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Varrin et al.

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(54) **DISPLAY SYSTEM HAVING PIXELS**

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(51) **Int. Cl.**
G09G 3/30 (2006.01)

(52) **U.S. Cl.** **345/76**; 345/77; 345/82; 345/84

(58) **Field of Classification Search** 345/76–84, 345/204–215
See application file for complete search history.

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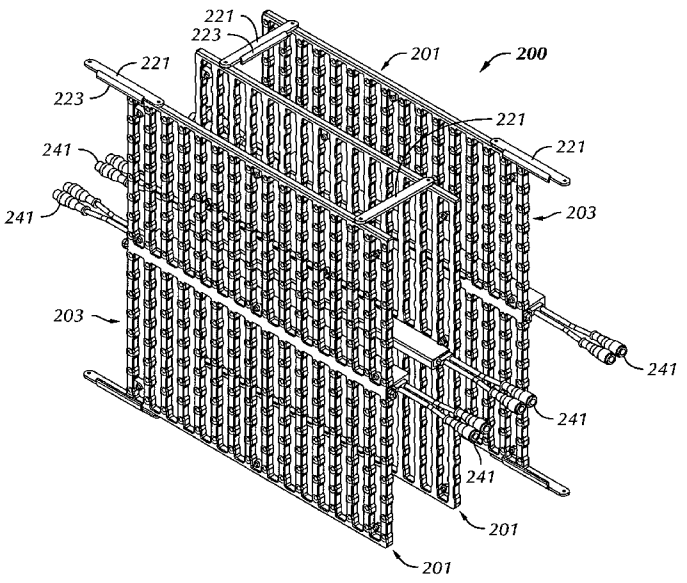
(57) **ABSTRACT**

A light emitting apparatus and a method of displaying an image therewith is disclosed. The light emitting apparatus includes a spine and a rib. The rib is attached to the spine and includes a plurality of alternating nodes and connection links. At least one of the connection links is thinner in cross-section than at least one of the nodes. The light emitting apparatus then further includes a connector to attach multiple light emitting apparatuses together. The light emitting apparatus further includes a plurality of pixels, in which the pixels are configured to receive a data signal and power.

15 Claims, 8 Drawing Sheets



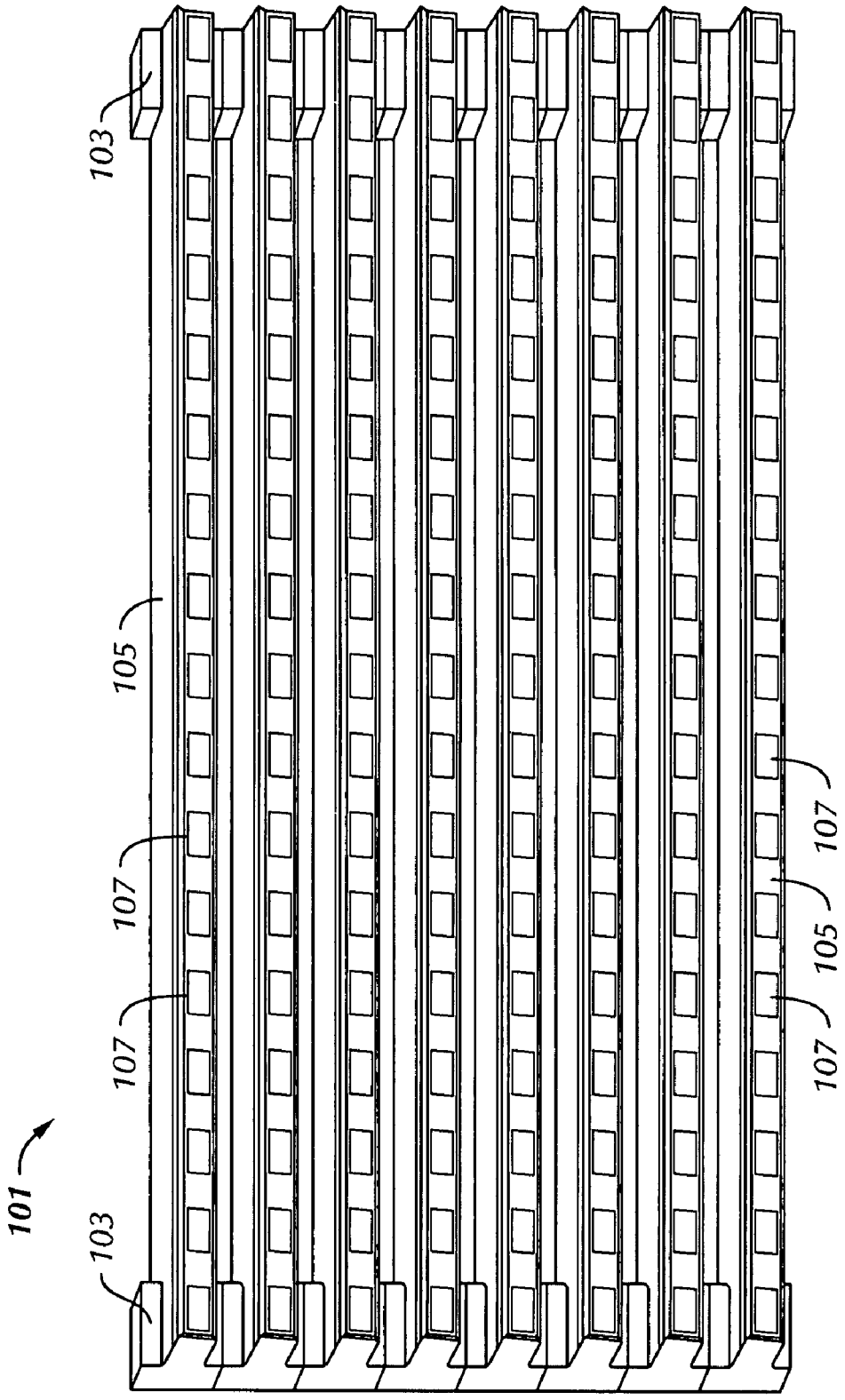
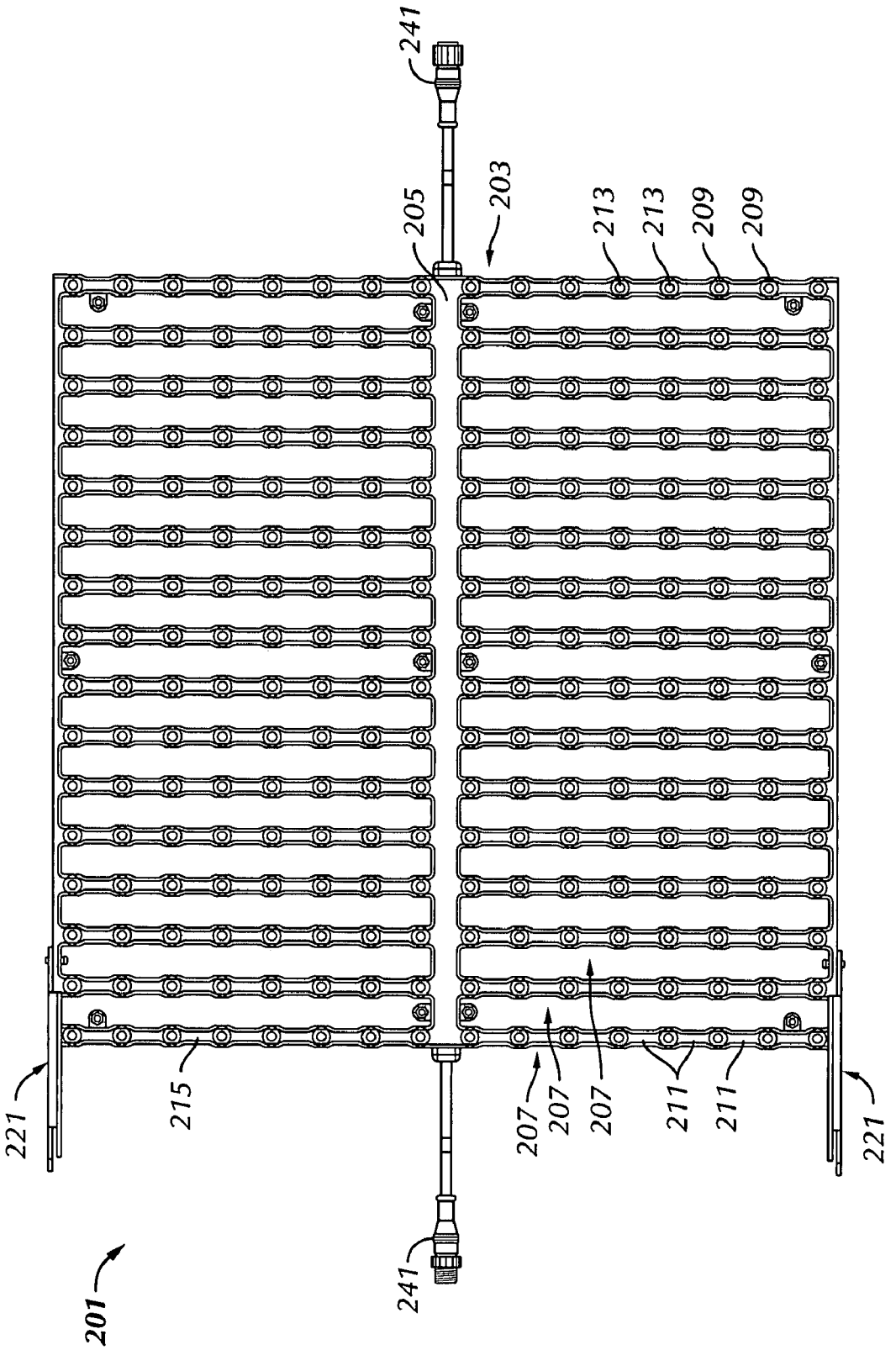


