zones 160a, 160b, 160c, etc. That portion of each annulus which is not coloured is opaque, to block light from being transmitted through such portion. Filter zones 172 are at least as wide as arcuately shaped receptor zones 160, in order to block light filtered by a given filter zone and meant to be transmitted by a correlated receptor zone from also impinging upon adjacent non-correlated zones.

Colour wheel filter 156 is preferably a circular polycarbonate disc having concentric arcuate filter zones created by silk-screening, using inks which transmit light of selected colours or wavelengths, while filtering out non-selected colours. The lengths of the coloured por-

tions of coloured filter zones 172 depend upon the duration of each visual effect. The colour wheel filter also acts as a heat shield to protect the input ends 152 of light guides 148.

Light guides 148 are preferably low-cost plastic (polymethylmethacrylate) fibres, although they may be glass (silica) fibres. The input ends 152 and output ends 162 of light guides 148 are highly polished or otherwise optically finished to an optical quality standard so that maximum light transmission is achieved.

Display panel 143 is preferably made of Lexan (Trade Mark) having a smooth outer side and a rough finish on the inside. A graphic image such as an advertisement may be lithographically or screen printed on the smooth outer side. The rough inside surface of display panel 143 diffuses the light points from the output ends 162. Display panel 143 should be placed a distance from effects surface 154 to help diffuse the light from output ends 162.

In operation, light emitted from light source 144 is directed onto and transmitted through colour wheel filter 156 and is received by input ends 152 of light guides 148 located in receptor zones 160. This filtered light is then distributed by light guides 148 to pre-selected locations on the bottom effects surface 154 of configuring means 150. The light then passes through spacer 145 and is received on the inside surface of display panel 143. As colour wheel filter 156 is rotated by motor 164, various filter zones 172 periodically register with correlated receptor zones 160, resulting in the periodic transmission of filtered light. As the leading edge of each filter zone 172 crosses the front of a receptor zone 160, the coloured light begins to be transmitted into the input ends 152 of light guides 148. The filtered light then travels through a particular group 163 of light guides 148 and is emitted from output ends 162 onto display panel 143. As the filter zones 172 sweep across the receptor zones 160, the effect of movement and flow is created. Different designs require a different number of light fibre groups 163 and different colour wheels 156 having receptor zones 160 of various lengths and colours, depending on the number and type of the desired special effects.

Referring now to Figures 13 and 14, illustrated therein are alternative embodiments of the subject light processing apparatus having different receptor/filter zone geometries. Figure 13 shows alternative embodiment 180 wherein the colour changing means comprises an endless flexible band filter 181 having a plurality of parallel linear coloured filter zones 182a, 182b, 182c etc., which are rectangular in shape. Configuring means 183 has receptor zones 184, the width of which corresponds to the width of coloured filter zones 182. Colour band filter 181 rotates around spindles 185, and is driven by drive spindle 186, activated by motor 187. During operation, colour band filter 181 rotates around the spindles and achieves the same visual effect as the previously described colour wheel filter 156. In this embodi-

ment, the light source 188 is preferably rectangular in shape, to provide uniform illumination of receptor zones 184.

Figure 14 shows a further alternative embodiment of the subject invention, shown generally as 190, in which the colour changing means comprises a rotatable colour cylinder filter 192, having a plurality of discrete coloured filter zones 193, comprising stacked, parallel sections of a cylinder, which correspond in width and shape to receptor zones 194 on configuring means 195. Colour cylinder filter 192 is in the shape of a cylindrical barrel having flat bottom portion 196 which is connected to motor 197 mounted to sign housing 198. Reflector 199 reflects light from light source 189 mounted on configuring means 195.

While the colour changing means of the presently preferred embodiments of the invention comprise filters having filter zones which transmit light of a constant, pre-selected colour, the filter could alternately be an active filter having zones which change colour. For example, the filter could be a thin circular disc containing coloured liquids of different densities, which mix together creating a colour blending effect when the disc is rotated.

Thus, while what is shown and described herein constitutes various preferred and alternative embodiments of the subject invention, it will be understood that various changes can be made to such embodiments without departing from the subject invention, the scope of which is defined in the appended claims.

Claims

1. Light-processing apparatus (10;140) comprising:

- (a) a multiplicity of flexible fibre optic light guides (28;68;148) having input ends (84;126;152) for receiving the light from a light source and output ends (42;162), the light guides (28;68;148) being grouped into groups (163,163a,163b,163c), wherein the input ends (84;152) of each group of light guides are placed in distinct receptor zones (27;84,84A;160,160a,160b,160c;184;194) which define a pre-selected geometry and the output ends (42;162) of each group of light guides are positioned in a pre-selected pattern; and
- (b) a movable colour-changing means (24;64;146;181;192), for periodically changing the colour of the light from the light source, comprising a plurality of discrete coloured filter zones (87,87A,87B,87C;172, 172a,172b,172c;182,182a,182b,182c;193) and arranged to register successively with and sweep across correlated receptor zones (27;84,84A;160,160a,160b,160c;184;194), thereby periodically changing the colour of the light which is trans-

mitted to the input ends (84;152) of said groups (163,163a,163b,163c) of light guides (28;68;148);

characterised in that:

each of the filter zones defines a preselected geometry so that each of said filter zones is at least as wide as said correlated receptor zone and has the same geometric pattern as said correlated receptor zone.

2. Apparatus as claimed in claim 1 arranged for creating on a displaying surface special effects which simulate movement.
3. Apparatus as claimed in claim 1 or claim 2, wherein the colour-changing means (24;64;146) comprises a rotatable circular colour wheel filter (86;156) which is coupled to a motor (38;91;164).
4. Apparatus as claimed in claim 1 or claim 2, wherein the colour-changing means (24;64;146) comprises a rotatable circular colour wheel filter (86;156) having concentric coloured filter zones (87,87A,87B,87C;172,172a,172b,172c) in the shape of sectors of an annulus.
5. Apparatus as claimed in any preceding claim, wherein the receptor zones (27;84,84A;160,160a,160b,160c) are arcuate in shape.
6. Apparatus as claimed in any preceding claim, wherein the colour-changing means comprises an endless flexible filter (181).
7. Apparatus as claimed in any preceding claim, further comprising configuring means (26;66;150;183;195) for configuring the input ends (84;152) and the output ends (42;162) of the light guides (28;68;148) in pre-selected positions.
8. Apparatus as claimed in claim 7, wherein the configuring means (150) comprises:
 - (a) an input surface (155) for holding and positioning the input ends (152) of the light guides (148) in their pre-selected geometry in the receptor zones (160); and
 - (b) an effects surface (154) for holding and positioning the output ends (162) of the light guides (148) in their pre-selected pattern.
9. Apparatus as claimed in claim 8, wherein the configuring means (150) further comprises a support surface (153) for supporting and positioning a said light source relative to the colour-changing means (146).

