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Air support mattress

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ABSTRACT OF THE DISCLOSURE

An air support mattress is provided with the following components. An interior securing frame includes at least two rows of arch members, wherein each of the arch member has a passage under thereof. A plurality of individually inflatable tubes are respectively secured within passages of the correspondingly matched arch members, wherein each of the tubes has two isolated partitions to be individually inflated or deflated. An air transferring unit transfers air from the air pump to the tubes. A cover is coupled with a coverlet bottom to form an enclosure to enclose the interior securing frame, the tubes and the air transferring unit inside.

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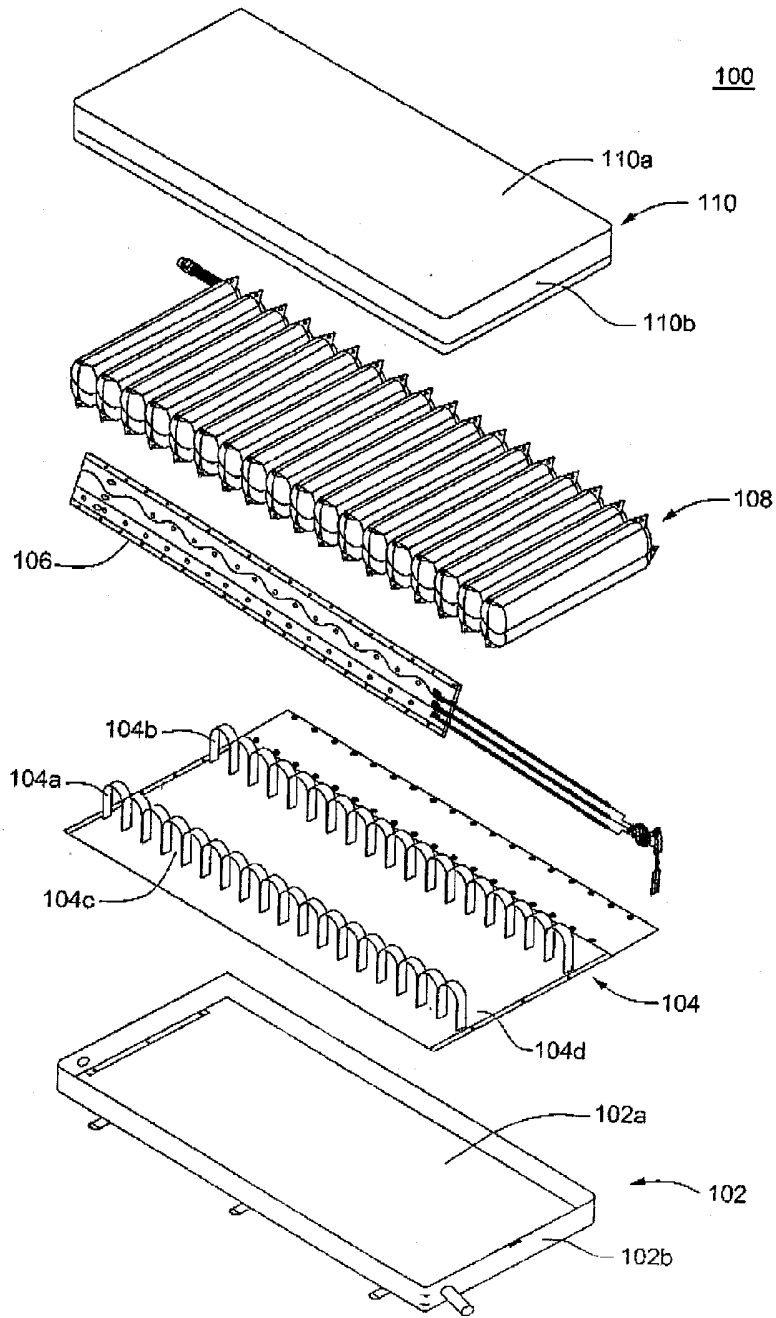


Fig. 1

AIR SUPPORT MATTRESS**BACKGROUND**

Field of Invention

The present invention relates generally to the field of air support inflatable
5 mattresses.