FIG. 1
(Prior Art)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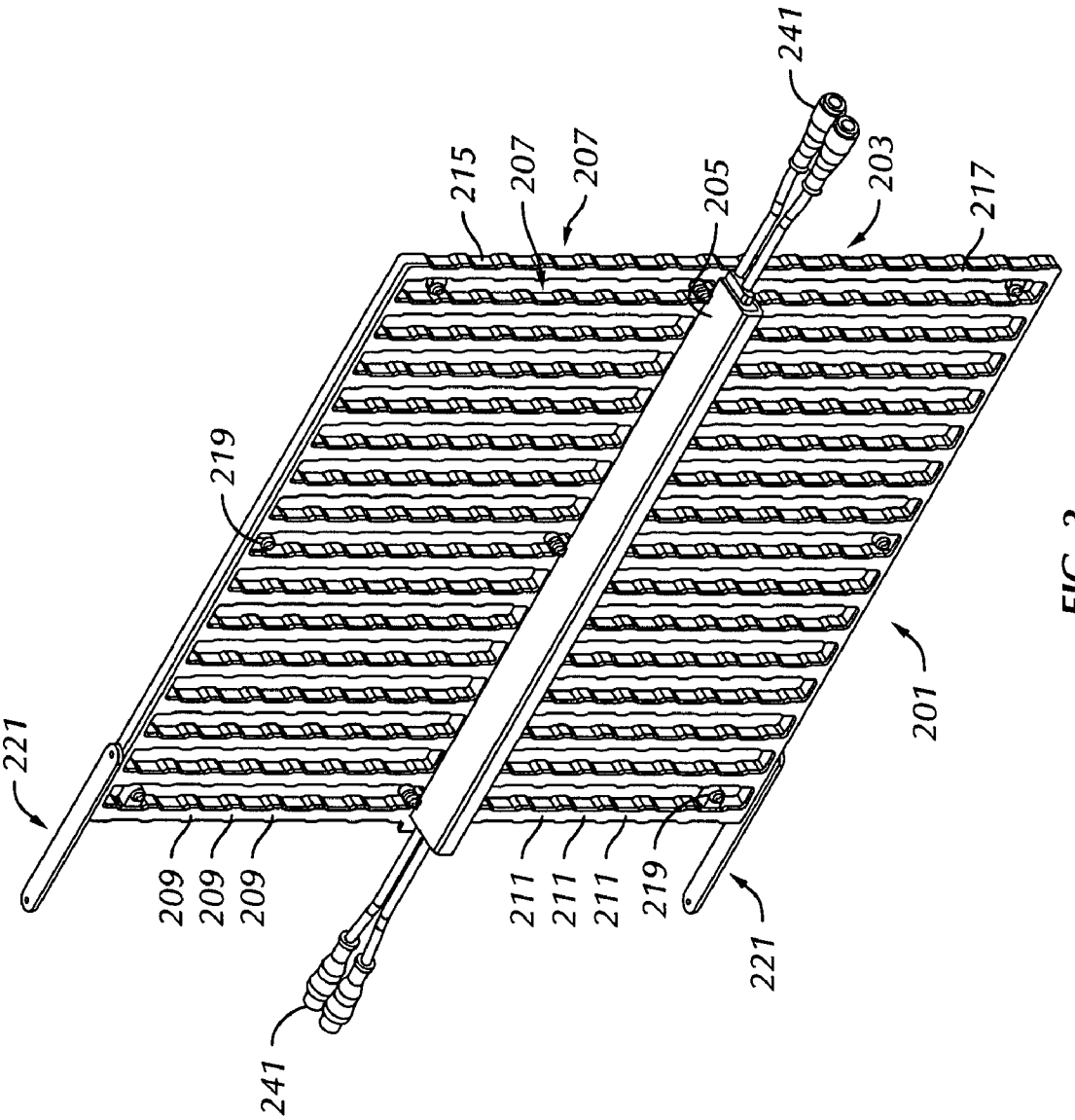
205
203
213
213
209
209
221
215
207
207
207
211
211
221
241
201

FIG.2


241
215
207
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205
203
217
219
221
209
209
209
211
211
211
219
221
201
241