10. Apparatus as claimed in claim 9, wherein the input surface (155) defines a plane which is perpendicular to a plane of said support surface (153) and supports the colour-changing means (146).

11. Apparatus as claimed in any one of claims 7 to 10, wherein the configuring means (150) is a piece of foamed material which encapsulates the light guides (148).

12. Apparatus as claimed in any preceding claim, further comprising said light source (14;57;144;188;189).

13. A visual effects sign (50;141;180;190) comprising:

(a) a housing (30;52;142;198);

(b) a light source (14;57;144;188;189) mounted in the housing;

(c) light-processing apparatus (10;140) as claimed in any one of claims 1 to 6, wherein said receptor zones (27;84;84A;160,160a,160b,160c;184;194) are mutually adjacent;

(d) configuring means (25;66;150;183;195) for configuring the light source (14;57;144;188;189), colour-changing means (24;64;146;181;192) and light guides (28;68;128;148) in pre-selected positions relative to one another; and

(e) display panel means (12;54;143) for displaying light emitted from the output ends (42;162) of the light guides (28;68;148) in pre-selected patterns.

14. A visual effects sign as claimed in claim 13, further comprising a spacer means (145) for spacing the display panel means (143) at a pre-determined distance from the configuring means (150).

Patentansprüche

1. Lichtverarbeitende Vorrichtung (10; 140) umfassend: (a) eine Mehrzahl von flexiblen Faseroptik-Lichtleitern (28; 68;148) mit Eingabeenden (84; 126; 152) für den Empfang des Lichts von einer Lichtquelle und Ausgabeenden (42; 162), wobei die Lichtleiter (28; 68; 148) in Gruppen (163, 163a, 163b, 163c) gruppiert sind, wobei die Eingabeenden (84; 152) von jeder Gruppe von Lichtleitern in unterschiedlichen Aufnahmebereichen (27; 84, 84A; 160, 160a, 160b, 160c; 184; 194) angeordnet sind, welche eine vorgewählte Geometrie definieren, und die Ausgabeenden (42; 162) jeder Gruppe von Lichtleitern in einem vorgewählten Muster angeordnet sind; und (b) eine bewegbare, farbverändernde Einrichtung (24; 64; 146; 181; 192) für ein periodisches Austauschen der Farbe des Lichts von der Lichtquelle, welche eine Mehrzahl von dis-

kret gefärbten Filterbereichen (87, 87A, 87B, 87C; 172, 172a, 172b, 172c; 182, 182a, 182b, 182c; 193) umfassen und welche so angeordnet sind, um aufeinanderfolgend entsprechende Aufnahmebereiche (27; 84, 84A; 160, 160a, 160b, 160c; 184; 194) zu überdecken und zu überstreichen, wodurch periodisch die Farbe des Lichts, welches zu den Eingabeenden (84; 152) der Gruppen (163, 163a, 163b, 163c) von Lichtleitern (26, 68; 148) übertragen wird, verändert wird; dadurch gekennzeichnet, daß jeder der Filterbereiche eine vorbestimmte Geometrie definiert, sodaß jeder der Filterbereiche zumindest so breit ist wie der entsprechende Aufnahmebereich und dasselbe geometrische Muster wie der entsprechende Aufnahmebereich aufweist.

2. Vorrichtung nach Anspruch 1, welche zur Ausbildung von speziellen Effekten, welche eine Bewegung simulieren, auf einer Display-Oberfläche angeordnet ist.

3. Vorrichtung nach Anspruch 1 oder 2, worin die farbverändernde Einrichtung (24; 64; 146) ein drehbares, kreisförmiges Farbscheiben-Filter (86; 156) umfaßt, welches mit einem Motor (38; 91; 164) gekoppelt ist.

4. Vorrichtung nach Anspruch 1 oder 2, worin die farbverändernde Einrichtung (24; 64; 146) ein rotierbares, kreisförmiges Farbscheiben-Filter (86; 156) umfaßt, welches konzentrische, gefärbte Filterbereiche (87, 87A, 87B, 87C; 172, 172a, 172b, 172c) in Form von Ringsektoren aufweist.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, worin die Aufnahmebereiche (27; 84, 84A; 160, 160a, 160b, 160c) eine gebogene Form aufweisen.

6. Vorrichtung nach einem der vorhergehenden Ansprüche, worin die farbverändernde Einrichtung ein flexibles Endlosfilter (181) umfaßt.

7. Vorrichtung nach einem der vorhergehenden Ansprüche, welche weiters gestaltende Einrichtungen (26; 66; 150; 183; 195) zum Anordnen der Eingabeenden (84; 152) und der Ausgabeenden (42; 162) der Lichtleiter (28; 68; 158) in Vorbestimmten Positionen umfaßt.

8. Vorrichtung nach Anspruch 7, worin die gestaltende Einrichtungen (150) umfassen:

(a) eine Eingabeoberfläche (155) zum Halten und Positionieren der Eingabeenden (152) der Lichtleiter (148) in deren vorgewählter Geometrie in den Aufnahmebereichen (160); und

- (b) eine Effektoberfläche (154) zum Halten und Positionieren der Ausgabeenden (162) der Lichtleiter (148) in deren vorgewähltem Muster.
9. Vorrichtung nach Anspruch 8, worin die gestaltenden Einrichtungen (150) weiters eine Supportoberfläche (153) zum Halten und Positionieren einer Lichtquelle relativ zu der farbverändernden Einrichtung (146) umfassen.
10. Vorrichtung nach Anspruch 9, worin die Eingabeoberfläche (155) eine Ebene definiert, welche senkrecht auf eine Ebene der Supportoberfläche (153) steht und die farbverändernde Einrichtung (146) trägt.
11. Vorrichtung nach einem der Ansprüche 7 bis 10, worin die gestaltende Einrichtung (150) ein Stück aus geschäumtem Material ist, welches die Lichtleiter (148) umgibt.
12. Vorrichtung nach einem der vorhergehenden Ansprüche, umfassend weiters die Lichtquelle (14; 57; 144; 188; 189).
13. Bildeffektanzeige (50; 141; 180; 190), umfassend
- (a) ein Gehäuse (30; 52; 142; 198);
- (b) eine Lichtquelle (14; 57; 144; 188; 189), welche in dem Gehäuse angeordnet ist;
- (c) eine lichtverarbeitende Vorrichtung (10; 140) nach einem der Ansprüche 1 bis 6, worin die Aufnahmebereiche (27; 84, 84A; 160, 160a, 160b, 160c; 184; 194) aneinander anliegen;
- (d) gestaltende Einrichtungen (25; 66; 150; 183; 195) zum Konfigurieren der Lichtquelle (14; 57; 144; 188; 189), der farbverändernde Einrichtung (24; 64; 146; 181; 192) und der Lichtleiter (28; 68; 128; 148) in vorgewählten Positionen relativ zueinander; und
- (e) eine Anzeigetafel (12; 54; 143) zum Anzeigen des von den Ausgabeenden (42; 162) der Lichtleiter (28; 68; 128; 148) in vorgewählten Mustern emittierten Lichts.
14. Bildeffektanzeige nach Anspruch 13, welche weiters Abstandseinrichtungen (145) zum Anordnen der Anzeigetafel (143) in einem vorbestimmten Abstand von den gestaltenden Einrichtungen (150) umfaßt.

