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(54) **SELF-SUFFICIENT PORTABLE HEATING SYSTEM USING RENEWABLE ENERGY**

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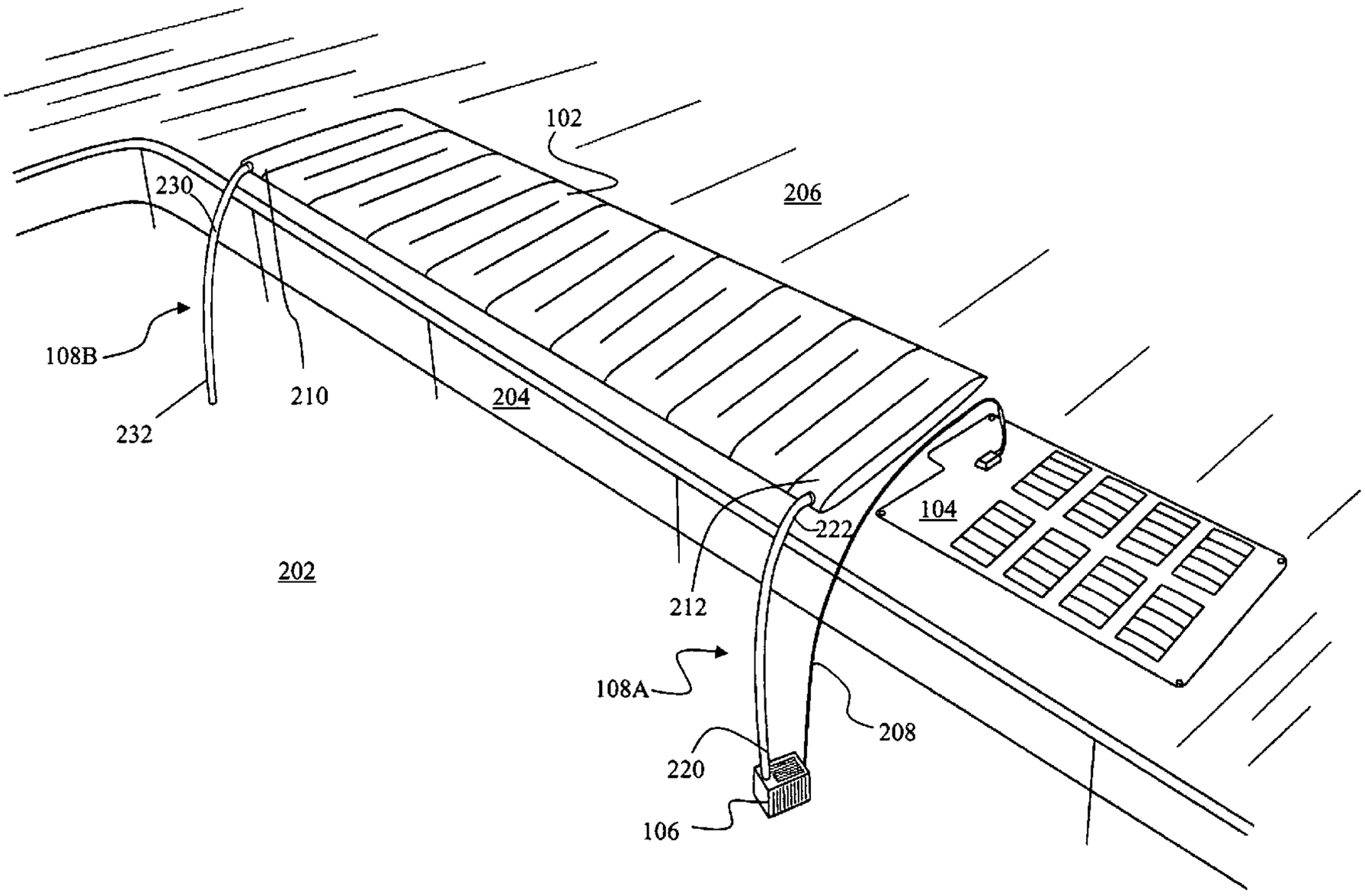
(57) **ABSTRACT**

The present invention discloses a heating system using renewable energy, comprising a portable heat collector using renewable energy to heat water. The present invention further includes a portable power source using renewable energy to generate electricity, and a portable pump coupled with the portable power source and powered to move water from a source into and through the portable heat collector for increasing water temperature, and return water back to the source as heated water.



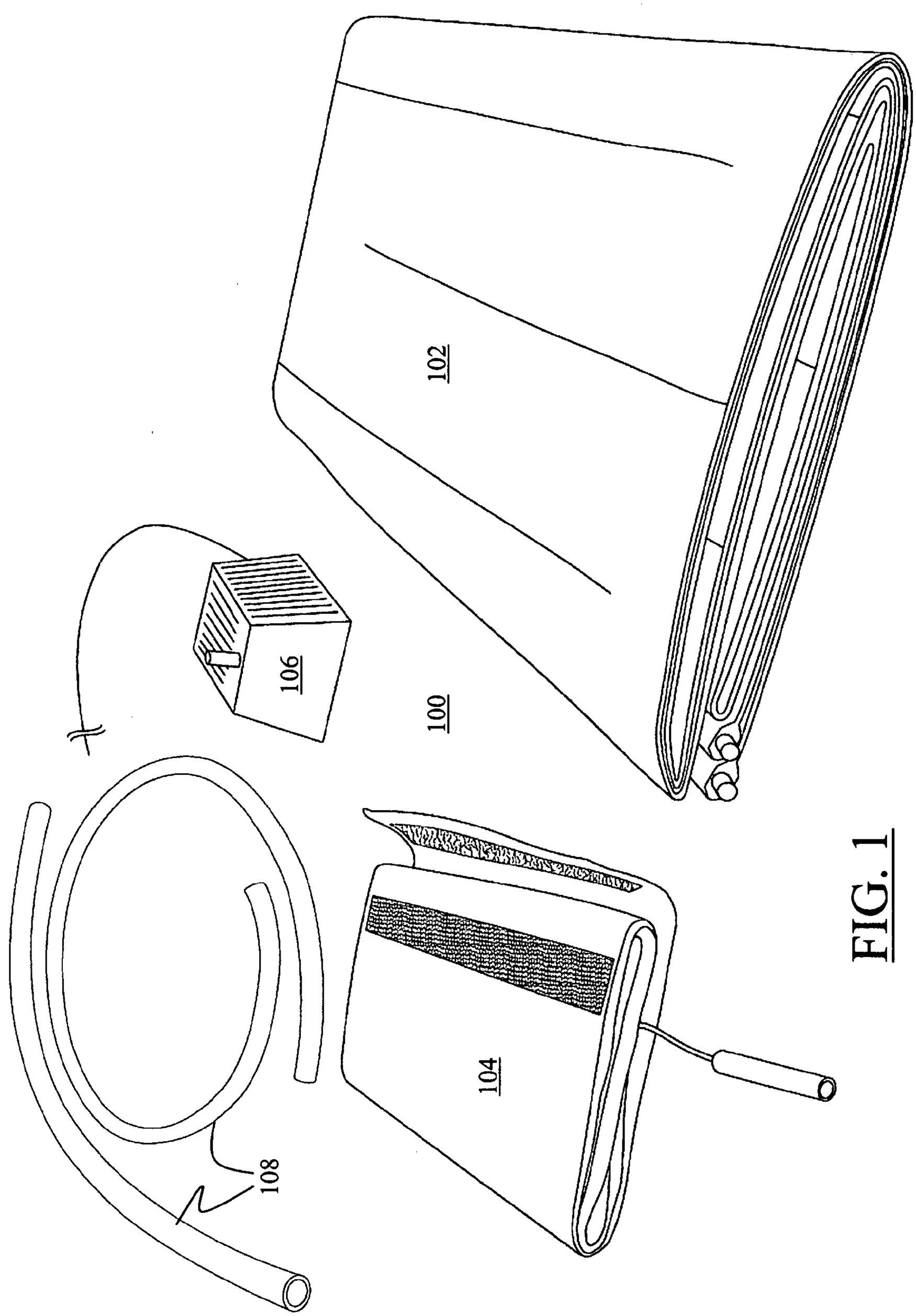


FIG. 1

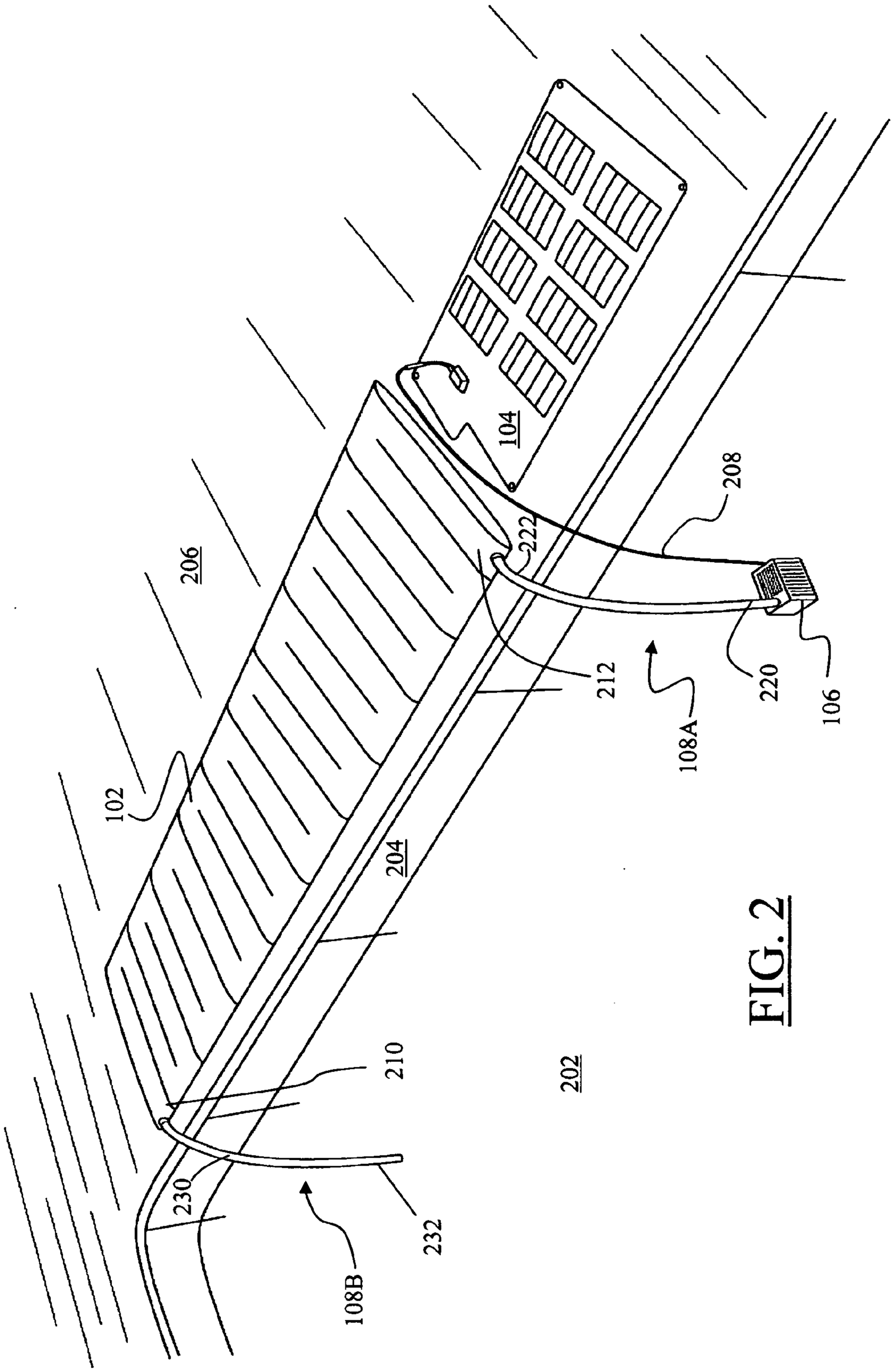
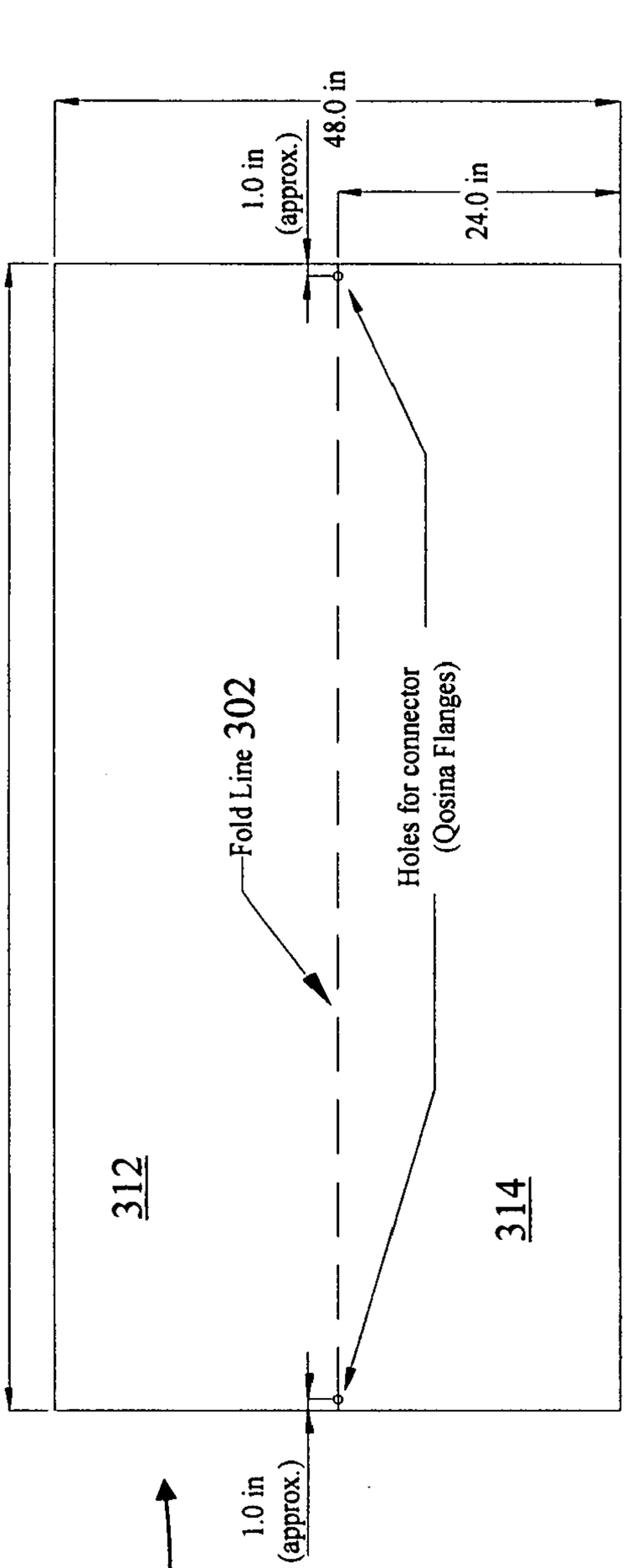