FIG. 3

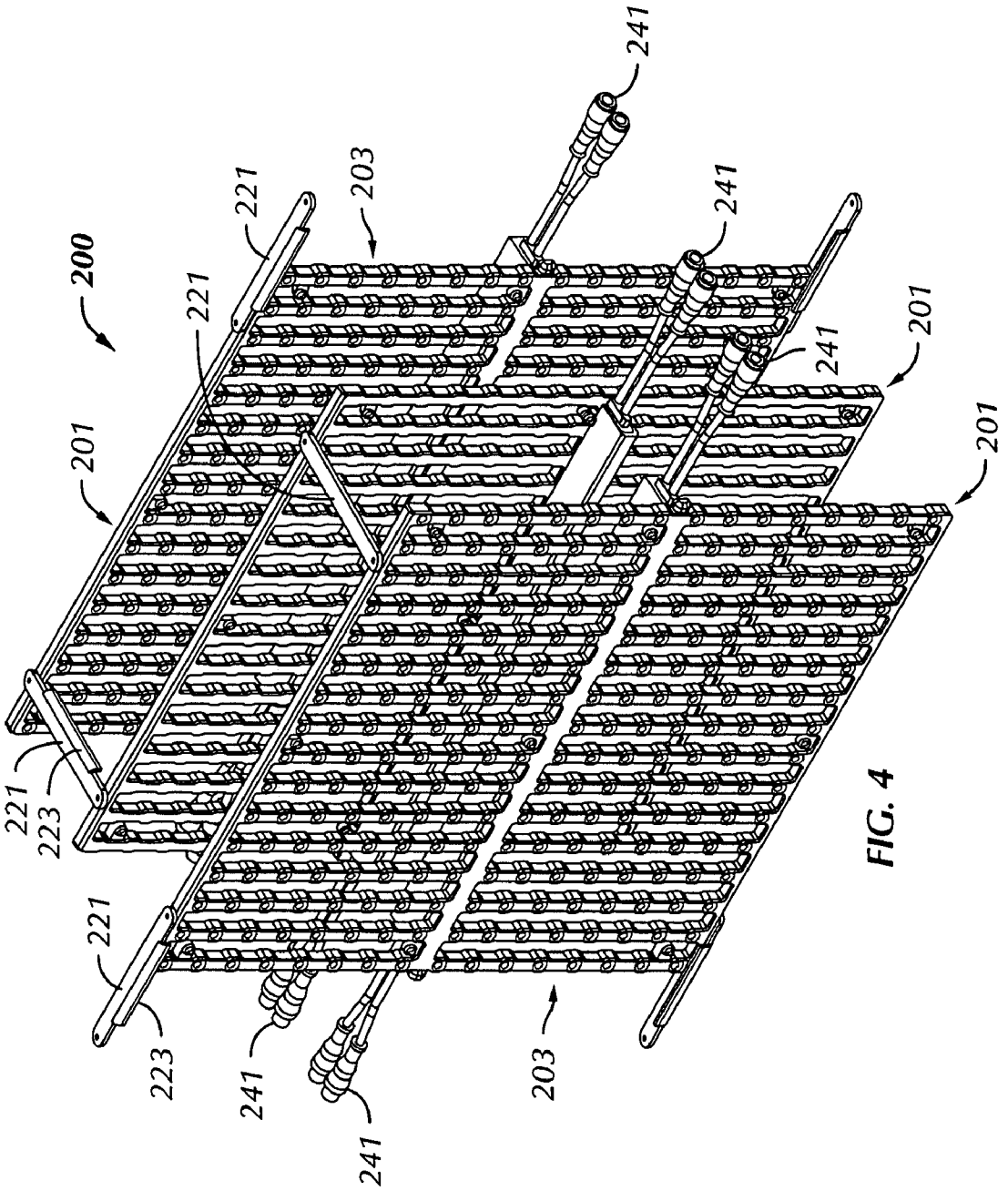
200
201
201
201
203
203
221
221
221
221
223
223
241
241
241
241
241