Revendications

1. Appareil de transformation de la lumière (10, 140) comprenant:
- (a) une multiplicité de conducteurs de lumière

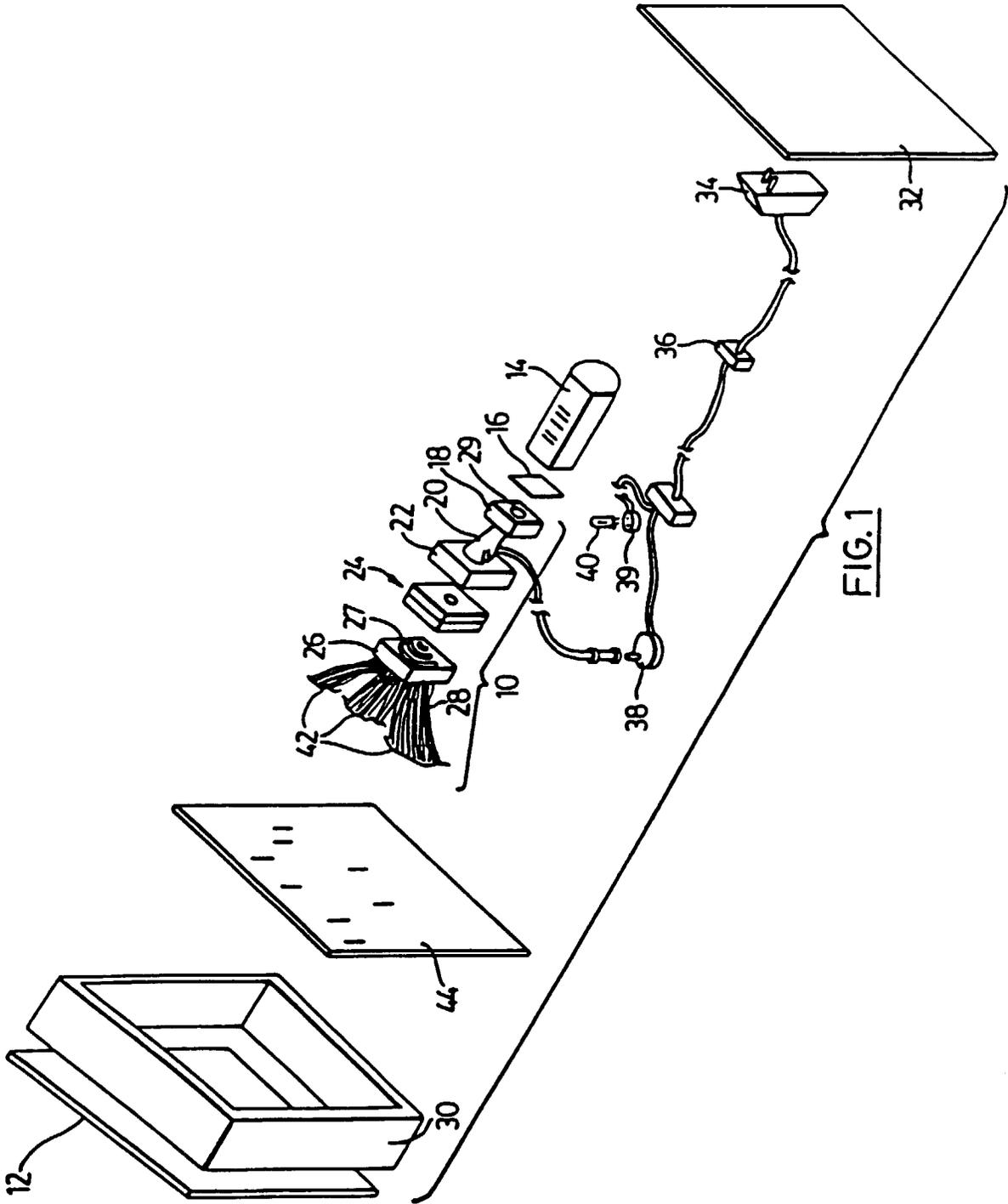
constitués par des fibres optiques flexibles (28, 68, 148), ayant une extrémité d'entrée (84, 126, 152) pour recevoir la lumière d'une source de lumière et une extrémité de sortie de la lumière (42, 142), les conducteurs de lumière (28, 68, 148) étant groupés dans des faisceaux (163, 163a, 163b, 163c) dans lesquels les extrémités d'entrée (84, 152) de chaque faisceau de conducteurs de lumière sont situées dans des zones distinctes de réception (27, 84, 84a, 160, 160a, 160b, 160c, 184, 194) qui définissent une géométrie pré-sélectionnée et dans lesquels les extrémités de sortie (42, 162) de chaque faisceau de conducteurs de lumière sont positionnées suivant un motif pré-sélectionné, et

- (b) un moyen mobile de changement de couleur, (24, 64, 146, 181, 192) pour changer périodiquement la couleur de la lumière de la source de lumière, comprenant une pluralité de zones de filtrage faiblement colonisées (87, 87a, 87b, 87c, 172, 172a, 172b, 172c, 182, 182a, 182b, 182c, 193) et disposé de façon à coïncider successivement avec les zones de réceptions correspondantes (27, 84, 84a, 160, 160a, 160b, 160c, 184, 194) et à laisser passer la lumière à travers, de façon à changer périodiquement la couleur de la lumière qui est transmise aux extrémités d'entrée (84, 152) desdits faisceaux (163, 163a, 163b, 163c) de conducteurs de lumière (28, 68, 148),

CHARACTERISE PAR LE FAIT QUE chacune des zones de filtrage définit une géométrie pré-sélectionnée de façon à ce que chacune desdites zones de filtrage soit au moins aussi étendue que ladite zone de réception correspondante et ait le même motif géométrique que ladite zone de réception correspondante.