FIG. 2


48.0 in
1.0 in
(approx.)
24.0 in
96.0 in
Fold Line 302
Holes for connector
(Qosina Flanges)
312
314
102
1.0 in
(approx.)

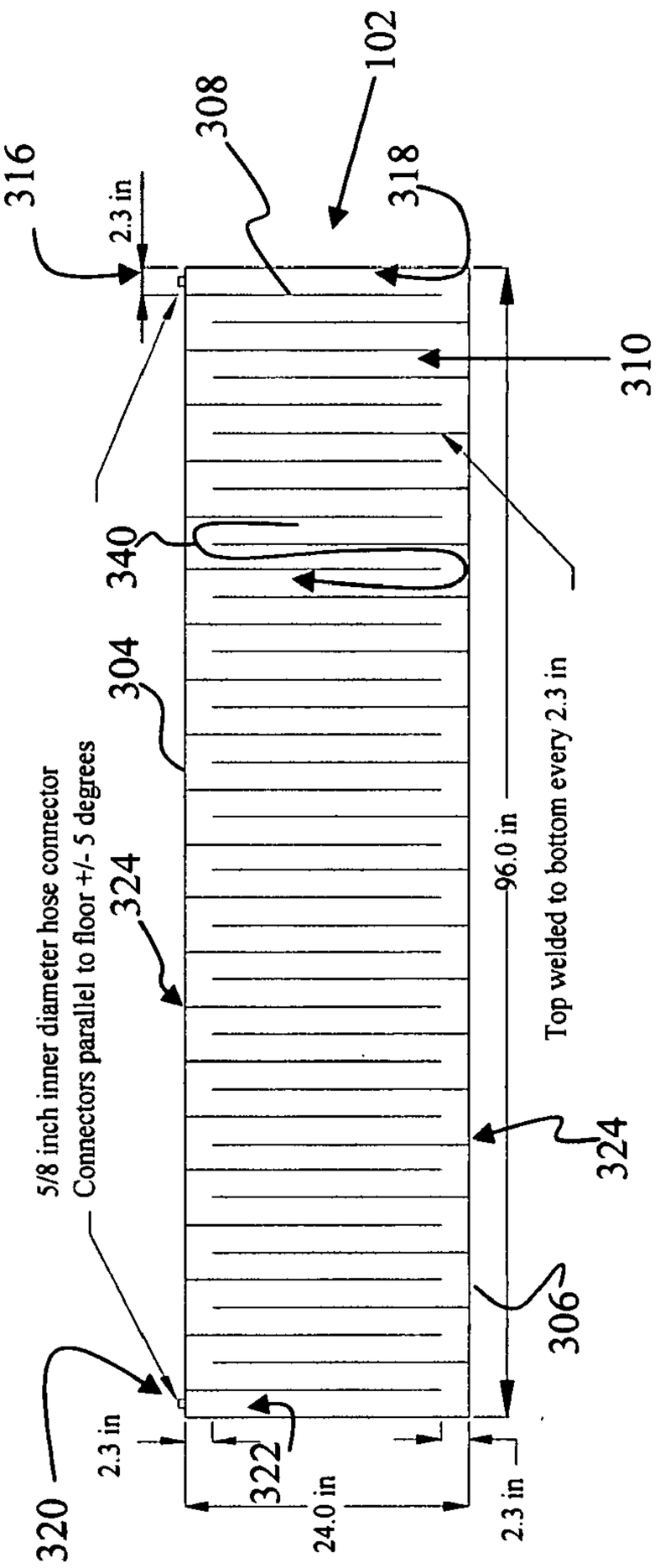

316
2.3 in
308
102
318
310
340
304
5/8 inch inner diameter hose connector
Connectors parallel to floor +/- 5 degrees
324
96.0 in
Top welded to bottom every 2.3 in
324
320
2.3 in
322
24.0 in
2.3 in
306
Vinyl Material 20 or 30 mils, dark or black in color and UV stabilized.