Description of Related Art

Air support beds are in widespread use in medical care settings, particularly for
patients requiring long term bed care. Bed ridden patients are susceptible to skin
10 ulcerations caused by excessive buildup of heat and moisture on the skin, typically in
combination with pressure, friction and shear forces exerted on the skin by contact with
the bed surface, which tend to close off capillary blood circulation in skin tissues. Such
ulcerations are painful and slow to heal, and are a frequent complication in bed ridden
individuals. Air mattresses and air support beds have been found to alleviate this
15 problem because the air filled chambers of the bed tend to conform to the anatomy of the
bed ridden patient better than ordinary mattresses and consequently distribute pressure
over a wider area of skin, thereby diminishing the risk and severity of skin ulcerations.
Furthermore, the firmness of an air mattress can be controlled and adjusted simply by
increasing or diminishing the internal air pressure, and air support beds featuring positive
20 pressure regulation by means of electronically controlled air pumps have been developed.
Air mattresses with compartmentalized air chambers which can be individually
pressurized to different degrees are used for creating different zones of varying firmness
adapted to the requirements of different anatomical areas of the patient's anatomy.

Cyclic pressure air beds alternately inflate and deflate different air chambers of
25 the bed mattress so as to periodically shift pressure between different areas of the user's

anatomy. The cyclic action of the air bed tends to stimulate the affected tissues and provides an opportunity for blood circulation to re-establish itself in those areas.

Although cyclic pressure air beds have been developed well in the industry, there is still a need for further improving the beds for specific types of bed ridden patients.

5 The above references to and descriptions of prior proposals or products are not intended to be, and are not to be construed as, statements or admissions of common general knowledge in the art in Australia.

SUMMARY

10 It is therefore an objective of the present invention to provide an improved air support mattress.

In accordance with the foregoing and other objectives of the present invention, an air support mattress is provided with the following components. An interior securing frame includes at least two rows of arch members, wherein each of the arch member has
15 a passage under thereof. A plurality of individually inflatable tubes are respectively secured within passages of the correspondingly matched arch members, wherein each of the tubes has two isolated partitions to be individually inflated or deflated. An air transferring unit transfers air from the air pump to the tubes. A radio-frequency welded cover is coupled with a coverlet bottom to form an enclosure to enclose the interior
20 securing frame, the tubes and the air transferring unit inside.

Thus, the present invention provides an air support mattress with double-partitioned air tubes or different-sized air tubes so as to more comfortably serve those bed ridden patients.

It is to be understood that both the foregoing general description and the following detailed description are by examples, and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention. In the drawings,

Fig. 1 illustrates a perspective exploded view of an air support mattress according one embodiment to this invention;

Fig. 2 illustrates an enlarged partial view of the air support mattress in Fig. 1;

Fig. 2B illustrates a cross-sectional view of an air tube according one embodiment to this invention;

Fig. 3 illustrates a perspective exploded view of an air support mattress according another embodiment to this invention; and

Fig. 4 illustrates an enlarged partial view of the air support mattress in Fig. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

Fig. 1 illustrates a perspective exploded view of an air support mattress 100 according one embodiment to this invention. Fig. 2 illustrates an enlarged partial view of the air support mattress in Fig. 1.

A coverlet bottom 102 has a rectangular bottom panel 102a sown to a side panel 102b which extends upwardly from all four edges of the bottom panel 102a defining a relatively shallow tray structure.