2. Appareil selon la revendication 1, CHARACTERISE PAR LE FAIT QU'il est aménagé afin de créer sur un écran de visualisation des effets spéciaux qui simulent le mouvement.
3. Appareil selon la revendication 1 ou la revendication 2, CHARACTERISE PAR LE FAIT QUE le moyen de changement de couleurs (24, 64, 146) comprend un filtre constitué d'une roue pivotable de couleur (86, 156) qui est couplé à un moteur (38, 91, 164).
4. Appareil selon la revendication 1 ou la revendication 2, CHARACTERISE PAR LE FAIT QUE le moyen de changement de couleurs (24, 64, 146) comprend un filtre constitué d'une roue pivotable de couleur (86, 156) possédant des zones de filtrages colorées concentriques (87, 87a, 87b, 87c, 172, 172a, 172b, 172c) adoptant la forme de secteurs angulaires d'une couronne.

5. Appareil selon l'une quelconque, des revendications précédentes, CARACTERISE PAR LE FAIT QUE les zones de réception (27, 84, 84a, 160, 160a, 160b, 160c) adoptent une forme arquée. 5
6. Appareil selon l'une quelconque des revendications précédentes, CARACTERISE PAR LE FAIT QUE le moyen de changement de couleurs comprend un filtre flexible sans fin (181). 10
7. Appareil selon l'une quelconque des revendications précédentes, CARACTERISE PAR LE FAIT QU'il comprend en outre un moyen de configuration (26, 66, 150, 183, 195) pour configurer les extrémités d'entrée (84, 152) et les extrémités de sortie (42, 162) des conducteurs de lumières (28, 68, 148) dans des positions présélectionnées. 15
8. Appareil selon la revendication 7, CARACTERISE PAR LE FAIT QUE le moyen de configuration comprend : 20
- (a) une aire d'entrée (155) pour fixer et positionner les extrémités d'entrée (152) des conducteurs de lumière (148) dans leur géométrie pré-sélectionnée dans les zones de réception (160), 25
 - et (b) une aire d'effets (154) pour fixer et positionner les extrémités de sortie (162) des conducteurs de lumière (148) dans leur motif pré-sélectionné. 30
9. Appareil selon la revendication 8, CARACTERISE PAR LE FAIT QUE le moyen de configuration (150) comprend en outre une aire de support (153) pour supporter et positionner une dite source de lumière par rapport au moyen de changement de couleur (146). 35
10. Appareil selon la revendication 9, CARACTERISE PAR LE FAIT QUE l'aire d'entrée (155) définit un plan qui est perpendiculaire au plan de ladite surface de support (153) et supporte le moyen de changement de couleur (146). 40
11. Appareil selon l'une quelconque des revendications de 7 à 10, CARACTERISE PAR LE FAIT QUE le moyen de configuration (150) est une pièce en matériau mousse qui renferme les conducteurs de lumière (148). 45
12. Appareil selon l'une quelconque des revendications précédentes, CARACTERISE PAR LE FAIT QU'il comprend en outre ladite source de lumière (14, 57, 144, 188, 189). 50
13. Indicateur d'effets visuels (50, 141, 180, 190) comprenant : 55
- (a) un boîtier (30, 52, 142, 198),
 - (b) une source de lumière (14, 57, 144, 188, 189) montée dans le boîtier,
 - (c) un appareil de transformation de lumière (10, 140) tel que revendiqué dans l'une quelconque des revendications de 1 à 6, dans lequel lesdites zones de réception (27, 84, 84A, 160, 160a, 160b, 160c, 184, 194) sont mutuellement adjacentes,
 - (d) un moyen de configuration (25, 66, 150, 183, 195) pour configurer la source de lumière (14, 57, 144, 188, 189), un moyen de changement de couleur (24, 64, 146, 181 192) et des conducteurs de lumière (28, 68, 128, 148) dans des positions présélectionnées les uns par rapport aux autres,
 - et (e) un écran de visualisation (12, 54, 142) pour visualiser la lumière émise par les extrémités de sortie (42, 162) des conducteurs de lumières (28, 68, 148) dans des motifs pré-sélectionnés.
14. Indicateur d'effets visuels selon la revendication 13, CARACTERISE PAR LE FAIT QU'il comprend en outre un moyen d'écartement (145) afin d'espacer le panneau de visualisation (143) à une distance pré-déterminée du moyen de configuration (150).