FIG. 3

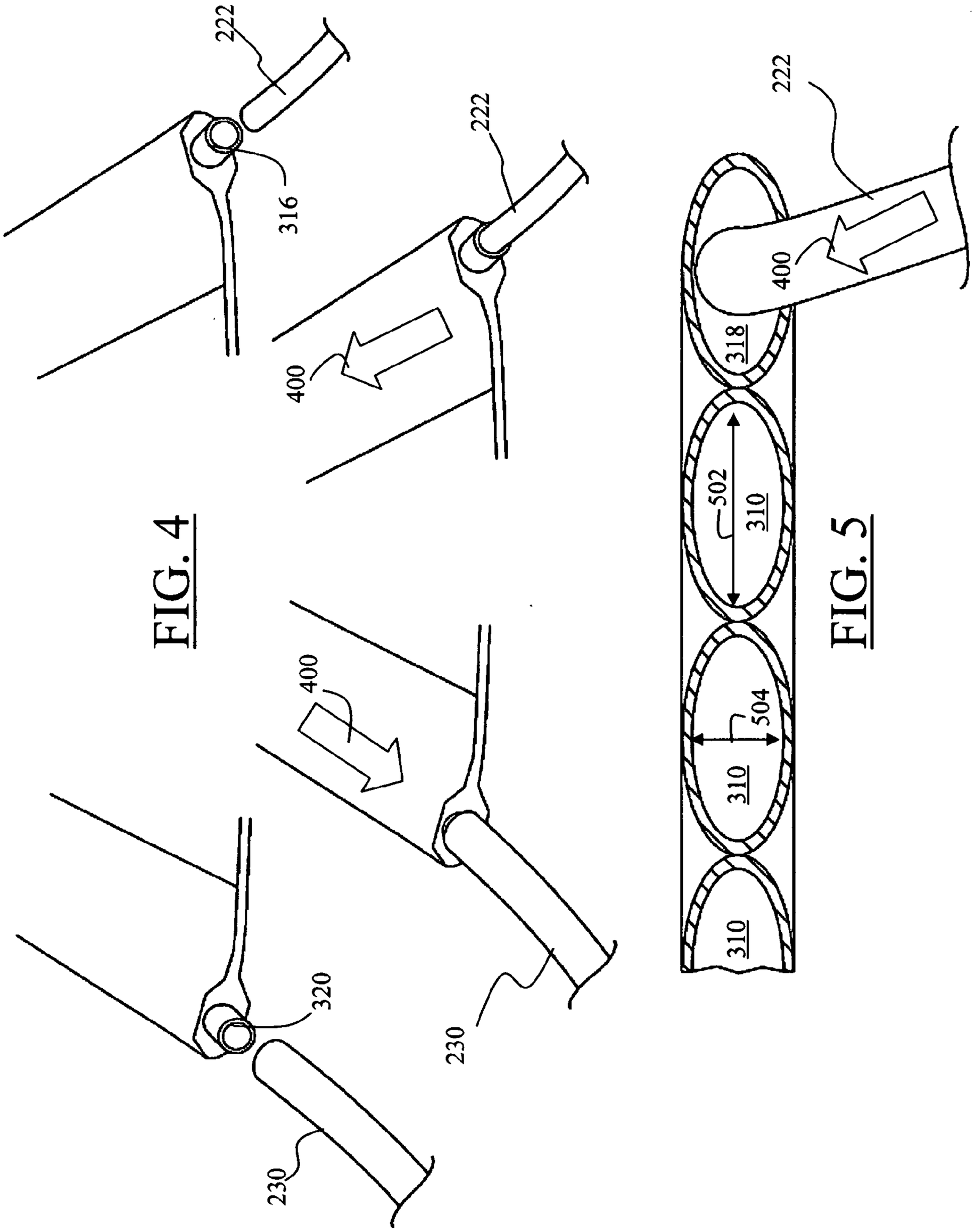


FIG. 4

FIG. 5

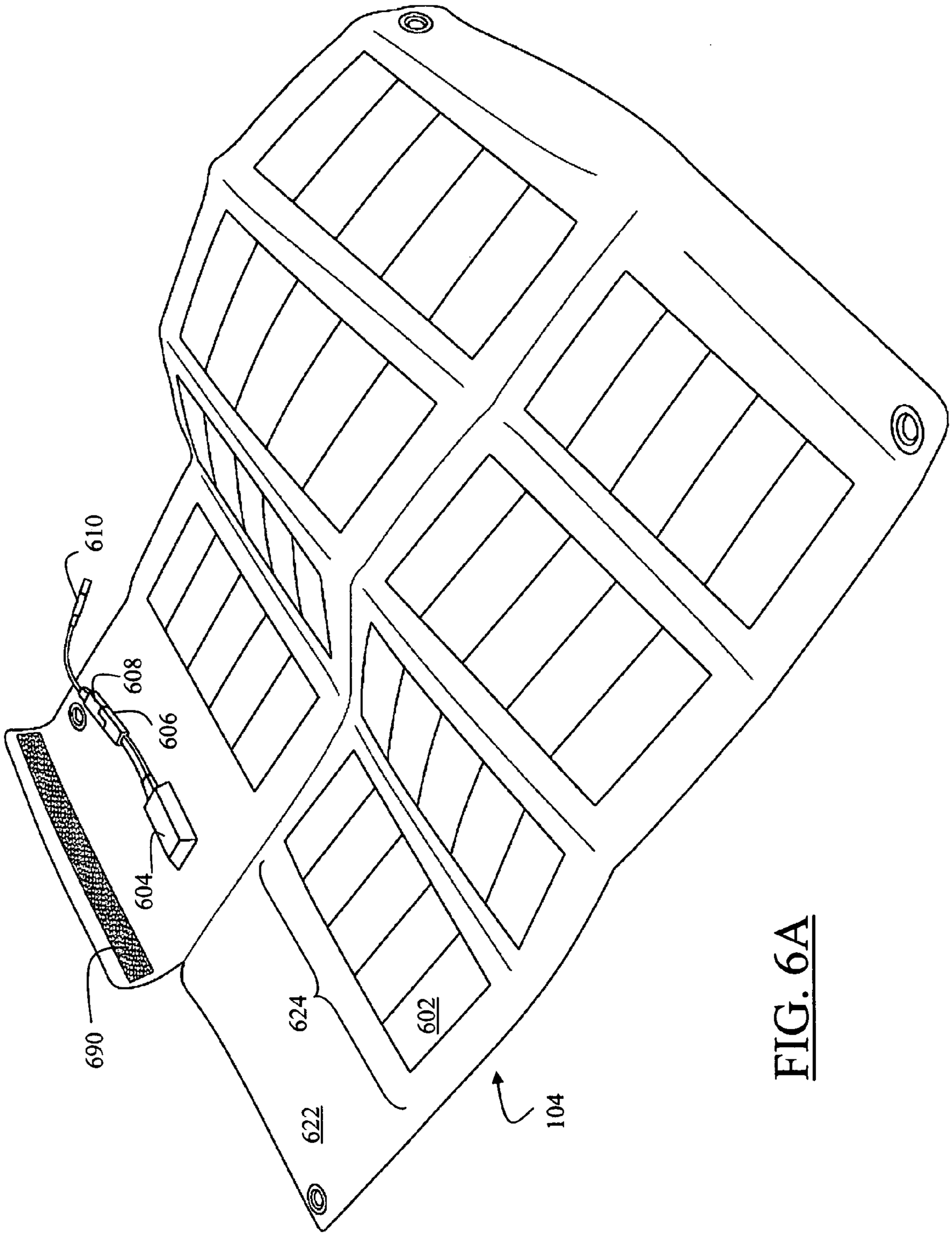


FIG. 6A

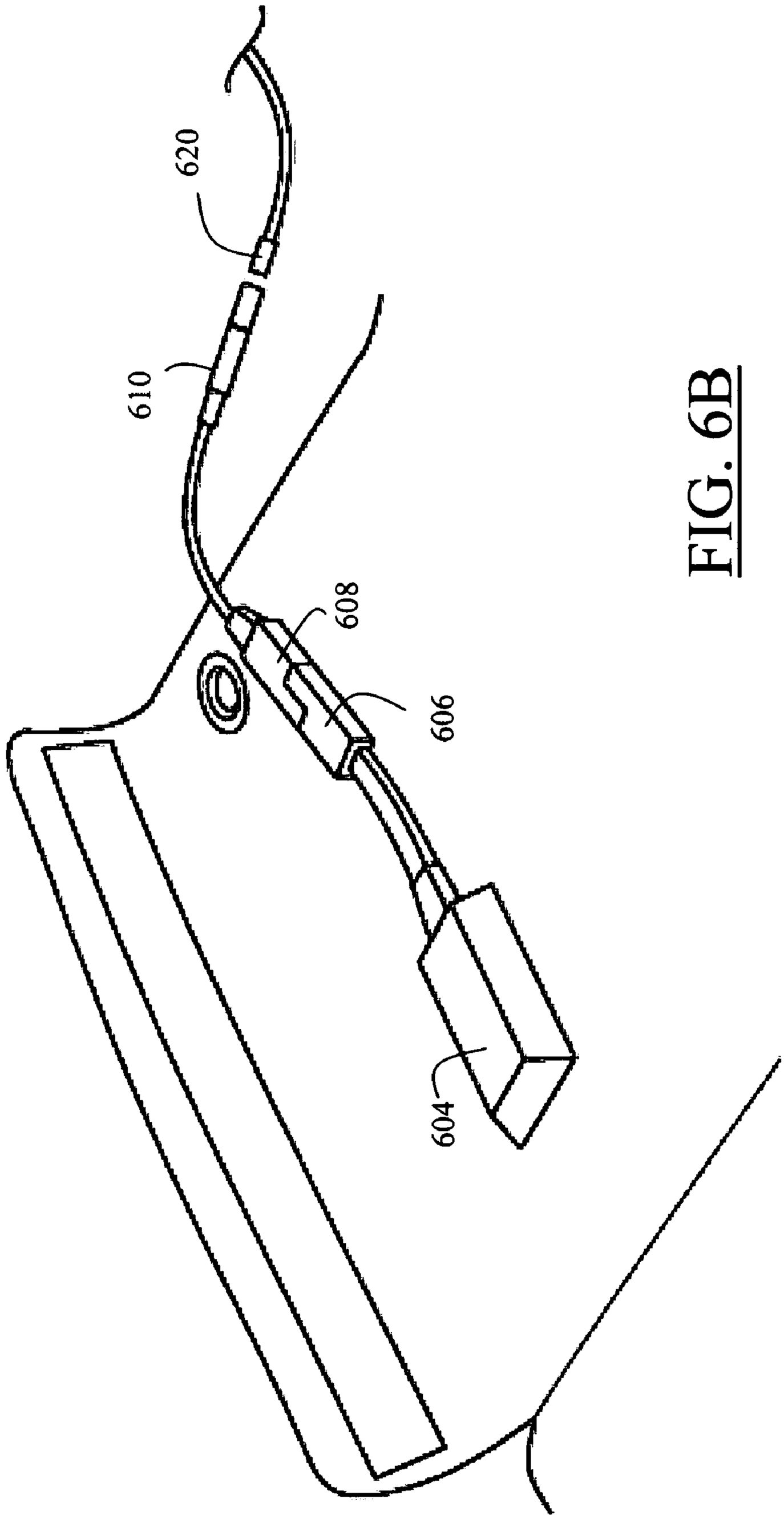


FIG. 6B

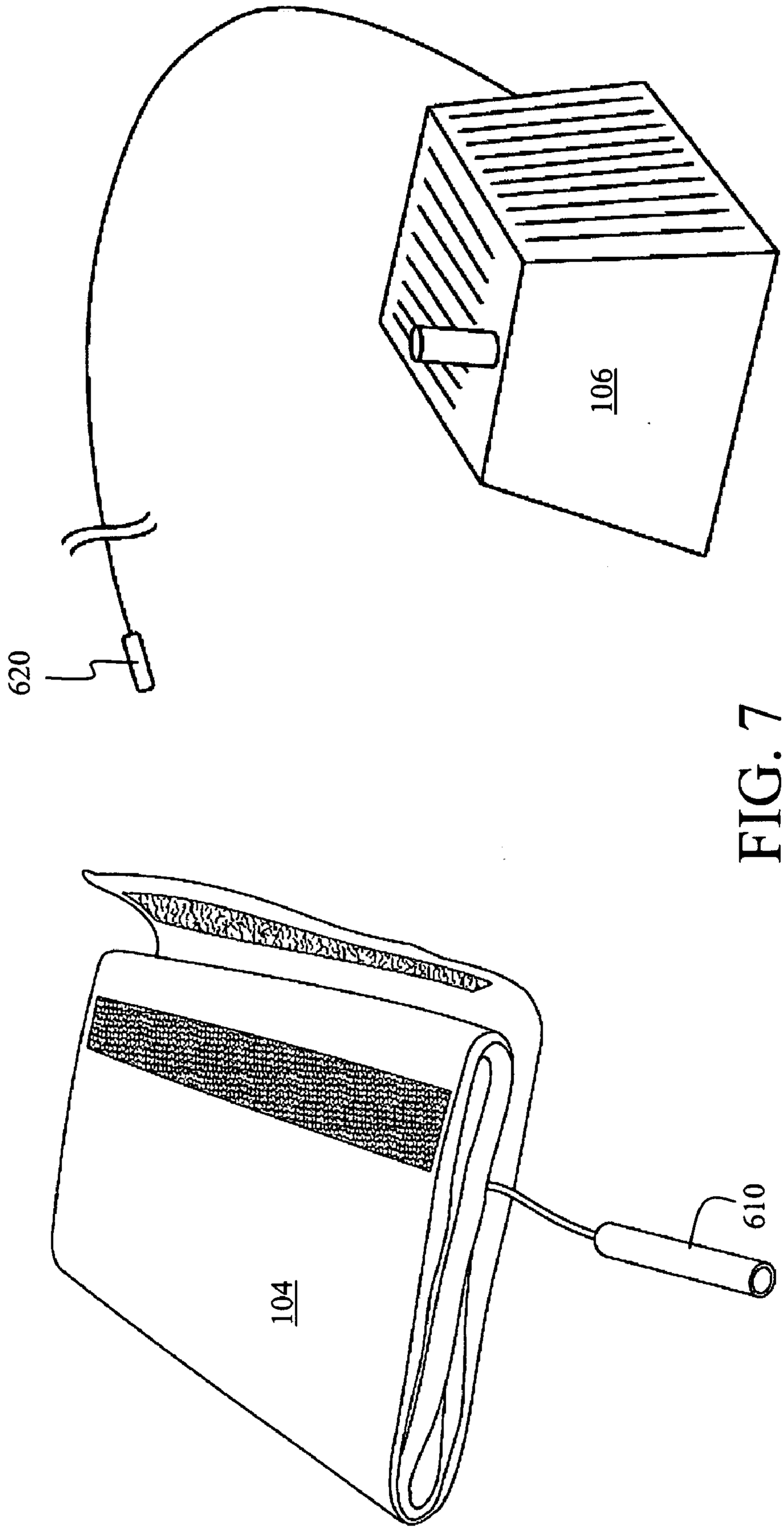


FIG. 7

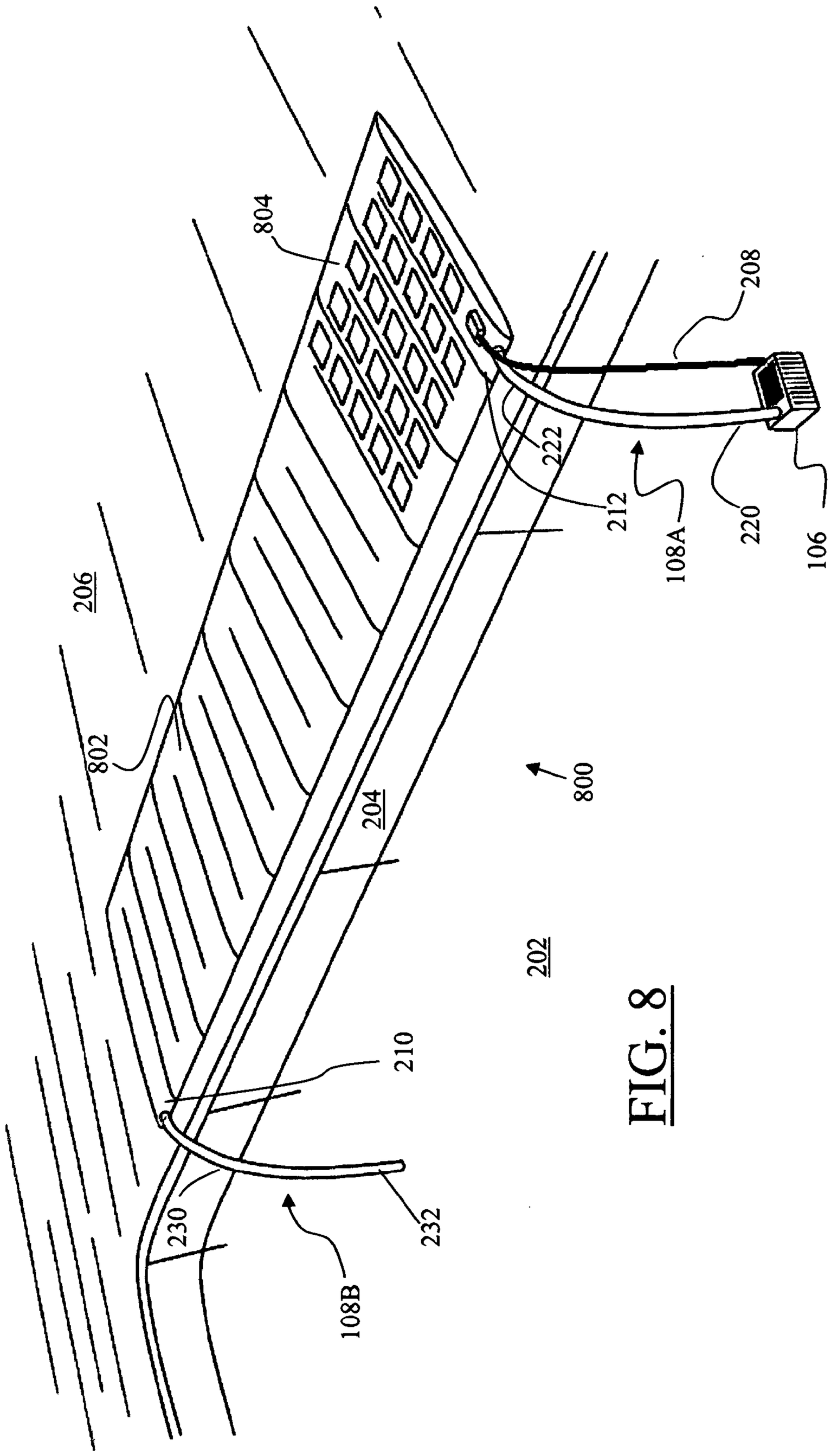

804
208
222
212
108A
220
106
206
802
204
800
202
210
230
232
108B

FIG. 8

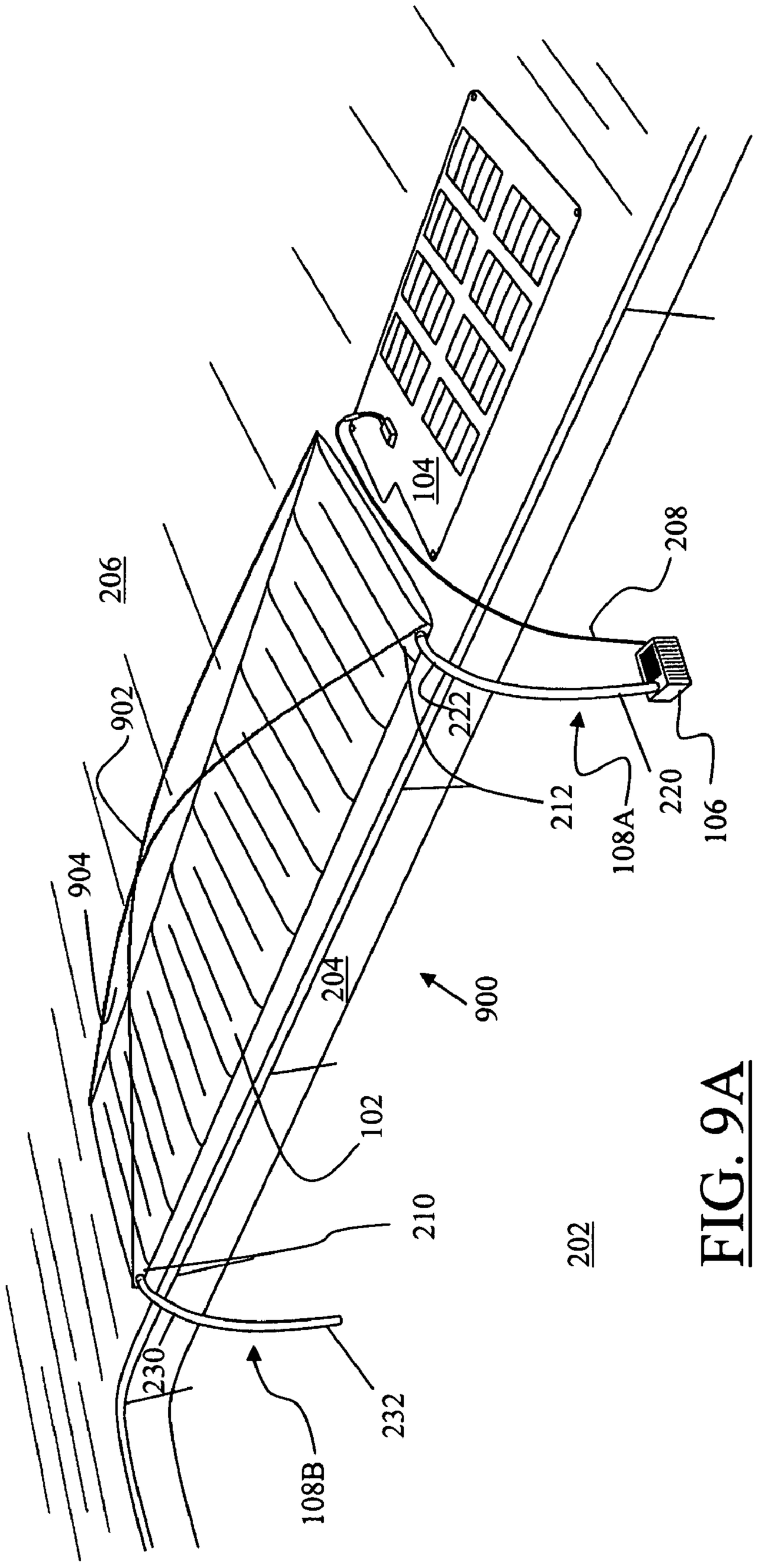

104
208
206
902
222
212
108A
220
106
904
204
900
102
210
202
230
232
108B

FIG. 9A

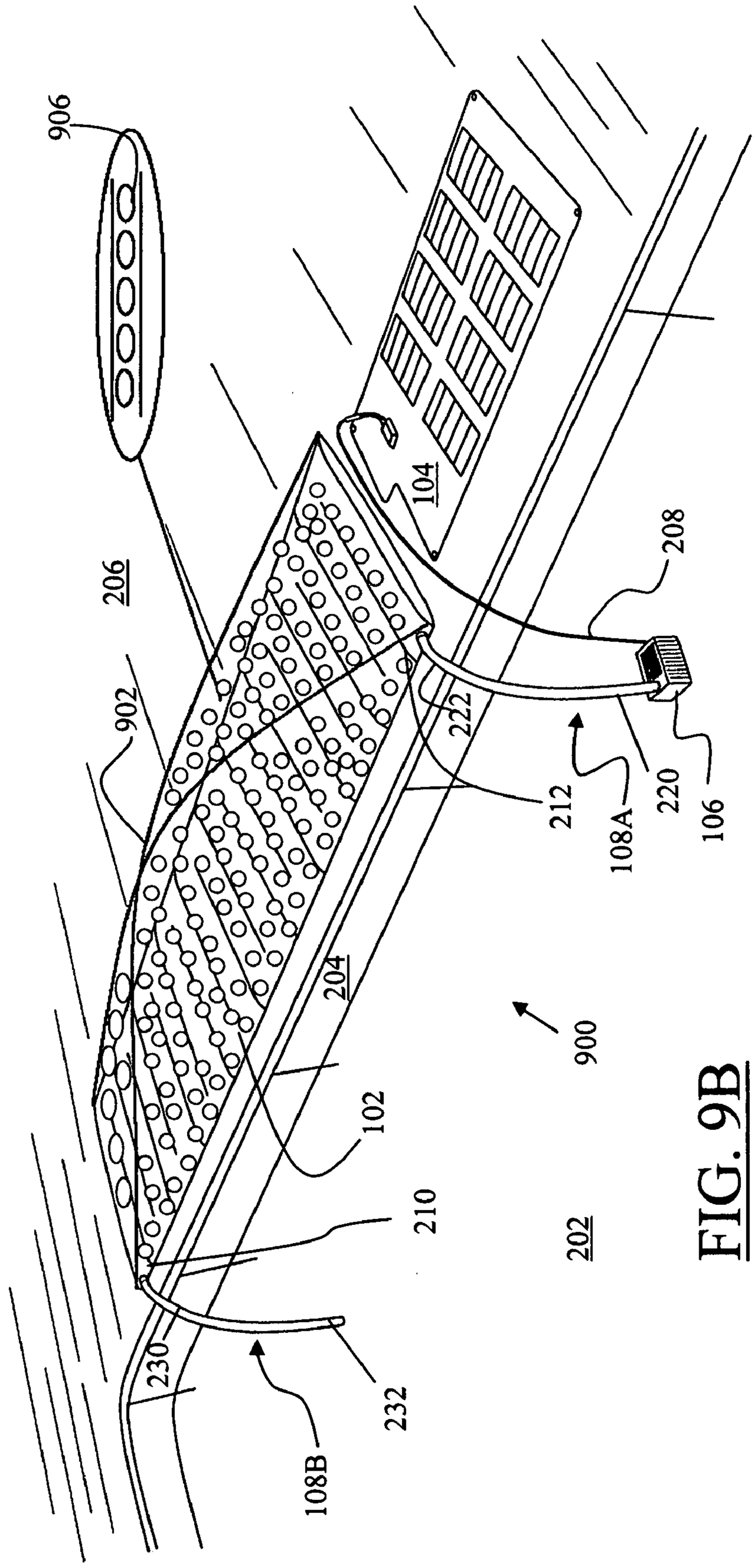

906
104
208
206
902
222
212
108A
220
106
204
900
102
210
230
232
108B
202

FIG. 9B

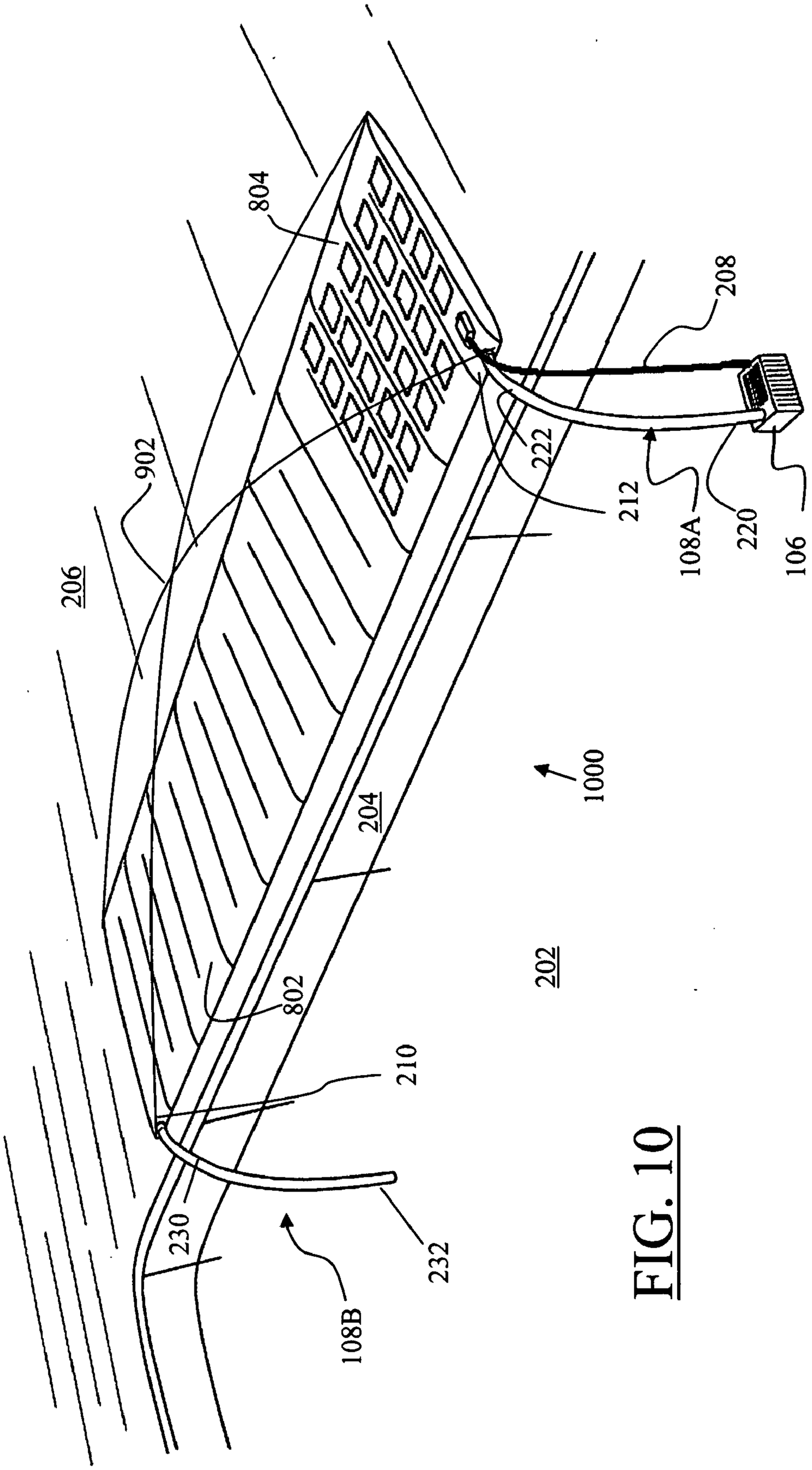

804
208
902
222
212
108A
220
106
206
1000
204
202
802
210
230
232
108B

FIG. 10

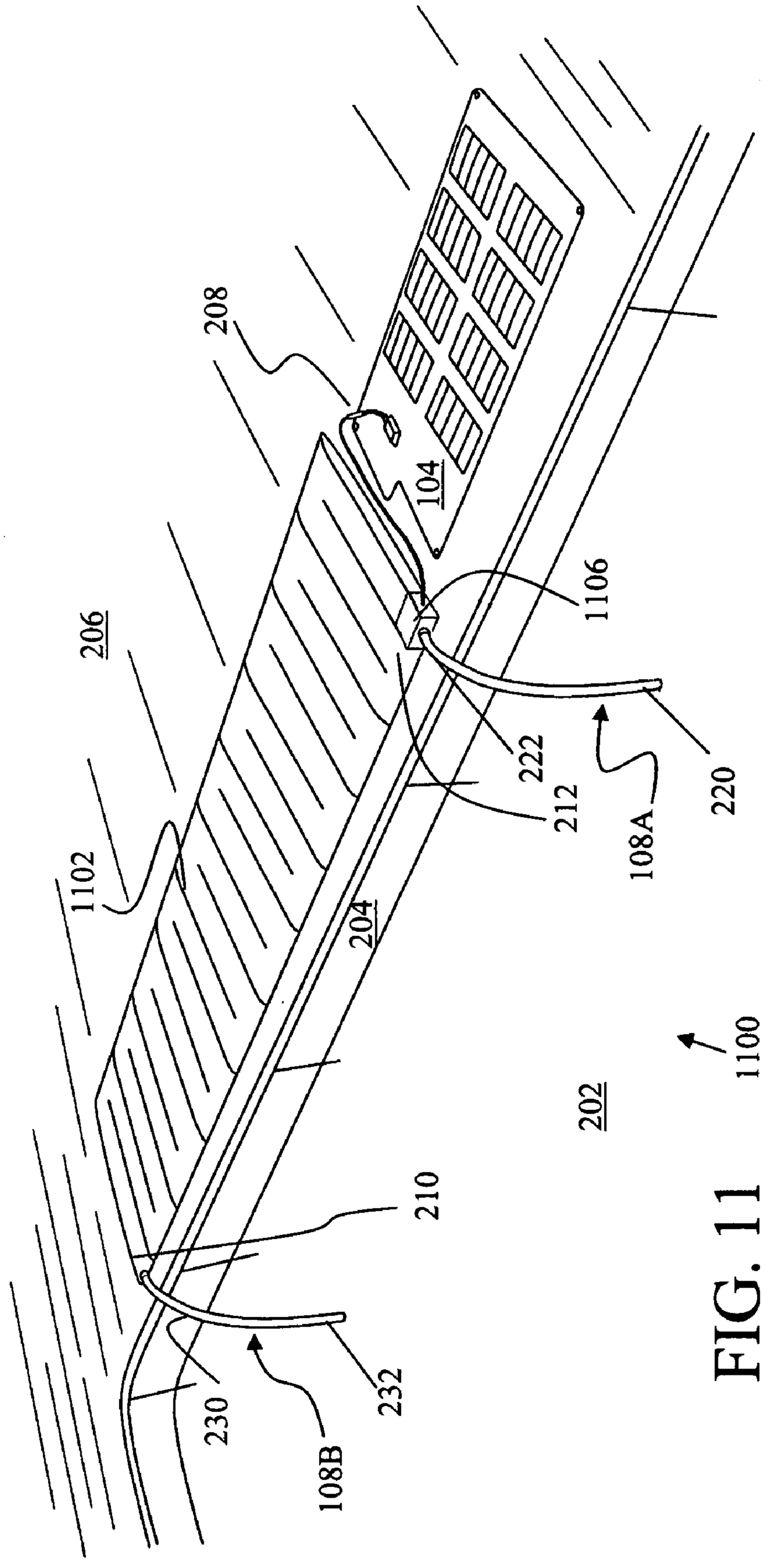

208
104
206
1106
1102
222
212
108A
220
204
210
230
232
108B
202
1100

FIG. 11

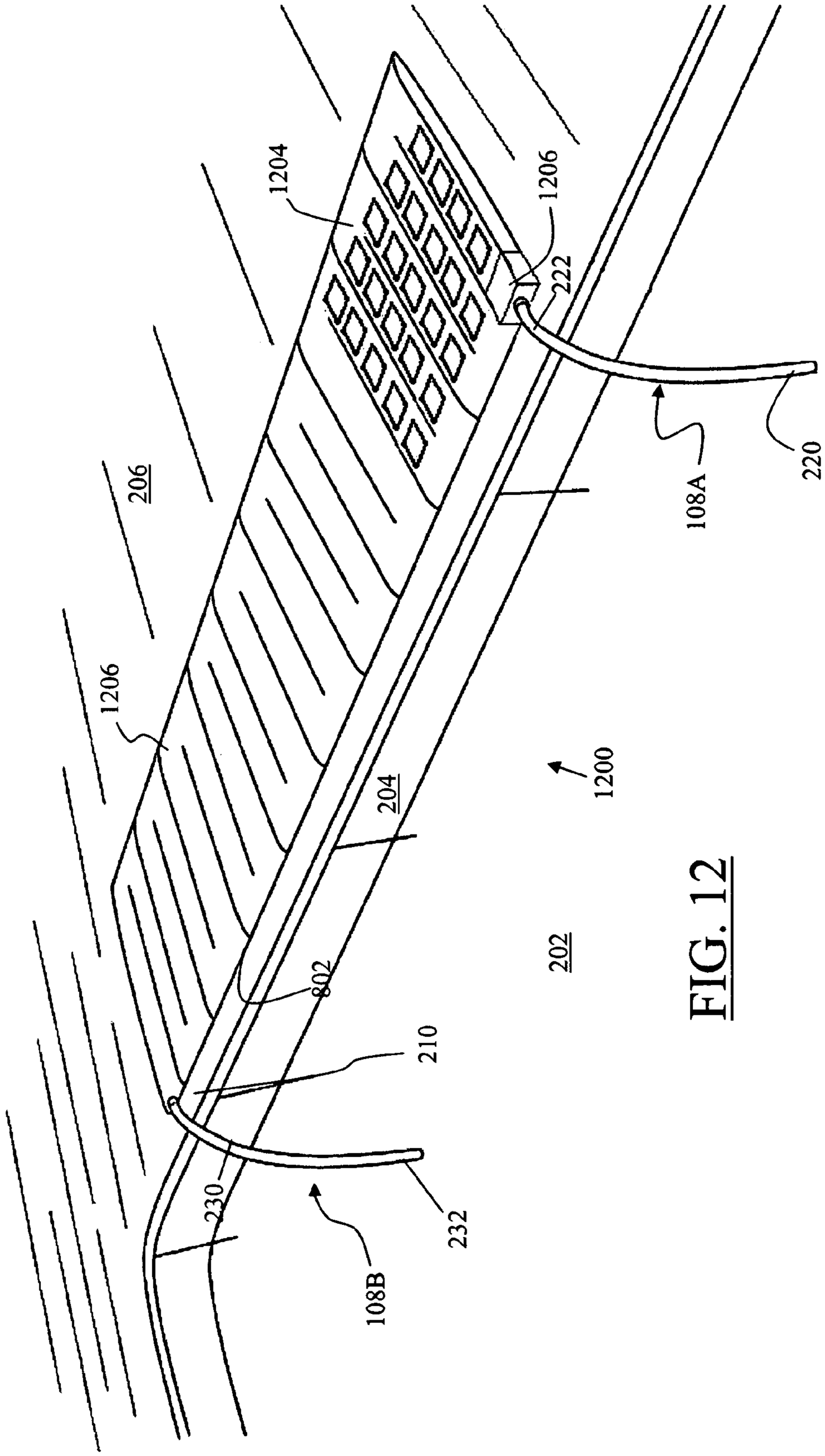

1204
1206
222
206
1206
204
802
210
230
232
108B
202
1200
108A
220

FIG. 12

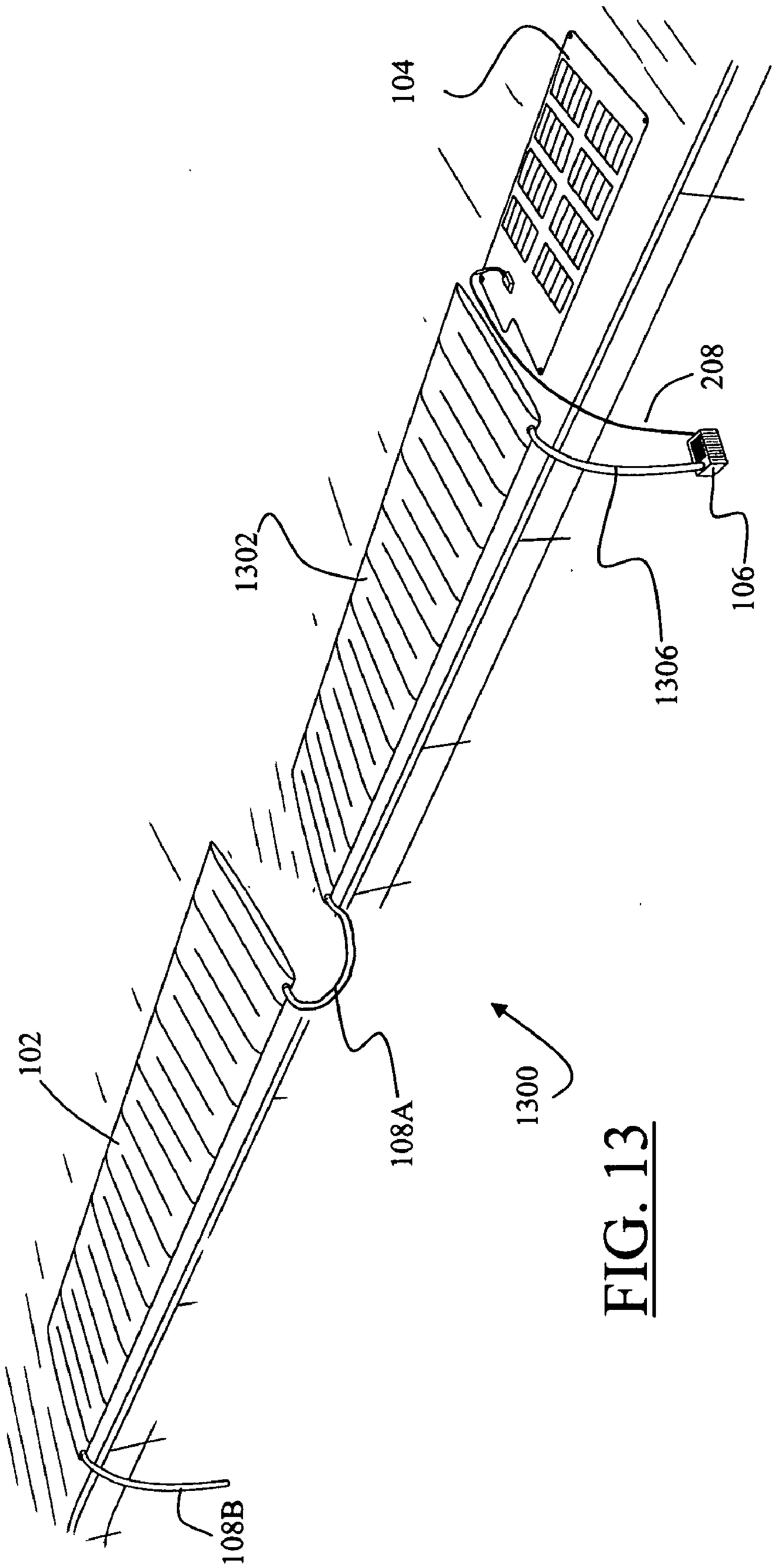


FIG. 13

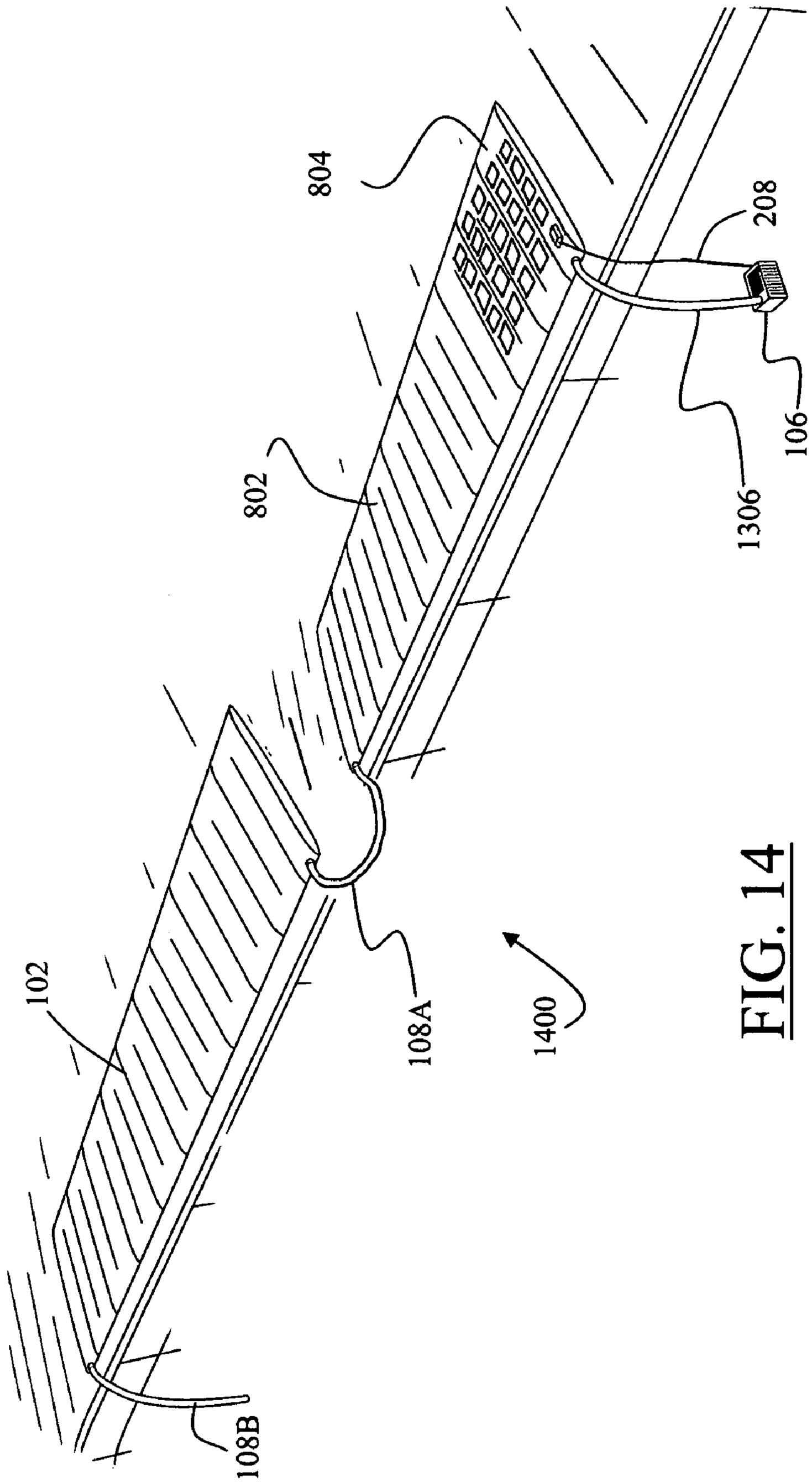


FIG. 14

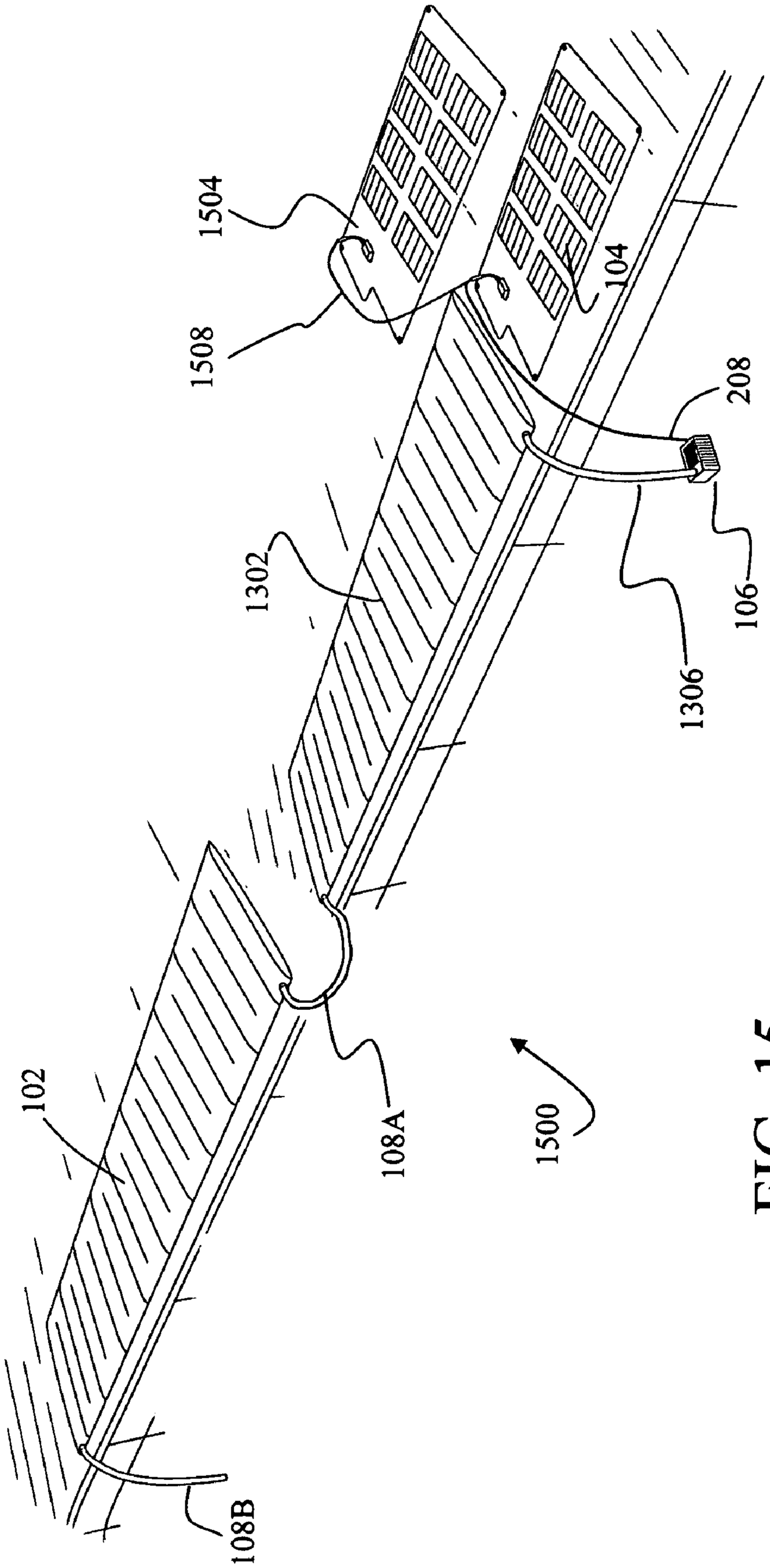


FIG. 15

SELF-SUFFICIENT PORTABLE HEATING SYSTEM USING RENEWABLE ENERGY

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] The present application is related to U.S. Utility Provisional Patent Application Ser. No. 60/680,301 filed May 13, 2005, the entire disclosure of which application is hereby expressly incorporated by reference herein.

BACKGROUND OF THE INVENTION

[0002] (1) Field of the Invention

[0003] The present invention relates to a self-sufficient portable heating system that uses renewable energy and, more particularly, to a self-sufficient portable solar heating system for heating water for swimming pools.

[0004] (2) Description of Related Art

[0005] Conventional water heaters (solar or otherwise) are well known and have been in use for a number of years. Reference is made to the following few exemplary U.S. Patent publications, including U.S. Pat. Nos. 6,837,236; 5,823,177; 5,586,548; 5,388,567; 5,293,447; 5,074,282; 4,766,885; 4,312,323; and D312,069. Regrettably, most prior art conventional water heaters suffer from obvious disadvantages in terms of cost of the heating system equipment, complicated