FIG. 4

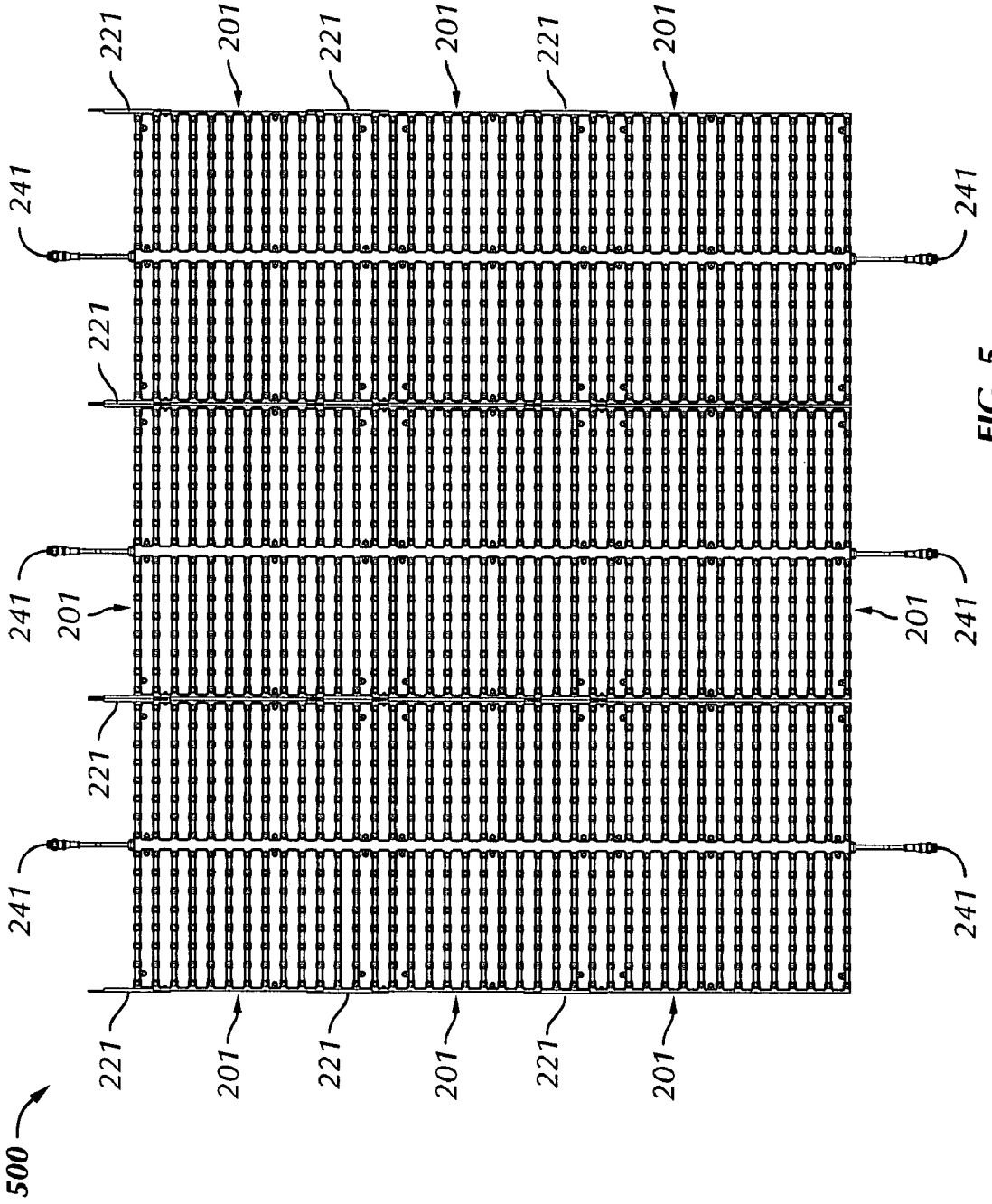

FIG. 5

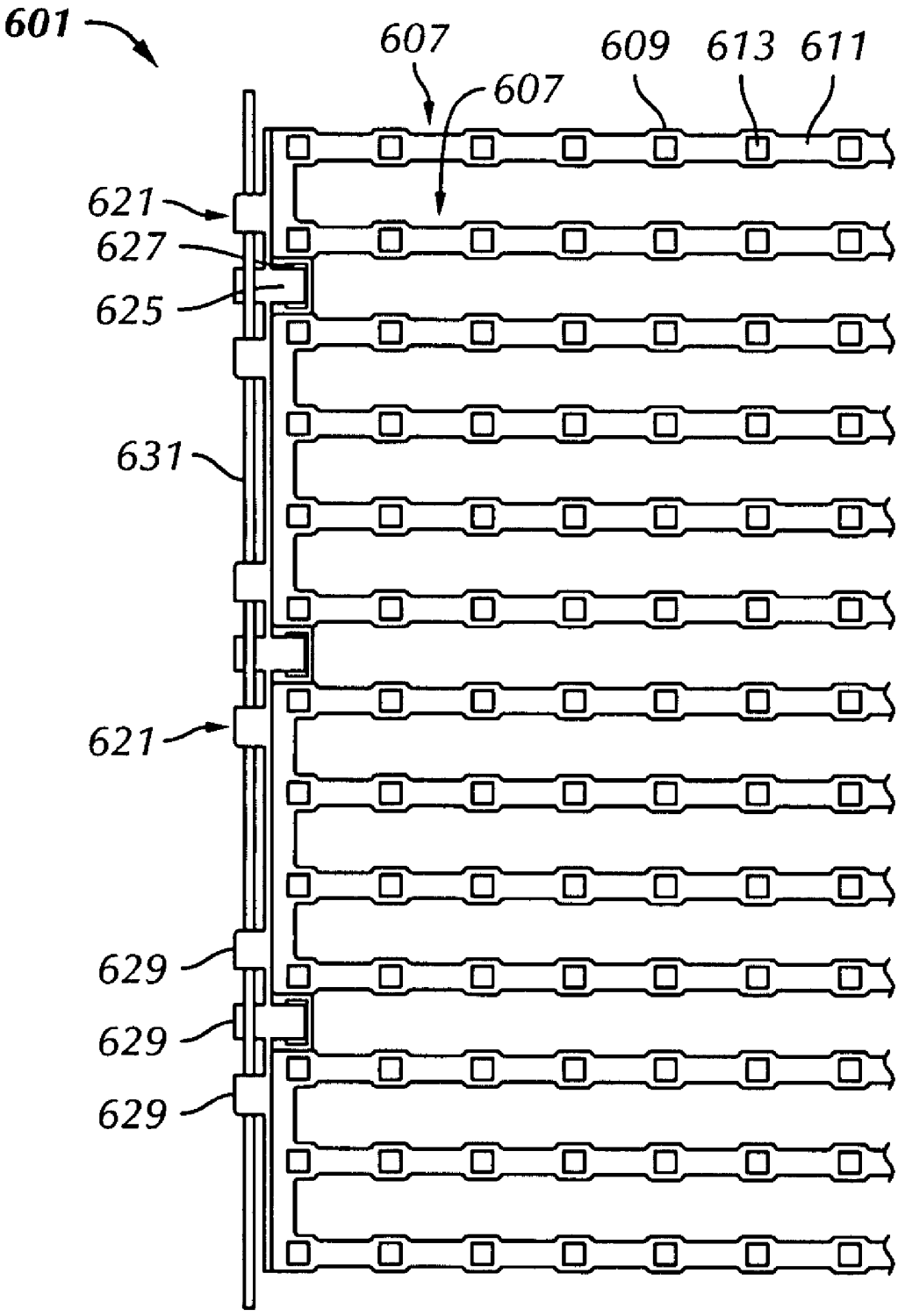

FIG. 6

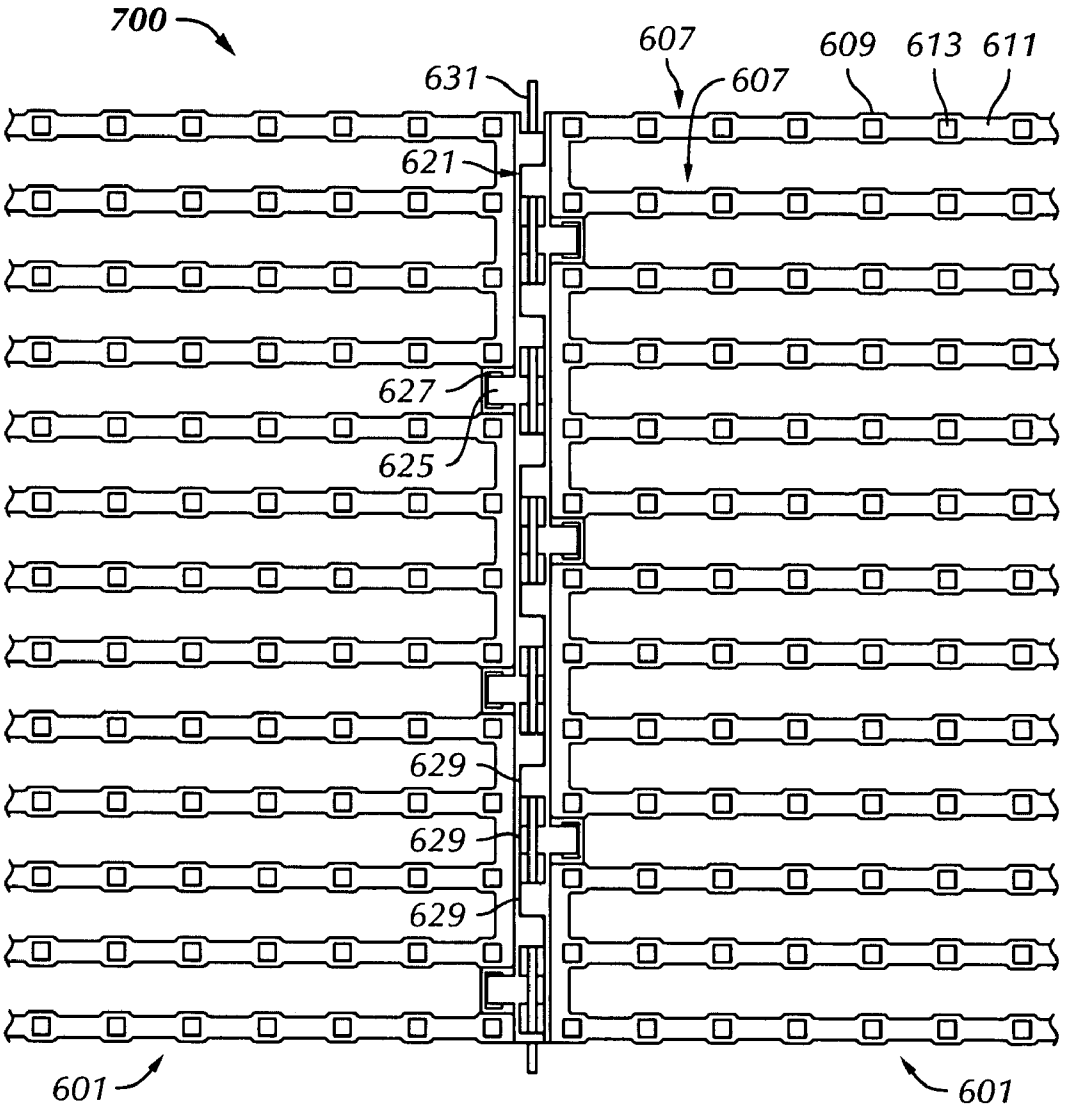

FIG. 7

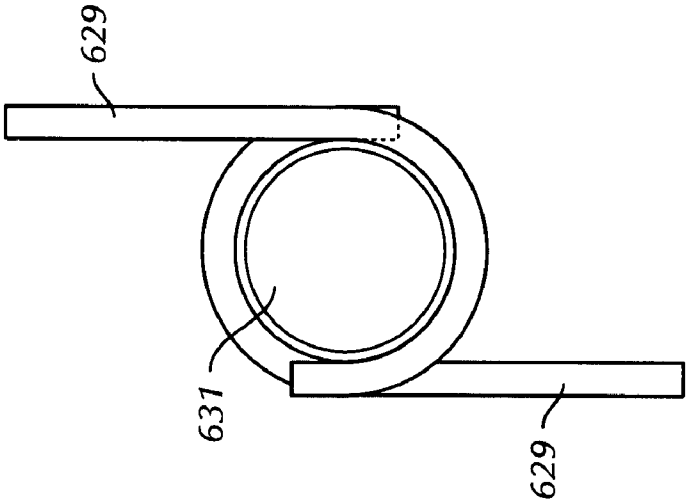
629
631
629

FIG. 9

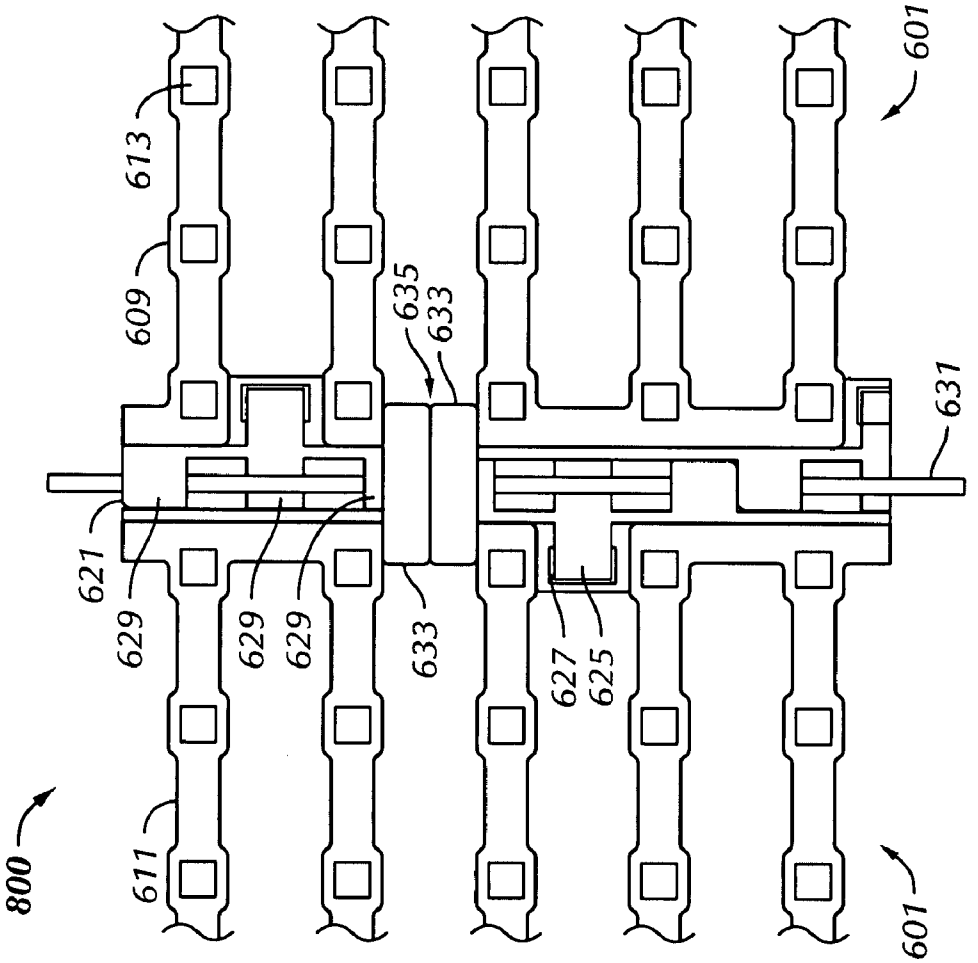
800
611
613
609
621
629
629
629
635
633
633
627
625
631
601
601

FIG. 8

DISPLAY SYSTEM HAVING PIXELS

CROSS-REFERENCE TO RELATED APPLICATIONS

This applications claims benefit, under 35 U.S.C. §119, of U.S. Provisional Application Ser. No. 60/796,451 filed on May 1, 2006 and entitled "Rid Based LED Cladding System with Obvious Nodes" in the name of Christopher Varrin, Nils Thoijussen, Matthew Ward, Jeremy Hochman, Jeff Maddox, and David Main. This application also claims benefit of U.S. Provisional Application Ser. No. 60/831,907 filed on Jul. 18, 2006 and entitled "Support and Connecting Structure for a Display System" in the name of Christopher Varrin and Jeff Maddox. The disclosures of these U.S. Provisional Applications are incorporated herein by reference in their entirety.

BACKGROUND OF DISCLOSURE

1. Field of the Disclosure

Embodiments disclosed herein generally relate to light emitting apparatuses and light emitting systems. More specifically, embodiments disclosed herein relate to an improved light emitting apparatus with pixels for use in various industries.

2. Background Art

Display units for entertainment, architectural, and advertising purposes have commonly been constructed of numbers of light emitting elements, such as light emitting diodes ("LEDs") or incandescent lamps mounted onto flat panels. These light emitting elements may be selectively turned on and off to create patterns, graphics, and video displays for both informational and aesthetic purposes. It is well known to construct these displays of tiles or large panels, each containing several light emitting elements, which may be assembled in position for an entertainment show or event, or as an architectural or advertising display. Examples of such systems are disclosed in U.S. Pat. Nos. 6,813,853, 6,704,989, 6,677,918, and 6,314,669.

As the LED video market expands into new domains, the classic fixed structure of the LED video panel may become a limitation. Designers, architects, and advertisers may desire the flexibility and versatility to use only one or a few products within the rapidly changing environment of the modem era. For example, a panel or modular box system may work well in a stadium score board or as an advertisement on the Las Vegas Strip, but the large panels may have limitations on transparency and weight.

As such, there may be a requirement at an event or within a theatrical production to use a display system that is easily removable, for example, in between scenes of a play or as the needs of the production may dictate. A display apparatus constructed as a large panel or as a series of solid tiles bolted or permanently fixed together may be very inappropriate for such an application or need. The displays may be large and heavy, and require abundant support machinery, time, and storage space for installation. For example, as disclosed in U.S. Pat. No. 6,704,989, issued to Lutz, an electronic signal display system requires the individual display sections be lifted out of storage cases with a lifting truss and then joined and stacked appropriately for display.

To improve upon these limitations, as described above, many existing products are being developed with a degree of transparency and to weigh less than their panel based counterparts. An example of such a prior art display apparatus is disclosed in U.S. Pat. No. 6,237,918, issued to Tokimoto, and incorporated by reference.