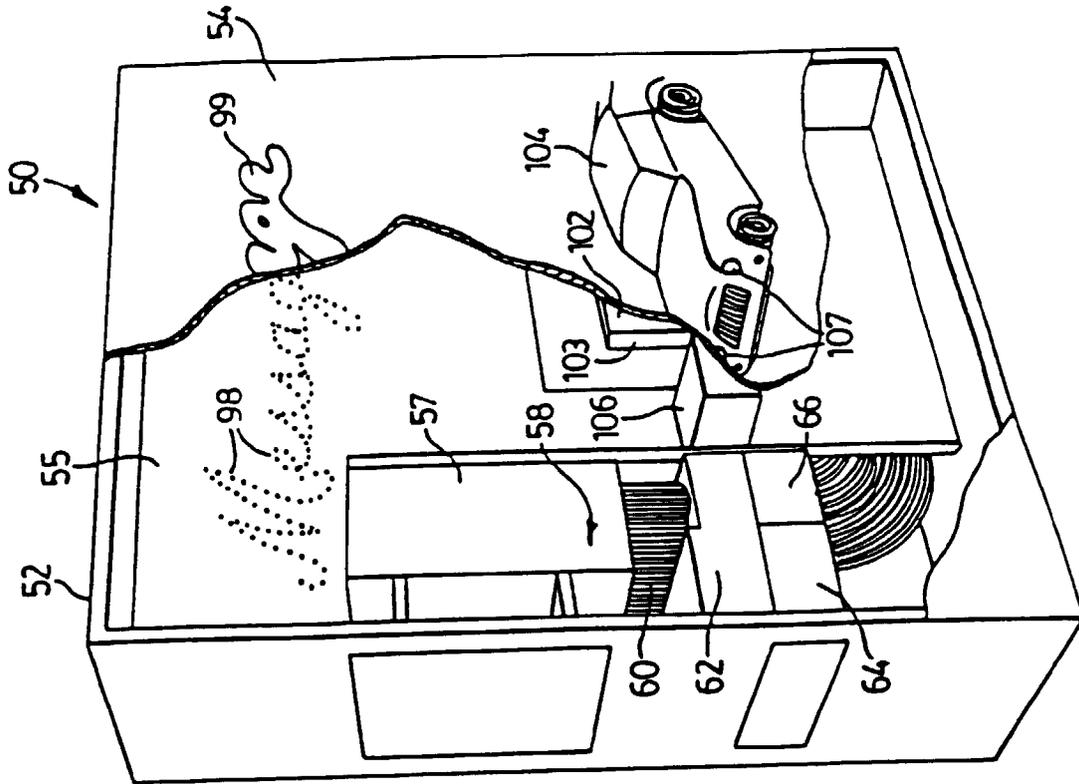


FIG. 2

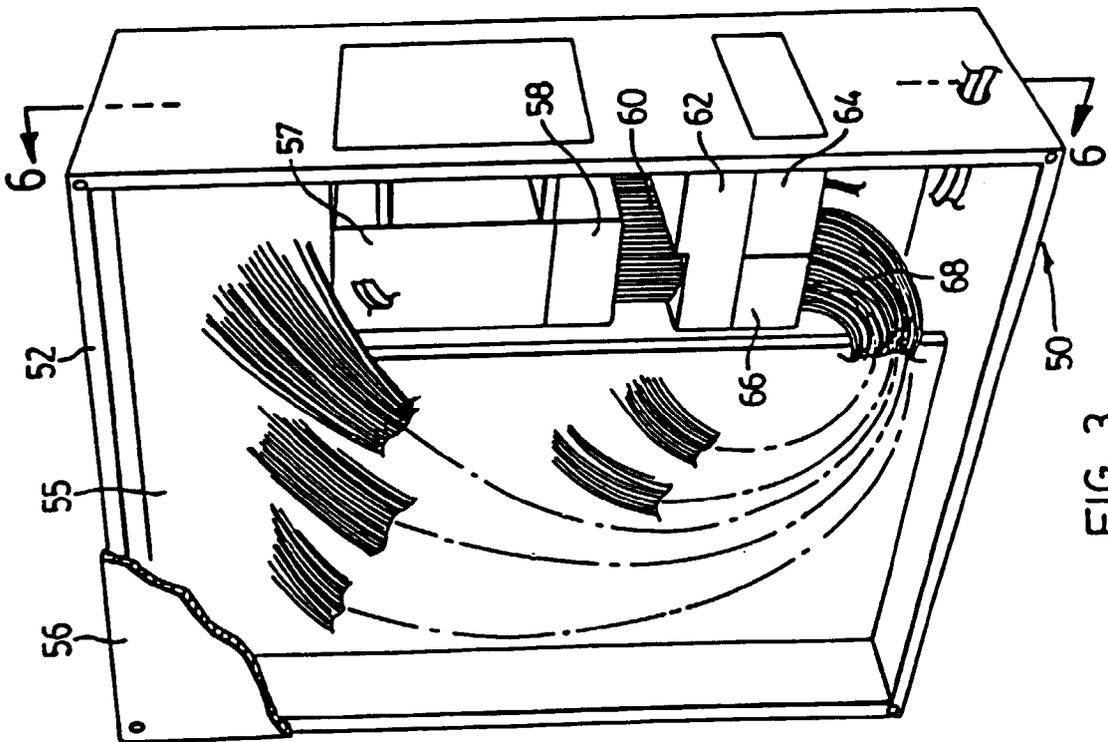
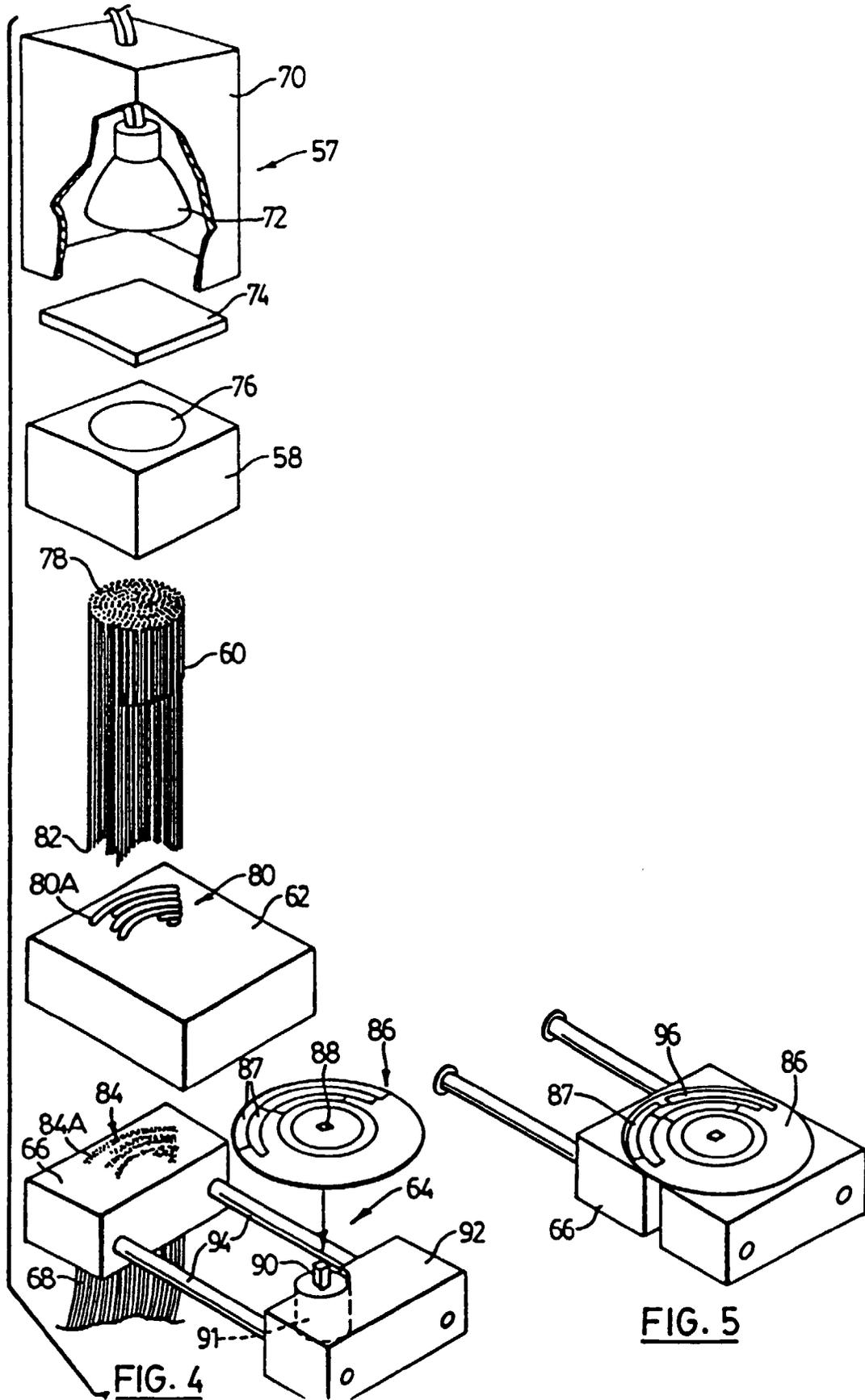