An interior securing frame 104 has a bottom panel 104d to be laid against the bottom panel 102a of the coverlet bottom 102. A side panel 104e, extending from a relatively long edge of the bottom panel 104d, has two rows of fasteners 104f. Two rows of arch members (104a, 104b) are arranged in parallel with each other on the bottom panel 104d. Each arch member (104a or 104b) has an arch passage 104c under thereof allowing each air tube 108, of substantially the same size, to be inserted through. Each arch member 104a is paired (or matched) with a corresponding arch member 104b to align the air tube 108 accommodated within their arch passages 104c. In another embodiment, arch members may be arranged in three or more rows on the bottom panel 104d.

Each air tube 108 is aligned by a pair of arch members (104a and 104b) such that all air tubes 108 are in parallel with one another and in parallel with a relatively short edge of the rectangular bottom panel 102a. Two opposite ends of each air tube 108 have fasteners (108a, 108b). Fasteners 108a are used to engage fasteners 104f on the side panel 104e such that the air tubes 108 can be secured on the interior securing frame 104. Fasteners 108b are used to engage fasteners 106e of an air module 106. The air tubes 108 may be made of thin vinyl or urethane sheet material with radio-frequency welded seams (heated with high frequency electromagnetic waves).

Referring to Fig. 2B, each air tube 108 are divided two partitions (109a, 109b), which are isolated from each other, i.e. without air exchange between two partitions (109a, 109b). The bottom partition wall 109c (of the lower partition 109b) is in contact with the bottom panel 104d when the air tube 108 is secured on the interior securing
5 frame 104.

An air transferring unit 106 includes three air hoses and a pack 106d, which contains many sub air hoses therein to connected with those air tubes 108. The air hoses (106b, 106c) transfer cyclic pressure, that is, alternately inflate and deflate the upper partition 109a of different air tubes 108 so as to periodically shift pressure between
10 different areas of the user's body. The air hose 106a is mainly used to inflate the lower partitions 109b of all the air tubes 108 up to a constant pressure. Several upper partitions 109a, which support a person's head portion, may be inflated by the air hose 106a. A valve 106f is used to interconnect three pipes and an air pump 120. The valve 106f may be equipped with backflow preventing function, especially for the air hose 106a. In case
15 the air pump 120 is short of power, the upper partitions 109a of each air tube may be deflated rapidly through air leaks of the air pump 120 while the lower partitions 109b of each air tube can be prevented from deflating due to the backflow preventing function. Therefore, a person's body can be stilled supported by the relatively soft lower partitions 109b of each air tube, rather than a relatively stiff bed board (not illustrated in drawings).
20 The pack 106d encloses sub air hoses extending from three air hoses (106a, 106b, 106c) to be easily attached to the ends of all air tubes 108 by their fasteners 106e engaging fasteners 108b of all air tubes 108.

The air pump 120 supplies air to all the air tubes 108 through air hoses and valves. The air pump 120 is equipped with an auto-firmness control for the air tubes 108,
25 within which pressure sensors are installed to detect pressure and decide whether or not

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to further inflate or deflate air to support a corresponding weight on the air support mattress 100.

A CPR hose and valve set 107 is also connected to every partition (109a or 109b) and used to deflate every tube 108 when CPR is performed on the air support mattress
5 100.

A cover 110 has a rectangular top panel 110a sown to a side panel 110b which extends downwardly from all four edges of the top panel 110a. The top panel 110a and the side panel 110b are coupled by the radio-frequency welding, which is impermeable of liquid. The side panel 110b is provided with a zipper half (not illustrated in drawings)
10 which attaches to a corresponding zipper half (not illustrated in drawings) along the upper edge of the side panel 102b. When zipped together the coverlet bottom 102 and the cover 110 form a box-shaped enclosure which contains the interior securing frame 104, the air transferring unit 106 and all the air tubes 108. The assembled air support mattress 100 is normally fitted with conventionally bed sheets, pillows and the like in
15 preparation for use.

Fig. 3 illustrates a perspective exploded view of an air support mattress 200 according another embodiment to this invention. Fig. 4 illustrates an enlarged partial view of the air support mattress in Fig. 3.