and costly installation, inefficient operational and maintenance costs and generation of environmental pollutants, and fuel costs. In particular, with relation to known solar heating systems for heating swimming pool water, the conventional solar systems continue to be dependent on conventional non-solar energy resources. For example, known solar heating systems use the pool pump to deliver water from the pool into the solar panels to heat the water, and return the water back to the pool. The pool pump relies on conventional, non-solar energy resources for its function.

[0006] Accordingly, in light of the current state of the art and the drawbacks to current water heater systems mentioned above, a need exists for a self-sufficient portable heating system using renewable energy for water that would be lightweight, portable, inexpensive, easily installed, and be completely self-sufficient without relying on external non-renewable energy sources. In particular, a need exists for a self-sufficient portable heating system that uses renewable energy for heating water that would include as an integral part of the system a portable heat collector, a portable pump, and a portable mechanism that uses renewable energy source for generating power to run the portable pump.

BRIEF SUMMARY OF THE INVENTION

[0007] One aspect of the present invention provides a heating system using renewable energy, comprising:

[0008] a portable heat collector using renewable energy to heat water;

[0009] a portable power source using renewable energy to generate electricity;

[0010] a portable pump coupled with the portable power source and powered to move water from a source into and through the portable heat collector for increasing water temperature, and return water back to the source as heated water.

[0011] An optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0012] the portable heat collector is comprised of a dark color, single piece flexible plastic vinyl material that is resistant to ultraviolet radiation, and is folded about a fold line onto itself forming a wrap having a folded side and a free periphery side that is sealed;