FIG. 3



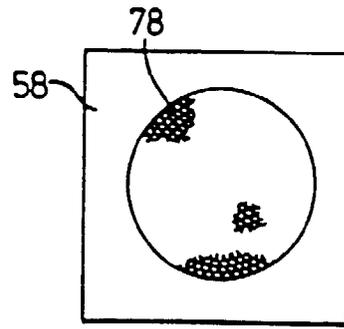
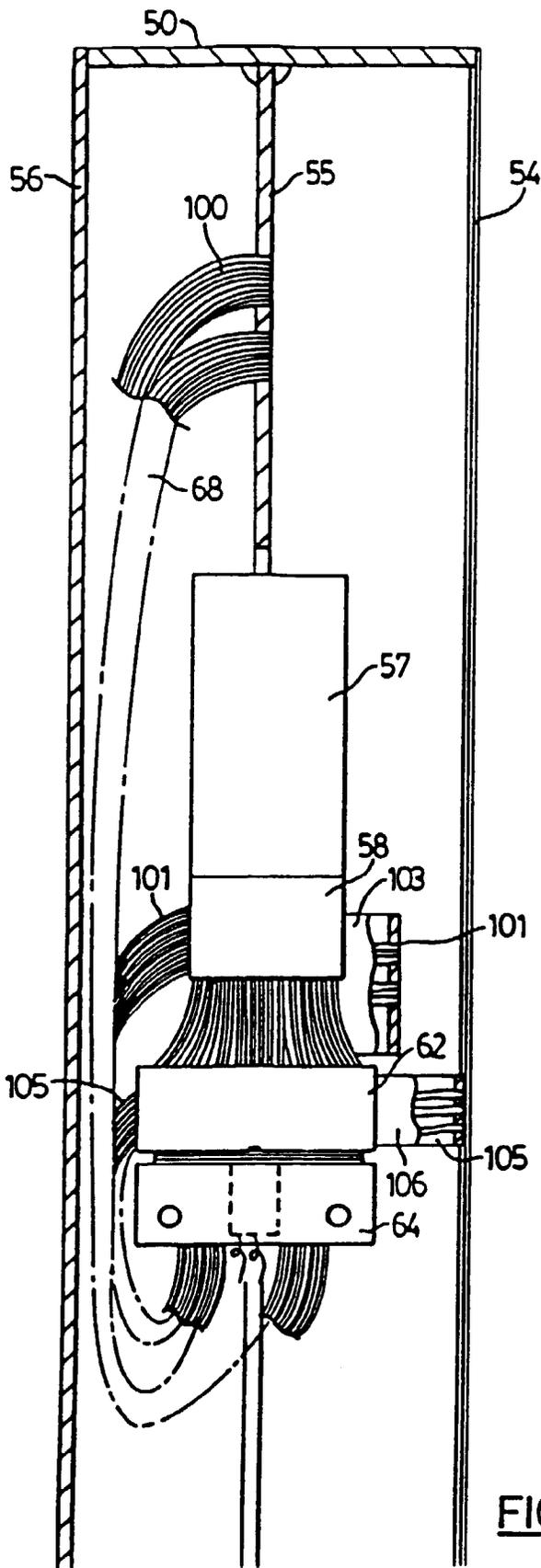


FIG. 7

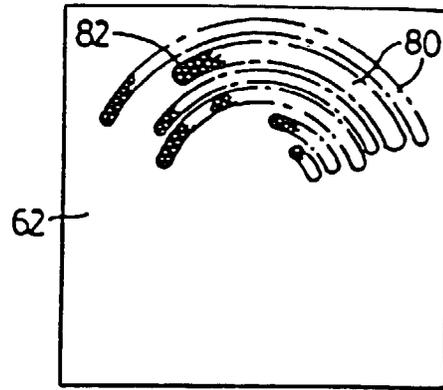


FIG. 8

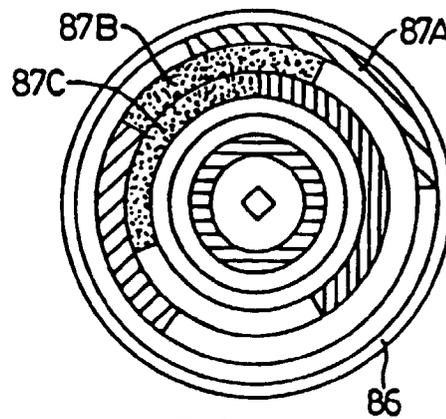
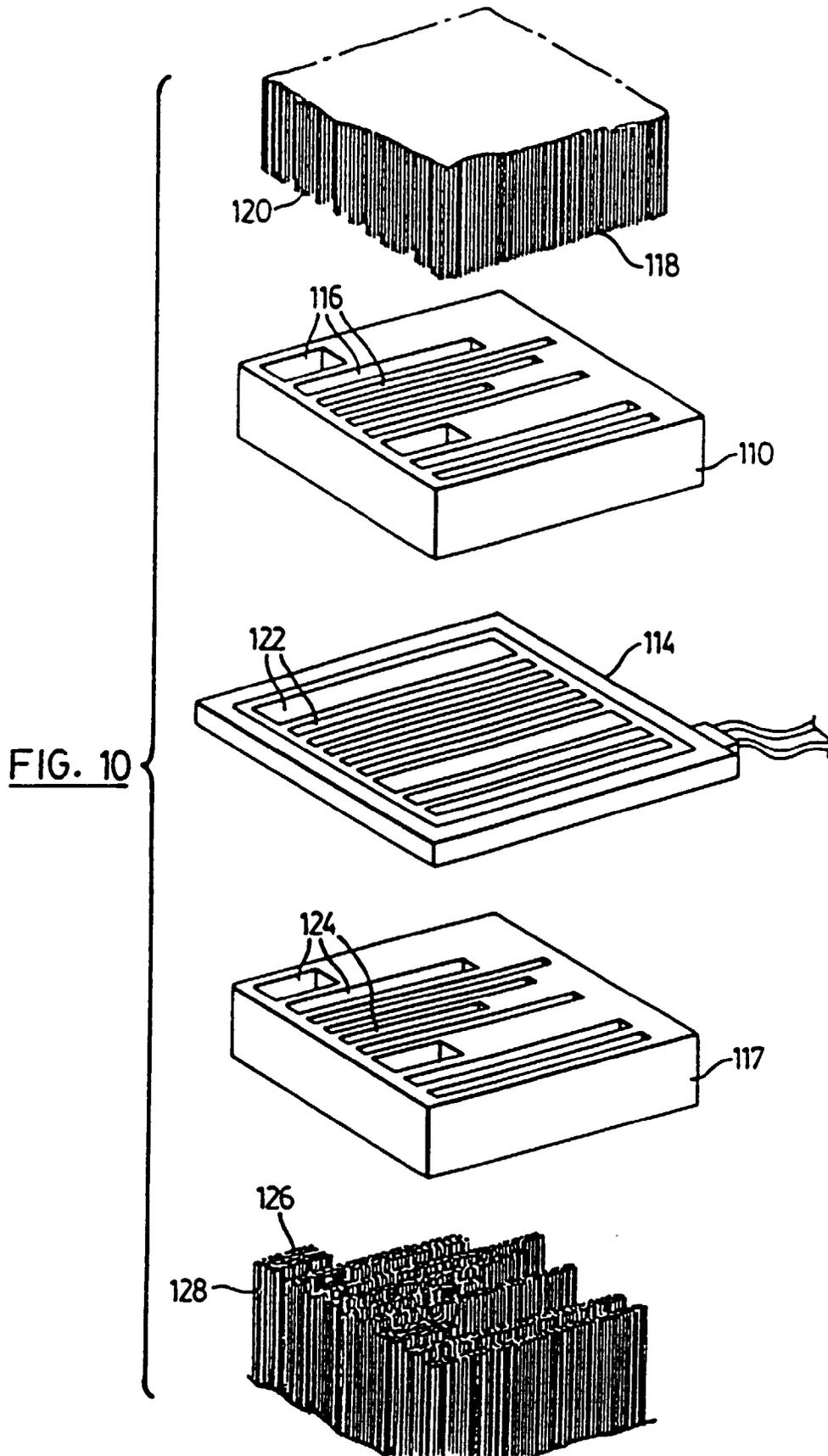