A rectangular base pad 201 is made of synthetic foam covered with impermeable
20 plastic sheeting such as vinyl sheet. The base pad 201 should be of sufficient size to comfortably accommodate the body of a person.

A coverlet bottom 202 has a rectangular bottom panel 202a sown to a side panel 202b which extends upwardly from all four edges of the bottom panel 202a defining a relatively shallow tray structure. The coverlet bottom 202 is placed on the rectangular
25 base pad 201.

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An interior securing frame 204 has a bottom panel 204d to be laid against the bottom panel 202a of the coverlet bottom 202. A side panel 204e, extending from a relatively long edge of the bottom panel 204d, has two rows of fasteners 204f. Two rows of arch members (204a, 204b) are arranged in parallel with each other on the bottom panel 204d. Each arch member (204a or 204b) has an arch passage 204c under thereof allowing each air tube (208a or 208b) to be inserted through. Each arch member 204a is paired (matched) with a corresponding arch member 204b to align and secure the air tube array 208 accommodated within their arch passages 204c.

Each of the air tube array 208 is aligned by a pair of arch members (204a and 204b) such that the air tube array 208 are in parallel with one another and in parallel with a relatively short edge of the rectangular bottom panel 202a or the base pad 201. In this embodiment, the air tube array 208 includes relative large air tubes 208a, i.e. larger top support surface or larger cross-section and relative small air tubes 208b, i.e. smaller top support surface or smaller cross-section. The relative small air tubes 208b are used to mainly support the leg portions of a person's body, which are more susceptible to skin ulcerations than the remaining portions of the person's body. Thus, the relative large air tubes 208a are used to support the remaining portions of the person's body. That is, the tubes of relatively small sizes, relatively small cross-sections or relatively small top support surfaces are disposed where a person's legs being laid within the interior securing frame. Two opposite ends of each air tube (208a or 208b) have fasteners (208c, 208d). Fasteners 208c are used to engage fasteners 204f on the side panel 204e such that the air tube array 208 can be firmly secured on the interior securing frame 204. Fasteners 208d are used to engage fasteners 206d of an air module 206. The air tubes (208a, 208b) may be made of thin vinyl or urethane sheet material with radio-frequency welded seams (heated with high frequency electromagnetic waves). In this embodiment, each air tube

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(208a or 208b) is of single partition, rather than two isolated partitions as illustrated in Fig. 2B. The base pad 201 basically serves the same function as the lower partitions 109b of each air tube 108 does. However, the base pad 201 can still be arranged under the coverlet bottom 202.

5 Air transferring unit 206 includes two air hoses (206a, 206b) and a pack 206c, which contains many sub air hoses therein to connected with those air tubes (208a, 208b). The air hoses (206a, 206b) transfer cyclic pressure, that is, alternately inflate and deflate different air tubes (208a, 208b) so as to periodically shift pressure between different areas of the user's body. The pack 206c encloses sub air hoses extending from
10 two air hoses (206a, 206b) to be easily attached to the ends of all air tubes (208a, 208b) by their fasteners 206d engaging fasteners 208d of all air tubes (208a, 208b).

A CPR hose and valve set 207 is also connected all air tubes (208a, 208b) and used to deflate thereof when CPR is performed on the air support mattresses 200.

A cover 210 has a rectangular top panel 210a sown to a side panel 210b which
15 extends downwardly from all four edges of the top panel 210a. The top panel 210a and the side panel 210b are coupled by the radio-frequency welding, which is impermeable of liquid. The side panel 210b is provided with a zipper half (not illustrated in drawings), which attaches to a corresponding zipper half (not illustrated in drawings) along the upper edge of the side panel 202b. When zipped together, the coverlet bottom 202 and
20 the cover 210 form a box-shaped enclosure which contains the interior securing frame 204, the air transferring unit 206 and the air tube array 208. The assembled air support mattress 200 is normally fitted with conventionally bed sheets, pillows and the like in preparation for use.