[0013] the portable heat collector includes a plurality of spaced apart transversely extending sealed seams joining an upper and a lower sections of the wrap having end points alternately spaced from and joined to sides of the portable heat collector to define a plurality of transverse passageways forming a continuous serpentine water pathway through the portable heat collector;

[0014] the portable heat collector includes an inlet at a first of the passageways and an outlet at a last of the passageways, and when in use water is introduced at the inlet and heated from thermal energy absorbed from solar radiation by the portable heat collector, and is moved out of the portable heat collector at the outlet as heated water.

[0015] Another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0016] the portable heat collector has a thickness of approximately 20 to 30 mils.

[0017] Still another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0018] the portable heat collector is approximately 90 to 100 inches in length and approximately 20 to 24 inches in width, with the heat sealed seams spaced approximately 2 to 2.3 inches apart.

[0019] Yet another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0020] the inlet and the outlet of the portable heat collector are oriented parallel, and longitudinally along the axial length of the respective first and last of the passageways.

[0021] A further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0022] an inlet tube that has a first proximal end coupled to the inlet and has a first distal end coupled to the portable pump, allowing water to flow from the portable pump into the first of the passageways of the portable heat collector; and

[0023] an outlet tube that has a second proximal end coupled to the outlet and has a second distal end free, allowing water to exit from the last of the passageways of the portable heat collector.

[0024] Yet a further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0025] the inlet tube has an outer diameter smaller than the inner diameter of the inlet allowing for insertion of the inlet tube inside the inlet; and

[0026] the outlet tube has an inner diameter larger than the outer diameter of the outlet, allowing for insertion of the outlet inside the outlet tube, thereby reducing backpressure of water.