Referring to FIG. **1**, an example of a prior art display apparatus **101** is shown. Display apparatus **101** includes two posts **103** at each end of display apparatus **101** with parallel and uniformly spaced beams **105** attached thereto. Each beam **105** then includes multiple pixels **107** disposed thereon with uniform spacing between each of beams **105**.

However, several limitations may still prevent full usefulness of the prior art display apparatus. The display apparatus may still be overly cumbersome in weight. Next, the transparency of the apparatus may still be improved to decrease their visibility when not in use. Further, the rigging of the display apparatus may make it difficult assemble and/or disassemble the display system before and after use. Accordingly, there exists a need for a display apparatus and a display system that improves upon these prior art displays for continued development and success within the various light emitting industries.

SUMMARY OF INVENTION

In one aspect, embodiments disclosed herein relate to a light emitting apparatus. The light emitting apparatus includes a spine, a rib attached to the spine, and a connector configured to rotationally attach to another light emitting apparatus. The rib includes a plurality of nodes, each node having a pixel, and a plurality of connection links. The plurality of nodes alternate with the plurality of connection links to form the rib. Further, at least one of the plurality of connection links is thinner in cross-section than at least one of the plurality of nodes. Finally, the plurality of pixels are configured to receive a data signal and power.

In another aspect, embodiments disclosed herein relate to a system to display visual information. The system includes a first light emitting apparatus and a second light emitting apparatus, each having a plurality of pixels. A first connector and a second connector are attached to an edge of the first light emitting apparatus and the second light emitting apparatus, respectively. Further, the first connector and the second connector are configured to receive a support structure to connect the first and second light emitting apparatuses with one another.

In yet another aspect, embodiments disclosed herein relate to a method for displaying an image. The method includes providing a display apparatus, in which the display apparatus includes a rib attached to a spine, and a connector. The rib includes a plurality of nodes, each node having a pixel, and a plurality of connection links. The plurality of nodes alternate with the plurality of connection links to form the rib, and at least one of the plurality of connection links is thinner in cross-section than at least one of the plurality of nodes. The connector is configured to rotationally attach to another light emitting apparatus, and the plurality of pixels are configured to receive a data signal and power. The method further includes sending the data signal to the display apparatus, in which the plurality of pixels are further configured to display the image based on the data signal.

Other aspects and advantages of the invention will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** shows a view of a prior art display apparatus.

FIG. **2** shows a front perspective view of a light emitting apparatus in accordance with embodiments disclosed herein.

FIG. **3** shows a back perspective view of a light emitting apparatus in accordance with embodiments disclosed herein.

FIG. **4** shows a perspective view of a light emitting system in accordance with embodiments disclosed herein.

FIG. **5** shows another perspective view of a light emitting system in accordance with embodiments disclosed herein.

FIG. **6** shows an enlarged view of a light emitting apparatus having a connector in accordance with embodiments disclosed herein.

FIG. **7** shows an enlarged view of a light emitting system having multiple light emitting apparatuses in accordance with embodiments disclosed herein.

FIG. **8** shows another enlarged view of a light emitting system having multiple light emitting apparatuses in accordance with embodiments disclosed herein.

FIG. **9** shows an enlarged elevation view of fingers and a support structure in accordance with embodiments disclosed herein.

DETAILED DESCRIPTION

In one aspect, embodiments disclosed herein relate to a light emitting apparatus with increased transparency. The light emitting apparatus includes ribs, in which the ribs have thicker nodes interconnected by thinner links. In another aspect, embodiments disclosed herein relate to connectors disposed between light emitting apparatuses of a light emitting system. The connectors enable the light emitting apparatuses of the system to rotate with respect to one another as the light emitting apparatuses are interconnected within the system. Further, like elements in the various figures may be denoted by like reference numerals for consistency.

Referring to FIG. **2**, a front perspective view of a light emitting apparatus **201** in accordance with embodiments disclosed herein is shown. Light emitting apparatus **201** includes a frame **203** having a spine **205** with ribs **207** attached thereto. Ribs **207** may be formed with spine **205**, as shown, or ribs **205** may be removably attached to spine **205**. Further, ribs **207** include nodes. **209** interconnected with connection links **211**. Specifically, as shown, each of ribs **207** have nodes **209** and connection links **211**, in which nodes **209** alternate with connection links **211** (e.g., a first node attaches to a first connection link, the first connection link attaches to a second node, the second node attaches to a second connection link, and so forth) to form ribs **207**. Each of nodes **209** then may include pixels **213**, such as disposed within nodes **209**, to emit light. Thus, the light emitting apparatus may include multiple ribs attached to the spine, with each of the ribs including multiple pixels.

Light emitting apparatus **201** further includes electrical connectors **241** to supply a data signal and power to light emitting apparatus **201**. Specifically, as shown, electrical connectors **241** may attach to spine **205** of light emitting apparatus **201** and electrically connect to pixels **213** to supply a data signal and power to control pixels **213**. Electrical connectors **241** may electrically connect with adjacent light emitting apparatuses (not shown) or electrically connect to a source (not shown). Spine **205** and ribs **207** may then include cabling or circuit boards to electrically connect pixels **213** with electrical connectors **241** to transfer and supply the necessary data signals and power. As such, for pixels **213** to receive power, power received within electrical connectors **241** may be transmitted through spine **205** and through each of connection links **211** using a circuit board or electrical wires for each of pixels **213** within light emitting apparatus **201** to emit light.

Referring still to FIG. **2**, frame **203** of light emitting apparatus **201** may include a front housing **215** and a back housing (not shown). Front housing **215** and back housing may provide structural rigidity and protection of pixels **213** and any electrical components disposed therein. For example, front housing **215** may have a U-shaped cross-section at the areas of spine **205** and ribs **207** with a back housing attached thereto. Thus, electrical wires and/or circuit boards to electrically connect pixels **213** to electrical connectors **241** and supply the data signals and power may be disposed with frame **203** for protection. Further, because the light emitting apparatus may be used in an outdoor environment, as well as an indoor environment, the light emitting apparatus may include seals to provide a weather-resistant or a weather-proof construction. For example, a seal, such as all-weather glue, may be disposed at some or all of the areas between the front housing and the back housing to prevent any fluid from entering or exiting the light emitting apparatus.

The light emitting apparatuses in accordance with embodiments disclosed herein increases transparency to enhance visibility through the light emitting apparatuses when not in use. As such, the connection links may be minimized in cross-sectional area to increase the transparency. For example, the connection links may have a thinner cross-section than the nodes. The pixels within the nodes may then be very apparent, visible, and bright when the light emitting apparatus is in use, but the thinner connection links will increase transparency when the light emitting apparatus is not in use. To further reduce the size and cross-section of the connection links, electrical wires may be used instead of a circuit board to electrically connect the pixels within the light emitting apparatus. However, if a circuit board is used, the circuit board within each of the connection links and/or the spine may be oriented perpendicular with respect to a plane of the ribs. With this orientation, the thinner side of the circuit board will be exposed to the visible path through the light emitting apparatus to reduce the necessary cross-sectional area of the connection links. Thus, a number of techniques may be used to reduce the cross-section of the connection links relative to the nodes, thereby enhancing the transparency of the light emitting apparatus.