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According to discussed embodiments, the present invention provides an air support mattress with double-partitioned air tubes or different-sized air tubes so as to more comfortably serve those bed ridden patients.

It will be apparent to those skilled in the art that various modifications and variations can be made to the structure of the present invention without departing from the scope or spirit of the invention. In view of the foregoing, it is intended that the present invention cover modifications and variations of this invention provided they fall within the scope of the following claims and their equivalents.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

WHAT IS CLAIMED IS:

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1. An air support mattress, comprising:
a coverlet bottom;
5 an interior securing frame comprising at least two rows of arch members, wherein each of the arch member has a passage under thereof;
a plurality of individually inflatable tubes being respectively secured within the passages of the correspondingly matched arch members, wherein each of the tubes has two isolated partitions to be individually inflated or deflated;
10 an air pump;
an air transferring unit transferring air from the air pump to the tubes; and
a radio-frequency welded cover being coupled with the coverlet bottom to form an enclosure to enclose the interior securing frame, the tubes and the air transferring unit inside.
15
 2. The air support mattress of claim 1, wherein the tubes are of relatively large and relatively small sizes, cross-sections or top support surfaces.
 3. The air support mattress of claim 2, wherein the tubes, of relatively small sizes,
20 cross-sections or top support surfaces, are disposed where a person's legs being laid within the interior securing frame.
 4. The air support mattress of claim 1, wherein the two isolated partitions are arranged at an upper part and a lower part of each tube, the partition at the lower part of
25 each tube has a partition wall in contact with the coverlet bottom.

5. The air support mattress of claim 4, wherein the air transferring unit comprises an air hose with backflow preventing function to connected with the partition at the lower part of each tube.

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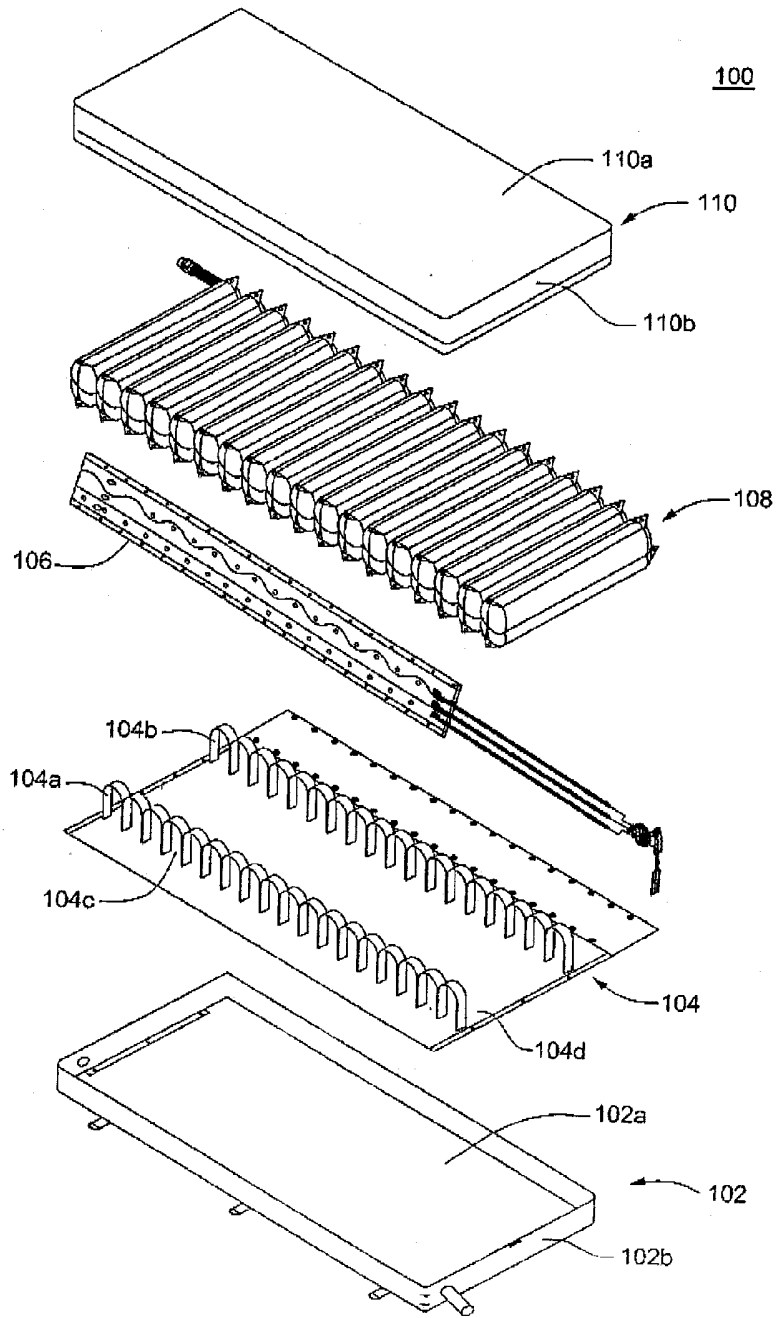