[0027] Still a further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0028] the portable heat collector further includes transparent insulating cover coupled with the portable heat

collector, with an air gap in between the transparent insulating cover and the portable heat collector, creating a greenhouse effect for maximizing heat absorbed as a result of incident radiation onto the portable heat collector.

[0029] Another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0030] the transparent insulating cover is comprised of a flexible transparent plastic vinyl.

[0031] Yet another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0032] the air gap is integrated into the transparent insulating cover as one or more air pockets, which are integrated into the flexible transparent plastic vinyl as air bubbles to construct the transparent insulating cover.

[0033] Still another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0034] the portable power source is integrally coupled with the portable heat collector, with the portable power source comprising an array of solar cells on a flexible, portable panel integral with a surface of the portable heat collector, under the transparent insulating cover, forming a single piece heating system.

[0035] A further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0036] the portable heat collector is integrally coupled with the portable power source, with the portable power source comprising an array of solar cells on a flexible, portable panel integral with the portable heat collector as a single piece heating system.

[0037] Yet a further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0038] the portable heat collector is integrally coupled with the portable pump, forming a single piece heating system.

[0039] Still a further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0040] the portable heat collector is integrally coupled with the portable power source and the portable pump, with the portable power source comprising an array of solar cells on a flexible, portable panel, and the portable heat collector, the portable power source, and the portable pump forming an integral, a single piece heating system.