FIG. 9

FIG. 6



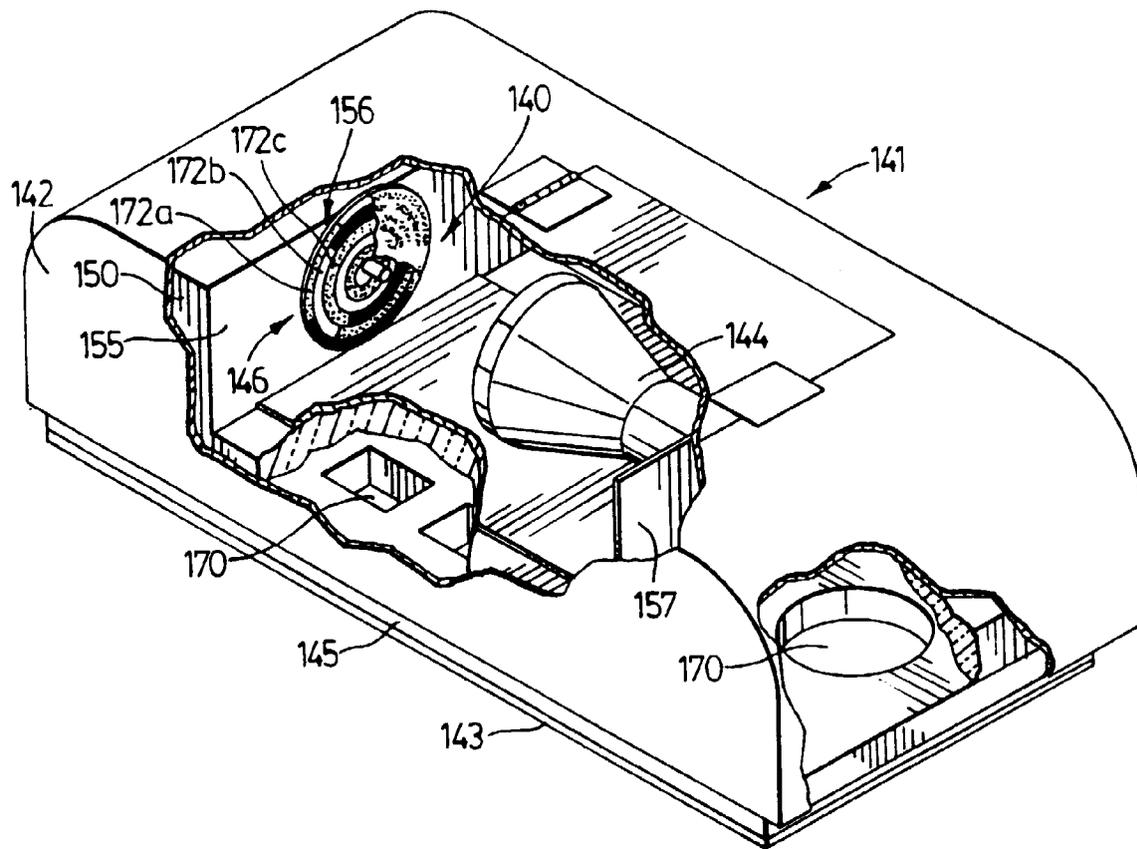


FIG. 11

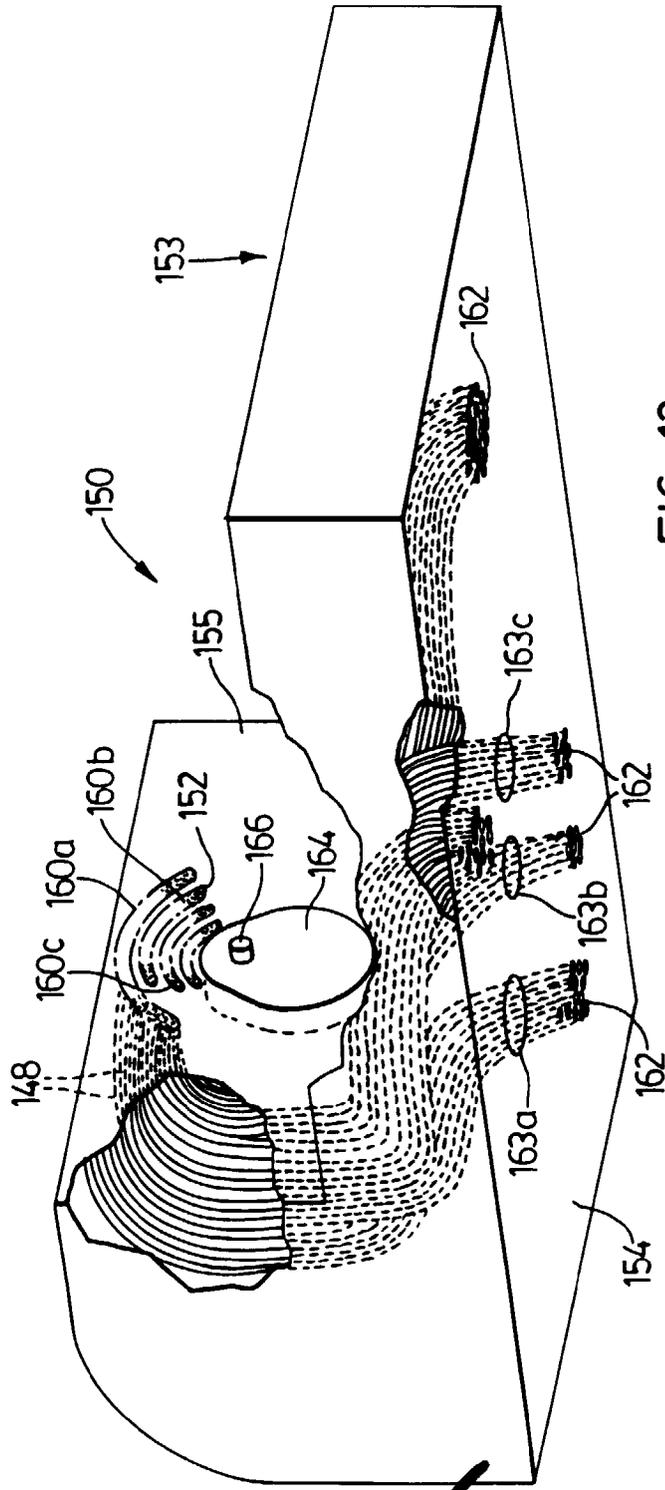