Fig. 1

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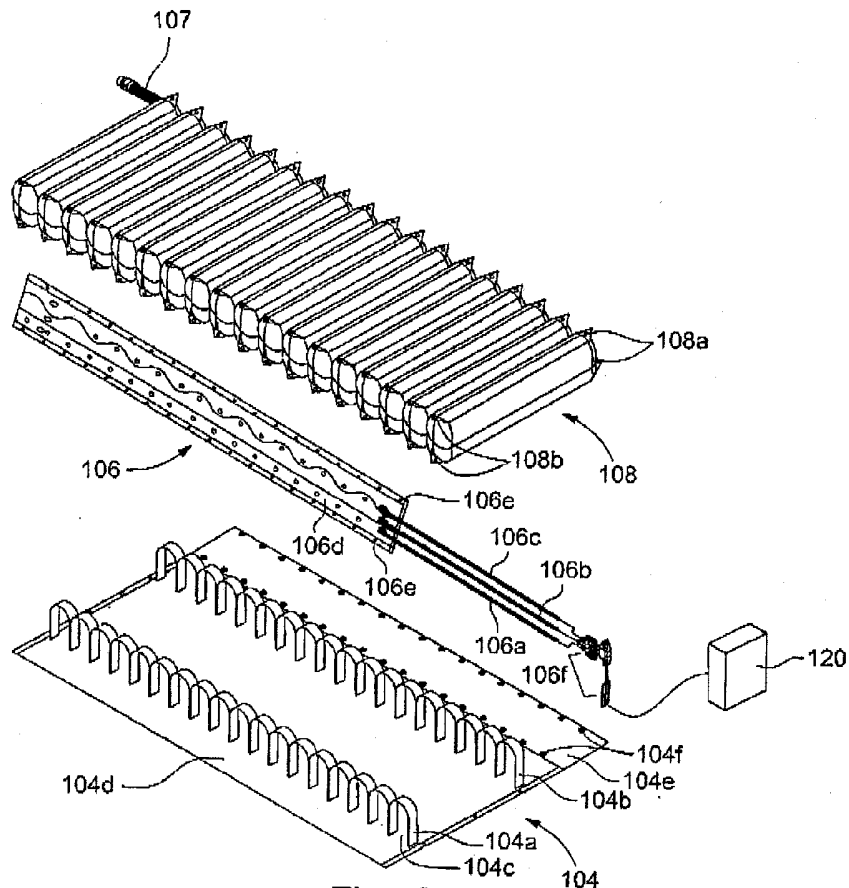