Referring now to FIG. **3**, a back perspective view of light emitting apparatus **201** in accordance with embodiments disclosed herein is shown. As discussed above, light emitting apparatus **201** includes frame **203** having spine **205** with ribs **207** attached thereto. Frame **203** then may include a front housing **215** and a back housing **217**. As shown, front housing **215** and back housing **217** may attach to one another using screws **219**. However, those having ordinary skill in the art will appreciate that the invention is not so limited, and any securing mechanism known in the art, such as bolts or adhesive materials, may be used without departing from the scope of the present invention. Further, in this embodiment, as indicated by the shape of spine **205**, spine **205** may include a circuit board disposed therein and oriented perpendicular to the plane of ribs **207**. This orientation of the circuit board within spine **205** may increase the rigidity of light emitting apparatus **201**, in addition to reducing the thickness and cross section of spine **205** to increase transparency of light emitting apparatus **201**.

As shown in FIGS. **2** and **3**, ribs **207** may be integrally formed with spine **205** within light emitting apparatus **201**. However, those having ordinary skill in the art will appreciate that the invention is not so limited, and in other embodiments, the ribs may be removably secured to the spine of the light emitting apparatus. For example, the ribs may attach to the spine through an interference fit such that the ribs may "snap" on-and-off with the spine, thereby enabling the ribs to be removably attached to the spine. Further, also shown in FIGS. **2** and **3**, connection links **211** may be integrally formed with

nodes **209** to form ribs **207**. However, those having ordinary skill in the art will appreciate that the invention is not so limited, and in other embodiments, the connection links and the nodes may also be removably secured to one another. For example, each of the connection links may attach to the nodes through an interference fit such that the connection links may snap on-and-off with nodes as appropriate. Enabling removable attachment of the ribs, the connection links, and the nodes would facilitate shaping the light emitting apparatus into, for example, letters, characters, or any other graphic designs.

Further, as described above, ribs **207** and spine **203** may be manufactured from a rigid material, such as having a rigid thicker plastic or metal. However, those having ordinary skill in the art will appreciate that the invention is not so limited, and in other embodiments, the ribs, the spine, and associated electrical wires and/or circuit boards may be manufactured from flexible materials. For example, using a thinner flexible plastic or metal to manufacture the ribs, the spine, and the associated wires and/or circuit boards, some or all of the components of the light emitting apparatus may be made flexible. As such, this would also facilitate shaping the light emitting apparatus into graphic designs.

Furthermore, those having ordinary skill in the art will appreciate that in the embodiments described herein, a pixel may include one or more light emitting elements. These light emitting elements may then include, for example, light emitting diodes (LEDs), organic LEDs (OLEDs), polymer LEDs (PLEDs), incandescent lamps, or any other lighting elements known in the art. Therefore, in one embodiment, a pixel may include a plurality of LEDs such that light of a desired color may be emitted from each pixel. For example, the pixel may include a red LED, a blue LED, and a green LED such that the intensity of each LED may be varied to produce a desired color, as is well known in the art. Further, those having ordinary skill in the art will appreciate that the pixels may be of any size and shape, such as square or circular, and the size and shape need not be uniform throughout the use in a system having multiple light emitting assemblies in accordance with embodiments disclosed herein. Furthermore, the pixels may also include driver circuits that vary the intensities of the lighting elements within the pixel.

Referring now to FIG. **4**, a perspective view of a light emitting system **200** having multiple light emitting apparatuses **201** in accordance with embodiments disclosed herein is shown. As shown in FIG. **4** (also shown in FIGS. **2** and **3**), light emitting apparatuses **201** may include connectors **221** disposed thereon or attached thereto. In this embodiment, connectors **221** are configured to rotationally attach or connect one light emitting apparatus **201** to an adjacent light emitting apparatus **221**. As such, one end of connectors **221** may attach to an edge of frame **203** of one light emitting apparatus **201**, and the other end of connectors **221** may then attach to an edge of a frame **203** of adjacent light emitting apparatus **201**.

Connectors **221** may then enable light emitting apparatuses **221** to rotate in alternating opposing directions, as shown in FIG. **4**, to fold light emitting system **200** into a stacked arrangement. This arrangement of light emitting apparatuses **201** may minimize the overall size of light emitting system **200** to facilitate storage and installation of system **200**. Connectors **221** may also contain prevention elements **223** to prevent rotation of light emitting apparatuses **201** in one direction, thereby only allowing rotation between adjacent light emitting apparatuses **201** with respect to one another in the other direction. These prevention mechanisms **227** may enable light emitting system **200** to form a rigid structure when light emitting system **200** is in a displayed arrangement and light emitting apparatuses **201** are arranged to form a single plane. Furthermore, when light emitting system **200** is in the stacked arrangement, connectors **221** may be used to form a rigid box structure between adjacent light emitting apparatuses **201**. For example, connectors **221** between two adjacent light emitting apparatuses **221** may be connected therebetween such that a rigid box structure is formed with two adjacent light emitting apparatuses **221**.

Referring now to FIG. **5**, another perspective view of a light emitting system **500** having multiple light emitting apparatuses **201** in accordance with embodiments disclosed herein is shown. In this embodiment, light emitting system **500** includes nine light emitting apparatuses **201**. System **500** is in a displayed arrangement such that light emitting apparatuses **201** are arranged to form a single plane. Further, FIG. **5** shows that connectors **221** may be used to connect adjacent light emitting apparatuses **201** to one another. Specifically, connectors **221** may be used to not only connect light emitting apparatuses **201** together vertically, but connectors **221** may also be used to connect light emitting apparatuses **201** together horizontally.

Referring now to FIG. **6**, an enlarged view of a light emitting apparatus **601** having a connector **621** in accordance with embodiments disclosed herein is shown. As discussed above, light emitting apparatus **601** includes a frame **603** having ribs **607** and a spine (not shown). Each of ribs **607** includes multiple connection links **611** and nodes **609**, in which pixels **613** that emit light are disposed within nodes **609**. Further, as shown in this embodiment, connector **621** is attached to an edge of light emitting apparatus **601**. Specifically, in this embodiment, connector **621** may be attached to light emitting apparatus through an interference fit. As shown, connector **621** may include a tab **625** that snaps into engagement with a hole **627** disposed within frame **603**. Thus, through the removable engagement of tab **625** and hole **627**, connector **621** may removably attach to the edge of light emitting apparatus **601**.

Further, connector **621** may include fingers **629** attached thereto or disposed thereon. In this embodiment, fingers **629** are attached to connector **621** by integrally forming fingers **629** therewith. Fingers **629** of connector **621** are then configured to receive a support structure **631**. The support structure may be a rigid rod, a flexible cable or wire, or any other similar support structure known in the art. Regardless, support structure **631** passes through fingers **629** such that connector **621** may rotate about and slide along support structure **631**.

A light emitting system may then be formed having multiple light emitting apparatuses. Each of the light emitting apparatuses may include a connector attached to an edge as shown in FIG. **6**. A support structure may then pass through each of the connectors of the light emitting apparatuses, thereby forming the light emitting system. As such, because the connectors may removably attach to each of the light emitting apparatuses, each of the light emitting apparatuses may be removed or replaced from the light emitting system while each of the connectors stay engaged with the support structure. For example, light emitting apparatus **601** may be removed or replaced while connector **621** stays engaged with support structure **631** because connector **621** may removably engage light emitting apparatus **601**.