[0041] Another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0042] the portable heat collector is comprised of a plurality of portable heat collectors couple in series, with a preceding outlet of one or more portable heat collectors of the plurality of portable heat collectors coupled to a subsequent inlet of one or more portable heat collectors of the plurality of portable heat collectors in a sequence.

[0043] Yet another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0044] at least one of the one or more of the portable heat collectors of the plurality of portable heat collectors is integrally coupled with the portable power source, with the portable power source comprising an array of solar cells on a flexible, portable panel integral with a surface of the at least one portable heat collector, forming a single piece heating system.

[0045] Still another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0046] the portable power source is comprised of an array of solar cells on a flexible, portable panel, forming a solar panel.

[0047] A further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0048] the solar cells are photovoltaic solar cells.

[0049] Still a further optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0050] the solar panel is comprised of a plurality of solar panels for increased power.

[0051] Another optional aspect of the present invention provides a heating system using renewable energy, wherein:

[0052] the portable pump is comprised of a sump pump.

[0053] These and other features, aspects, and advantages of the invention will be apparent to those skilled in the art from the following detailed description of preferred non-limiting exemplary embodiments, taken together with the drawings and the claims that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0054] It is to be understood that the drawings are to be used for the purposes of exemplary illustration only and not as a definition of the limits of the invention. Throughout the disclosure, the word "exemplary" is used exclusively to mean "serving as an example, instance, or illustration." Any embodiment described as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.

[0055] Referring to the drawings in which like reference character(s) present corresponding parts throughout:

[0056] FIG. **1** is an exemplary illustration of the components of a portable heating system that uses renewable energy in accordance with the present invention;

[0057] FIG. **2** is an exemplary illustration for an unfolded and fully assembled portable heating system illustrated in FIG. **1**, in an exemplary environment in accordance with the present invention;

[0058] FIG. **3** is an exemplary illustration for manufacture and assembly of the portable heat collector that is illustrated in FIGS. **1** and **2** in accordance with the present invention;

[0059] FIG. **4** is an exemplary illustration of the inlet tube and the outlet connections for the portable heat collector that is illustrated in FIGS. **1** and **2** in accordance with the present invention;

[0060] FIG. **5** is an exemplary cross-sectional illustration of the passageways of the portable heat collector that is illustrated in FIGS. **1** and **2** in accordance with the present invention;

[0061] FIG. **6**A is an exemplary illustration of a portable power source in the form of a flexible solar panel that is illustrated in FIGS. **1** and **2** in accordance with the present invention;

[0062] FIG. **6**B is an exemplary enlarged illustration of the electrical connection of the flexible solar panel that is illustrated in FIG. **6**A in accordance with the present invention;

[0063] FIG. **7** is an exemplary illustration of a portable power source and the portable pump in accordance with the present invention;

[0064] FIG. **8** is an exemplary illustration of a self-sufficient portable heating system that includes a portable power

source as an integral part of the portable heat collector in accordance with the present invention;

[0065] FIGS. **9**A and **9**B are exemplary illustrations of a self-sufficient portable heating system that includes a transparent insulating covering in accordance with the present invention;

[0066] FIG. **10** is an exemplary illustration of a self-sufficient portable heating system that includes a portable power source as an integral part thereof and a transparent insulating covering in accordance with the present invention;

[0067] FIG. **11** is an exemplary illustration of a self-sufficient portable heating system that includes an integral pump in accordance with the present invention;

[0068] FIG. **12** is an exemplary illustration of a self-sufficient portable heating system that includes an integral pump and power source in accordance with the present invention;

[0069] FIG. **13** is an exemplary illustration of a self-sufficient portable heating system that includes a plurality of portable heat collectors coupled in series in accordance with the present invention;

[0070] FIG. **14** is an exemplary illustration of a self-sufficient portable heating system that includes a plurality of portable heat collectors coupled in series, with one thereof having an integral power source in accordance with the present invention; and

[0071] FIG. **15** is an exemplary illustration of a self-sufficient portable heating system that includes a plurality of portable heat collectors coupled in series with one another, with a plurality of power sources coupled thereto in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0072] The detailed description set forth below in connection with the appended drawings is intended as a description of presently preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed and or utilized.

[0073] FIG. **1** is an exemplary illustration of the components of a portable heating system **100** of the present invention that uses renewable energy. As illustrated in FIG. **1**, the portable heating system **100** is a self-sufficient portable heating system using renewable energy for heating water that is lightweight, portable, inexpensive, easily installed, and self-sufficient without relying on external non-renewable energy sources. In particular, the present invention provides a self-sufficient portable heating system **100** that uses renewable energy for heating water that would include as an integral part of the system **100** a portable heat collector **102**, a portable power source **104**, a portable pump **106**, and a set of tubes **108**, all of which use renewable energy source for heating water. The entire portable heating system **100** of the present invention may be packaged into a carrying case for use anywhere.

[0074] FIG. **2** is an exemplary illustration for an unfolded and fully assembled portable heating system **100** in an exemplary environment in accordance with the present invention. As illustrated in FIG. **2**, the portable heating system **100** of the present invention is illustrated in use for heating water in the swimming pool **202**. The portable heat collector **102** of the portable heating system **100** is unfolded and placed across a footpath **206**, along an edge **204** of the swimming pool **202** under sunlight to absorb solar energy from the sun for heating the water in the pool **202**.

[0075] An outlet tube **108**B is comprised of a first proximal end **230** that is coupled with a first end **210** of the portable heat collector **102** for allowing heated water to exist from a free first distal end **232** thereof from the portable heat collector **102**. An inlet tube **108**A is comprised of a second proximal end **222** is coupled with a second opposite end **212** of the portable heat collector **102** to allow water to enter therein. As further illustrated, the inlet tube **108**A is further comprised of a second distal end **220** that is coupled with the portable pump **106** that is powered by the portable power source **104** for moving water from the pool **202** through the inlet tube **108**A and into the portable heat collector **102**, and out. The water moving through within the portable heat collector **102** is heated using absorbed solar energy from the sunlight, and is exited out from the outlet tube **108**B by the power of the pump **106**. The pump **106** is electrically coupled with the portable power source **104** by an electrical connector **208**, and is powered by the portable power source **104**, which uses renewable energy to generate electricity, which runs the portable pump **106**.

[0076] FIG. **3** is an exemplary illustration for manufacture and assembly of the portable heat collector **102** that is illustrated in FIGS. **1** and **2**. In general, the portable heat collector **102** is comprised of a dark color, waterproof, one single sheet or piece flexible plastic vinyl material that is resistant to ultraviolet radiation and most other corrosive material, a non-limiting example of which may include chlorine. The portable heat collector **102** is folded about a fold line **302** onto itself forming a wrap having a folded side **304** and a free periphery side **306** that is sealed. Two holes are made along the fold line **302**, one at the first end **210** of the portable heat collector **102** and the other at the second opposite end **212** for installation (welding) of the inlet **316** and the outlet **320** pieces therein. It should be noted that the portable heat collector **102** of the present invention does not require fasteners, washers, rivets, nuts, or bolts for assembly because it is a low-pressure application heat collector, which also means that the heat collector **102** further does not require a pressure relief device.

[0077] The portable heat collector **102** includes a plurality of spaced apart transversely extending sealed seams **308** joining an upper section **312** and a lower section **314** of the wrap. The upper section **312** is welded to the lower section **314** at approximately every 2.3 inches, forming the seams **308**. The seams **308** have end points **324** alternately spaced from and joined to the sides **304** and **306** of the portable heat collector **102** to define a plurality of transverse passageways **310** forming a continuous serpentine water pathway **340** through the portable heat collector **102**. The passageways **310** are made as thin as possible to allow more water to contact the actual surface of the heat collector **102** for a more efficient conductive heat transfer of solar radiation to water therein.

[0078] The portable heat collector **102** includes the inlet **316** at a first passageway **318** of the passageways **310** and an outlet **320** at a last passageway **322** of the passageways **310**. When in use, water is introduced at the inlet **316** and heated from thermal energy absorbed from solar radiation by the portable heat collector **102**, and is moved out of the portable heat collector **102** at the outlet **320** as heated water. The inlet **316** and the outlet **320** of the portable heat collector **102** are oriented substantially parallel (+/−5° degrees) from the horizontal (the ground), and are longitudinally positioned along the axial length of the respective first and last passageways **318** and **322**. Both the inlet **316** and the outlet **320** are com-

prised of approximately ¾ inch outer diameter (OD) hose connector. The inlet and the outlet will accommodate a ⅝ inch outer diameter or ¾ inch inner diameter tubes.

[0079] As best illustrated in FIG. **4**, the inlet tube **108**A has the first proximal end **222** coupled to the inlet **316**, allowing water to flow from the portable pump **106** into the first passageway **318** of the portable heat collector **102**. The outlet tube **108**B that has the second proximal end **230** is coupled to the outlet **320**, allowing water to exit from the last passageway **322** of the portable heat collector **102**. The inlet tube **108**A has an outer diameter that is smaller than the inner diameter of the inlet **316** allowing for insertion of the first proximal end **222** of the inlet tube **108**A inside the inlet **316**. The outlet tube **108**B has an inner diameter larger than the outer diameter of the outlet **320**, allowing for insertion of the outlet **320** inside the second proximal end **230** of the outlet tube **108**B, thereby reducing backpressure of water. This type of connection arrangement also allows for a faster, quicker transfer of already heated water **400** back to the source. The portable heat collector **102** has an exemplary thickness of approximately 20 to 30 mils, and approximate exemplary length of about 90 to 100 inches, with an exemplary approximate width of about 20 to 24 inches, with the heat-sealed seams spaced approximately 2 to 2.3 inches apart. As illustrated in FIG. **5**, the passageways **310** have an exemplary horizontal length **502** of approximately 1.75 inches, and an exemplary vertical length **504** of about 1 and ⅛ inches. The dimensions for the preferred embodiment of the present invention would be approximately 12 to 24 inches wide by 8 to 10 feet long by 1 to 2 inches deep for convenient placement and portability on the periphery **206** of a swimming pool. All dimensions may be varied depending on the application. It should be noted that a smaller sized volume for the passageways is preferable because it will accommodate for a more efficient conduction of heat transfer from the heat collector surface to the water passing through.

[0080] FIG. **6**A is an exemplary illustration of a portable power source in the form of a flexible solar panel, and FIG. **6**B is an exemplary enlarged illustration of the electrical connection for delivery of power to outside equipment. As illustrated in both FIGS. **6**A and **6**B, the well-known portable power source **104** is comprised of a plurality of array of solar cells **602** on a flexible, portable panel, forming a solar panel **622**. The plurality of photovoltaic arrays **624** generate electrical power responsive to incident solar energy impinged on the solar cells **602**. As illustrated, the plurality of photovoltaic arrays **624** includes a large number of generally conventional photovoltaic cells **602**, which are well-known. The electrical energy that is generated by the plurality of photovoltaic arrays **624** is used to power electrical equipment such as the portable pump **106** (FIG. **7**) through the electrical connectors **604** and **606** that mate with an adaptor **608** and **610** that plug into a receptacle **620** (FIGS. **6**B and **7**) of an electrical equipment. The portable pump **106** may be a dry or a sump pump, and is a low pressure pump, which does not require any washers, rivets, or fasteners when coupled with the portable heat collector **102**.

[0081] FIG. **8** is an exemplary illustration of a self-sufficient portable heating system **800** that includes a portable power source as an integral part of the portable heat collector in accordance with the present invention. The self-sufficient portable heating system **800** includes similar corresponding or equivalent components as the self-sufficient portable heating system **100** that is shown in FIGS. **1** to **7**, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **8** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating system **100** that is shown in FIGS. **1** to **7**. As illustrated in FIG. **8**, the self-sufficient portable heating system **800** includes a portable heat collector **802** that is integrally coupled with the portable power source **804**, with the portable power source **804** comprising a plurality of array of solar cells on a flexible, portable panel integral with the portable heat collector **802** as a single piece portable heating system.