FIG. 12

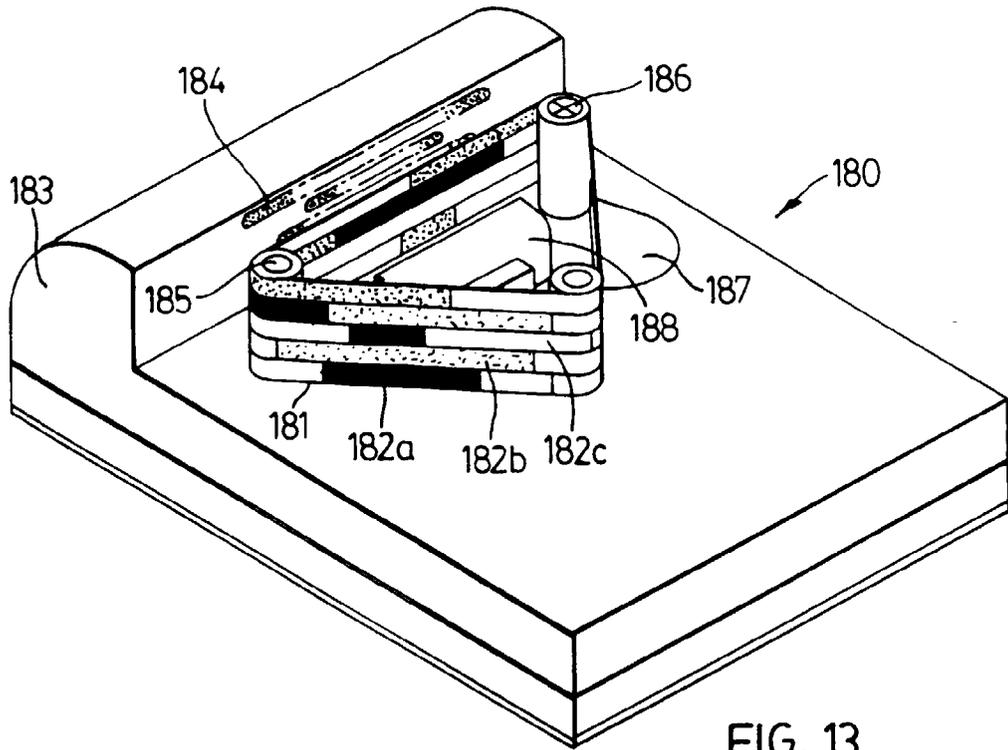


FIG. 13

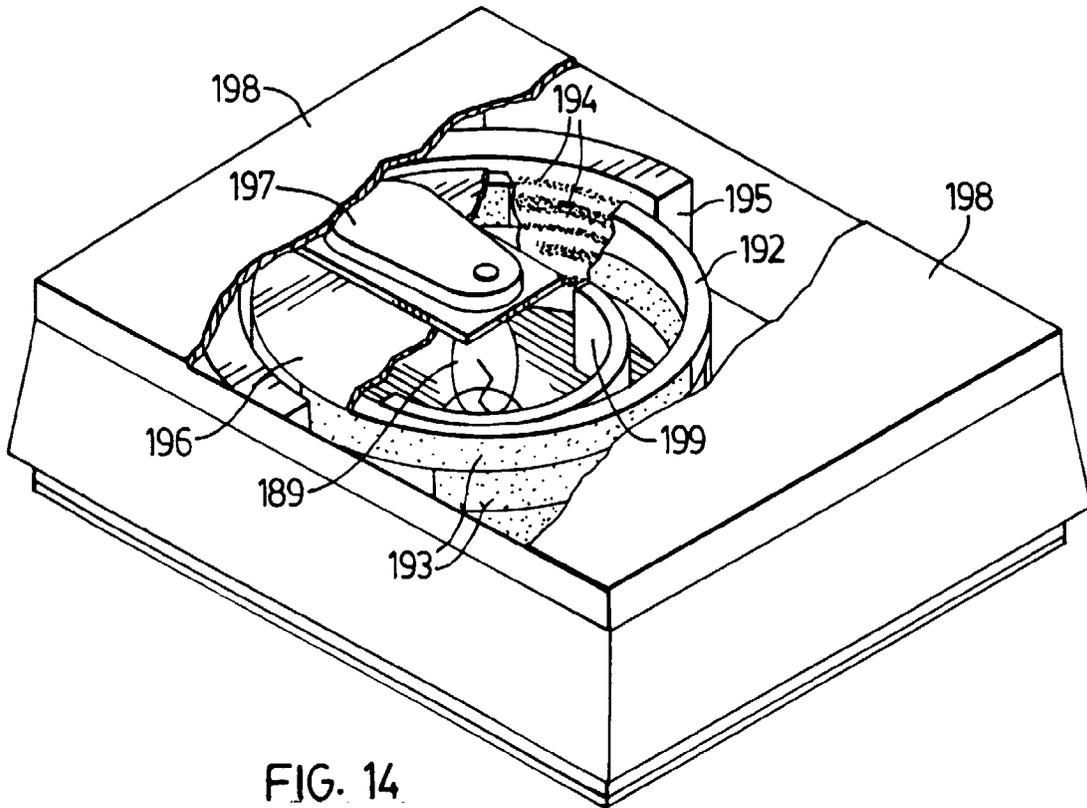


FIG. 14