Further, if the support structure is a rigid structure, such as a rigid rod, the rigid rod may pass through the fingers of the connector from one of the ends of the connector. However, as shown, the fingers of the connector may have a "U-shaped" design to only partially encompass or surround the support

structure. In such an embodiment, if the support structure is a flexible cable, such as a metal cable, the fingers of the connector may be placed around the support structure in any particular order without requiring the support structure to be installed first at one of the ends of the connector. This U-shape design of the fingers, therefore, may enable installation or removal of the connector from the support structure without requiring the support structure to pass through all of the fingers. As such, in a light emitting system having multiple light emitting apparatuses with connectors receiving a single support structure, one of the connectors may be removed from the system without having to remove adjacent connectors.

Referring now to FIG. **7**, an enlarged view of a light emitting system **700** having multiple light emitting apparatuses **601** in accordance with embodiments disclosed herein is shown. In this embodiment, light emitting system **700** includes two light emitting apparatuses **601**, each having a connector **621** with fingers **629**. Connectors **621** may be removably attached to light emitting apparatuses **601** through tabs **625** of connectors **621** removably engaging holes **627** of light emitting apparatus **601**. Further, as shown, multiple connectors **621** may engage support structure **631**. Specifically, in this embodiment, fingers **629** of connectors **621** interleave such that a single continuous support structure **631** may be used to assemble light emitting system **700** with adjacent light emitting apparatuses **601**.

Referring now to FIG. **8**, an enlarged view of a light emitting system **800** having multiple light emitting apparatuses **601** in accordance with embodiments disclosed herein is shown. In this embodiment, light emitting system **800** includes four light emitting apparatuses **601**, each light emitting apparatus **601** including a connector **621** with fingers **629**. Each of connectors **621** then engage support structure **631** to secure light emitting apparatuses **601** to support structure **631** and form light emitting system **800**.

Further, connectors **621** may include alignment nubs **633** disposed at one or more of the ends of connectors **621**. Similar to connectors **621**, alignment nubs **633** may be able to rotate about and slide along support structure **631**. As shown, alignment nubs **633** of adjacent connectors **621** may contact at a contact point **635**. This contact point **635** between adjacent alignment nubs **633** may facilitate accurate alignment between light emitting apparatuses **601** of light emitting system **800**. In one embodiment, if light emitting system **800** is oriented vertically, the force of gravity pushing down on light emitting apparatuses **601** may provide sufficient force to enable contact between alignment nubs **633** at contact point **635**. In another embodiment, if light emitting system **800** is oriented at other angles, then pressure may be provided by a spring or other pressure systems known in the art to light emitting apparatuses **601** to enable contact at contact point **635** between alignment nubs **633**.

Referring now to FIG. **9**, an enlarged elevation view of fingers **629** and a support structure **631** in accordance with embodiments disclosed herein is shown. As shown and discussed above, fingers **629** of connectors **621** (shown in FIGS. **6-8**) may have a "U-shaped" design. With a U-shaped design, fingers **629** may only partially encompass or surround support structure **631**. Thus, if support structure **631** is a flexible support structure, fingers **629** may be removably attached to support structure **631** without requiring support structure **631** to pass through all of fingers **629** at one end. However, those having ordinary skill in the art will appreciate that the invention is not so limited, and the fingers of the connectors may fully encompass or surround to the support structure when attaching the light emitting apparatuses thereto.

Embodiments of the present disclosure may provide for one or more of the following advantages. First, embodiments disclosed herein may provide for a light emitting apparatus having increased transparency. With decreased cross-section of the connection links, the light emitting apparatus may increase transparency, especially when not in use. Further, embodiments disclosed herein may provide for a light emitting apparatus having a decreased weight. By eliminating any excess material of a light emitting apparatus, the light emitting apparatus becomes lighter, which facilitates installation. Finally, embodiments disclosed herein may provide for a light emitting apparatus and a light emitting system that has a rigid structure. With a rigid structure, the light emitting apparatus may provide protection and support for the light emitting system to manage larger loads and stresses.

While the invention has been described with respect to a limited number of embodiments, those skilled in the art, having benefit of this disclosure, will appreciate that other embodiments can be devised which do not depart from the scope of the invention as disclosed herein. Accordingly, the scope of the invention should be limited only by the attached claims.

What is claimed is:

1. A method for displaying an image, the method comprising:
- providing a display apparatus, wherein the display apparatus comprises:
  - a rib attached to a spine, wherein the rib comprises:
    - a plurality of nodes, each node comprising a pixel; and
    - a plurality of connection links;
    - wherein the plurality of nodes alternate with the plurality of connection links to form the rib; and
    - wherein at least one of the plurality of connection links is thinner in cross-section than at least one of the plurality of nodes; and
  - a connector configured to rotationally attach to another light emitting apparatus;
  - wherein the plurality of pixels are configured to receive a data signal and power; and
- sending the data signal to the display apparatus, wherein the plurality of pixels are further configured to display the image based on the data signal.

2. A light emitting apparatus, comprising:
- a spine;
- a rib attached to the spine, wherein the rib comprises:
  - a plurality of nodes, each node comprising a pixel; and
  - a plurality of connection links;
  - wherein the plurality of nodes alternate with the plurality of connection links to form the rib; and
  - wherein at least one of the plurality of connection links is thinner in cross-section than at least one of the plurality of nodes; and
- a connector configured to rotationally attach to another light emitting apparatus;
- wherein the plurality of pixels are configured to receive a data signal and power.

3. The light emitting apparatus of claim **2**, further comprising:
- a frame, wherein the frame comprises the spine and the rib;
- a circuit board disposed within the frame, wherein at least one of the plurality of pixels is disposed upon and electrically connected to the circuit board.

4. The light emitting apparatus of claim **3**, wherein the frame further comprises:
- a front housing; and
- a back housing configured to connect to the front housing;

wherein the circuit board is disposed between the front housing and the back housing.

5. The light emitting apparatus of claim **4**, wherein the rib comprises a plurality of ribs, wherein each of the plurality of ribs is attached to the spine such that the ribs are aligned substantially parallel with one another and form a plane, wherein the circuit board is oriented perpendicular with respect to the plane within the frame.

6. The light emitting apparatus of claim **2**, wherein each of the plurality of connection links is thinner than each of the plurality of nodes.

7. The light emitting apparatus of claim **2**, wherein the connector comprises a hinge to rotationally attach to another apparatus.

8. The light emitting apparatus of claim **2**, wherein the connector attaches to an edge of the light emitting apparatus.

9. The light emitting apparatus of claim **2**, wherein the connector is configured to receive a support structure to attach to another light emitting apparatus.

10. The light emitting apparatus of claim **9**, wherein the connector comprises fingers to receive the support structure.

11. The light emitting apparatus of claim **10**, wherein the connector is configured to rotationally engage the support structure.

12. The light emitting apparatus of claim **2**, wherein the plurality of pixels each comprise at least one light emitting elements selected from the group consisting of: a light emitting diode (LED), an organic light emitting diode (OLED), a polymer light emitting diode (PLED), and an incandescent lamp.

13. The light emitting apparatus of claim **2**, wherein the plurality of pixels comprise a red LED, a green LEDD, and a blue LED.

14. The light emitting apparatus of claim **2**, further comprising:

electrical connectors attached to the spine and electrically connected to the plurality of pixels to supply the data signal and power.

15. A system comprising a plurality of light emitting apparatuses as recited in claim **2**.

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