[0082] Electricity that is generated from the incident solar radiation by flexible photovoltaic arrays is used to power a water pump **106** to move water along intake water tube **108**A towards and into the portable heat collector **802**. Incident solar radiation falls and impinges on the body of portable heat collector **802** and heats the water inside therein. It should be noted that the heated surface area of the portable heat collector **802** is reduced by the inclusion of the portable power source **804** on top of the portable heat collector **802** as a single piece integral part thereof, which may reduce the amount of heat generated. However, the heat generated from the semiconductor photovoltaic cells compensates for any possible reduction in solar radiation absorption, which continues to increase the temperature of water. Given that photovoltaic cells are semiconductor devices, they generate additional heat, which is dissipated by conduction through the under skin of the portable heat collector **802** that is covered by the portable power source **804** and into the water that is pumped therein, which further aids in increase of the water temperature. The heated water is returned to the water source **202** by the outflow tube **108**B propelled by the water pressure from water pump **106**.

[0083] FIGS. **9**A and **9**B are exemplary illustrations of a self-sufficient portable heating system **900** that includes a transparent insulating covering in accordance with the present invention. The self-sufficient portable heating system **900** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **8**, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIGS. **9**A and **9**B will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **8**.

[0084] As illustrated in FIGS. **9**A and **9**B, the portable heat collector **102** includes a transparent insulating cover **902** coupled with the portable heat collector **102**, with an air gap **904** in between the transparent insulating cover **902** and the portable heat collector **102**, creating a greenhouse effect for maximizing heat absorbed as a result of incident radiation impinged onto the portable heat collector **102**. The drawings are not to scale, and therefore, the air gap **904** (the volume in between transparent insulating cover **902** and the portable heat collector **102**) is exaggerated for illustrative purposes only. Non-limiting example of material from which the transparent insulating cover **902** may comprise may include a flexible transparent plastic vinyl. As further illustrated, the air gap **904** may also be integrated into the transparent insulating cover **902** as one or more air pockets **906**, which are integrated into the flexible transparent plastic vinyl **902** as air bubbles **906** to construct the transparent insulating cover **902**.

[0085] FIG. **10** is an exemplary illustration of a self-sufficient portable heating system **1000** that includes a transparent

insulating covering in accordance with the present invention. The self-sufficient portable heating system **1000** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **9**B, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **10** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **9**B.

[0086] As illustrated in FIG. **10**, a portable power source **804** is integrally coupled with the portable heat collector **802**, with the portable power source **804** comprising an array of solar cells on a flexible, portable panel integral with a surface of the portable heat collector **802**, under the transparent insulating cover **902**, forming a single piece heating system **1000**.

[0087] Electricity that is generated from the incident solar radiation by flexible photovoltaic arrays is used to power a water pump **106** to move water along intake water tube **108**A towards and into the portable heat collector **802**. Incident solar radiation falls and impinges on the body of portable heat collector **802** and heats the water inside therein. It should be noted the heated surface area of the portable heat collector **802** is reduced by the inclusion of the portable power source **804** on top of the portable heat collector **802** as a single piece integral part thereof, which may reduce the amount of heat generated. However, the heat generated from the semiconductor photovoltaic cells compensates for any possible reduction in solar radiation absorption, which continues to increase the temperature of water. Given that photovoltaic cells are semiconductor devices, they generate additional heat, which is dissipated by conduction through the under skin of the portable heat collector **802** that is covered by the portable power source **804** and into the water that is pumped therein, which further aids in increase of the water temperature. In addition, the heat generated is also compounded by the greenhouse effect due to the covering **902**. The heated water is returned to the water source **202** by the outflow tube **108**B propelled by the water pressure from water pump **106**.

[0088] FIG. **11** is an exemplary illustration of a self-sufficient portable heating system **1100** that includes an integral pump in accordance with the present invention. The self-sufficient portable heating system **1100** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **10**, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **11** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **10**. As illustrated, the portable heat collector **1102** is integrally coupled with the portable pump **1106**, forming a single piece heating system **1100**. In this particular instance the pump **1106** is not a sump, but a dry pump.

[0089] FIG. **12** is an exemplary illustration of a self-sufficient portable heating system **1200** that includes an integral pump and power source in accordance with the present invention. The self-sufficient portable heating system **1200** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **11**, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **12** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **11**. As illustrated, the heating system **1200** using renewable energy includes a portable heat collector **1202** that is integrally coupled with the portable power source **1204** and the portable pump **1206**. The portable power source **1204** is comprised of an array of solar cells on a flexible, portable panel, and the portable heat collector **1202**, the portable power source **1204**, and the portable pump **1206** form an integral, single piece heating system **1200**. Although not illustrated, a transparent insulating cover **902** may also be used with the heating system **1200**, similar to that illustrated in relation to FIGS. **9**A and **9**B.

[0090] FIG. **13** is an exemplary illustration of a self-sufficient portable heating system **1300** that includes a plurality of portable heat collectors coupled in series in accordance with the present invention. The self-sufficient portable heating system **1300** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **12**, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **13** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **12**. As illustrated in FIG. **13**, the portable heat collector is comprised of a plurality of portable heat collectors **102** and **1302** couple in series. The preceding outlet **320** of one or more portable heat collectors **1302** of the plurality of portable heat collectors is coupled to a subsequent inlet **316** of one or more portable heat collectors **102** of the plurality of portable heat collectors in a sequence via tubes **108**A. Connection of the plurality of portable heat collectors in series provides for an increased surface area that is exposed to solar radiation absorbed and conductively transferred to greater volume of water that remains within the heat collector at longer travel time before being discharged.

[0091] FIG. **14** is an exemplary illustration of a self-sufficient portable heating system **1400** that includes a plurality of portable heat collectors coupled in series, with one thereof having an integral power source in accordance with the present invention. The self-sufficient portable heating system **1400** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **13**, and described above. Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **14** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **13**. As illustrated in FIG. **14**, at least one of the one or more of the portable heat collectors **802** of the plurality of portable heat collectors is integrally coupled with the portable power source **804**, with the portable power source **804** comprising an array of solar cells on a flexible, portable panel integral with a surface of the at least one portable heat collector **802**, forming a single piece heating system.

[0092] FIG. **15** is an exemplary illustration of a self-sufficient portable heating system **1500** that includes a plurality of portable heat collectors coupled in series with one another, with a plurality of power sources coupled thereto in accordance with the present invention. The self-sufficient portable heating system **1500** includes similar corresponding or equivalent components as the self-sufficient portable heating systems that are shown in FIGS. **1** to **14**, and described above.

Therefore, for the sake of brevity, clarity, convenience, and to avoid duplication, the general description of FIG. **15** will not repeat every corresponding or equivalent component that has already been described above in relation to the self-sufficient portable heating systems that are shown in FIGS. **1** to **14**. As illustrated in FIG. **15**, the portable power sources **104** and **1504** are each comprised of an array of solar cells on a flexible, portable panels, forming the solar panels, with the solar panel comprised of a plurality of solar panels **104** and **1504** for increased power.

[0093] Although the invention has been described in considerable detail in language specific to structural features and or method acts, it is to be understood that the invention defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as preferred forms of implementing the claimed invention. Therefore, while exemplary illustrative embodiments of the invention have been described, numerous variations and alternative embodiments will occur to those skilled in the art. For example, the portable heat collector can be in any shape with any dimensions, including size, volume, thickness, which is also applicable to the channels or passageways; non-limiting examples of shapes may include animals, cartoon characters, etc. Although not illustrated in every FIG., it should be noted that all portable heat collectors may include a transparent insulating covering. Such variations and alternate embodiments are contemplated, and can be made without departing from the spirit and scope of the invention.

[0094] It should further be noted that throughout the entire disclosure, the labels such as left, right, front, back, top, bottom, forward, reverse, clockwise, counter clockwise, up, down, or other similar terms such as upper, lower, aft, fore, vertical, horizontal, proximal, distal, etc. have been used for convenience purposes only and are not intended to imply any particular fixed direction or orientation. Instead, they are used to reflect relative locations and/or directions/orientations between various portions of an object.

[0095] In addition, reference to "first," "second," "third," and etc. members throughout the disclosure (and in particular, claims) is not used to show a serial or numerical limitation but instead is used to distinguish or identify the various members of the group.

What is claimed is:

1. A heating system using renewable energy, comprising:

a portable heat collector using renewable energy to heat water;

a portable power source using renewable energy to generate electricity;

a portable pump coupled with the portable power source and powered to move water from a source into and through the portable heat collector for increasing water temperature, and return water back to the source as heated water.

2. The heating system using renewable energy as set forth in claim **1**, wherein:

the portable heat collector is comprised of a dark color, single piece flexible plastic vinyl material that is resistant to ultraviolet radiation, and is folded about a fold line onto itself forming a wrap having a folded side and a free periphery side that is sealed;

the portable heat collector includes a plurality of spaced apart transversely extending sealed seams joining an upper and a lower sections of the wrap having end points alternately spaced from and joined to sides of the portable heat collector to define a plurality of transverse passageways forming a continuous serpentine water pathway through the portable heat collector;

the portable heat collector includes an inlet at a first of the passageways and an outlet at a last of the passageways, and when in use water is introduced at the inlet and heated from thermal energy absorbed from solar radiation by the portable heat collector, and is moved out of the portable heat collector at the outlet as heated water.

3. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector has a thickness of approximately 20 to 30 mils.

4. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector is approximately 90 to 100 inches in length and approximately 20 to 24 inches in width, with the heat sealed seams spaced approximately 2 to 2.3 inches apart.

5. The heating system using renewable energy as set forth in claim **2**, wherein:

the inlet and the outlet of the portable heat collector are oriented parallel, and longitudinally along the axial length of the respective first and last of the passageways.

6. The heating system using renewable energy as set forth in claim **2**, further including:

an inlet tube that has a first proximal end coupled to the inlet and has a first distal end coupled to the portable pump, allowing water to flow from the portable pump into the first of the passageways of the portable heat collector; and

an outlet tube that has a second proximal end coupled to the outlet and has a second distal end free, allowing water to exit from the last of the passageways of the portable heat collector.

7. The heating system using renewable energy as set forth in claim **6**, wherein:

the inlet tube has an outer diameter smaller than the inner diameter of the inlet allowing for insertion of the inlet tube inside the inlet; and

the outlet tube has an inner diameter larger than the outer diameter of the outlet, allowing for insertion of the outlet inside the outlet tube, thereby reducing backpressure of water.

8. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector further includes transparent insulating cover coupled with the portable heat collector, with an air gap in between the transparent insulating cover and the portable heat collector, creating a greenhouse effect for maximizing heat absorbed as a result of incident radiation onto the portable heat collector.

9. The heating system using renewable energy as set forth in claim **8**, wherein:

the transparent insulating cover is comprised of a flexible transparent plastic vinyl.

10. The heating system using renewable energy as set forth in claim **9**, wherein:

the air gap is integrated into the transparent insulating cover as one or more air pockets, which are integrated into the flexible transparent plastic vinyl as air bubbles to construct the transparent insulating cover.

11. The heating system using renewable energy as set forth in claim **10**, wherein:

the portable power source is integrally coupled with the portable heat collector, with the portable power source comprising an array of solar cells on a flexible, portable panel integral with a surface of the portable heat collector, under the transparent insulating cover, forming a single piece heating system.

12. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector is integrally coupled with the portable power source, with the portable power source comprising an array of solar cells on a flexible, portable panel integral with the portable heat collector as a single piece heating system.

13. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector is integrally coupled with the portable pump, forming a single piece heating system.

14. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector is integrally coupled with the portable power source and the portable pump, with the portable power source comprising an array of solar cells on a flexible, portable panel, and the portable heat collector, the portable power source, and the portable pump forming an integral, a single piece heating system.

15. The heating system using renewable energy as set forth in claim **2**, wherein:

the portable heat collector is comprised of a plurality of portable heat collectors couple in series, with a preceding outlet of one or more portable heat collectors of the plurality of portable heat collectors coupled to a subsequent inlet of one or more portable heat collectors of the plurality of portable heat collectors in a sequence.

16. The heating system using renewable energy as set forth in claim **15**, wherein:

at least one of the one or more of the portable heat collectors of the plurality of portable heat collectors is integrally coupled with the portable power source, with the portable power source comprising an array of solar cells on a flexible, portable panel integral with a surface of the at least one portable heat collector, forming a single piece heating system.

17. The heating system using renewable energy as set forth in claim **1**, wherein:

the portable power source is comprised of an array of solar cells on a flexible, portable panel, forming a solar panel.

18. The heating system using renewable energy as set forth in claim **15**, wherein:

the solar cells are photovoltaic solar cells.

19. The heating system using renewable energy as set forth in claim **15**, wherein:

the solar panel is comprised of a plurality of solar panels for increased power.

20. The heating system using renewable energy as set forth in claim **1**, wherein:

the portable pump is comprised of a sump pump.

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