Fig. 2

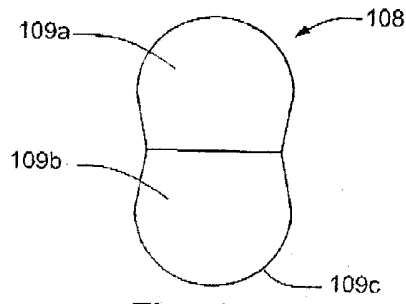


Fig. 2B

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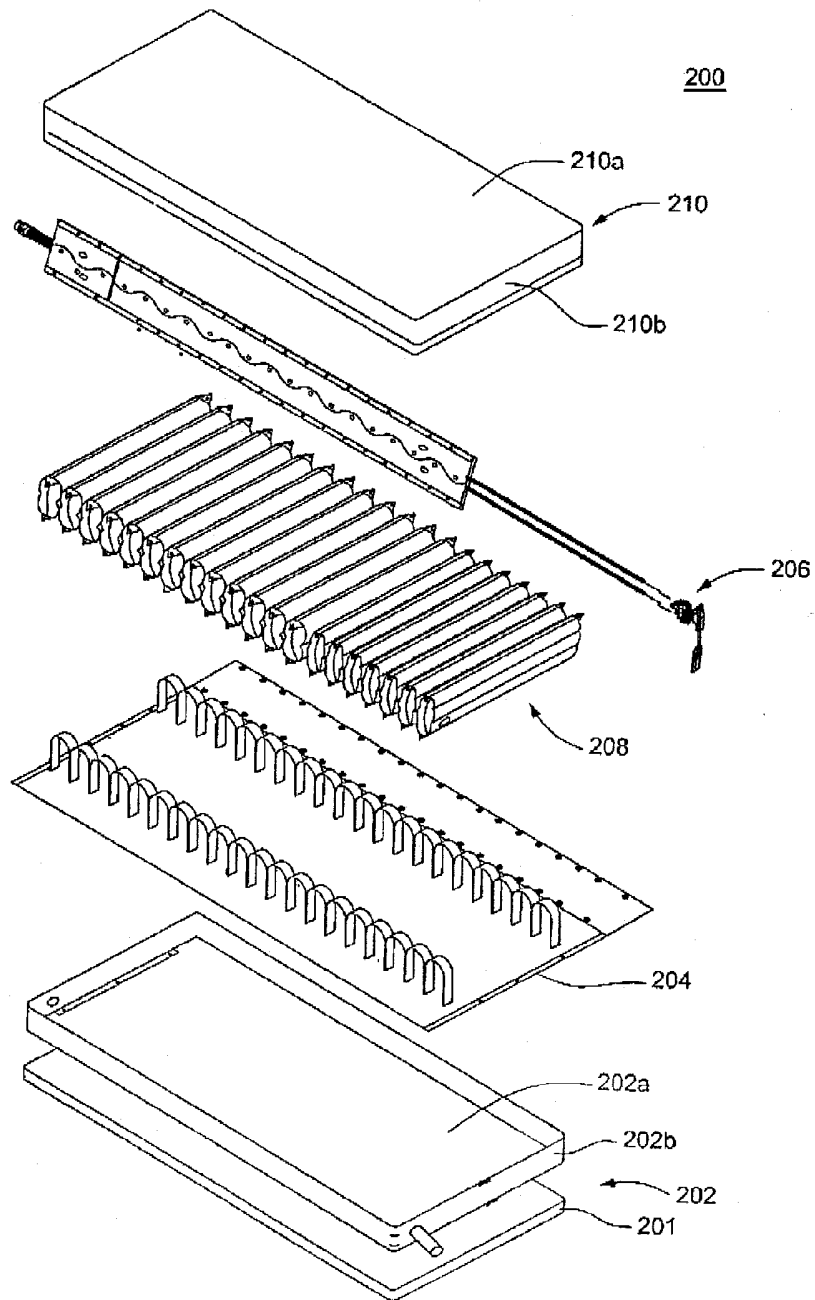


Fig. 3

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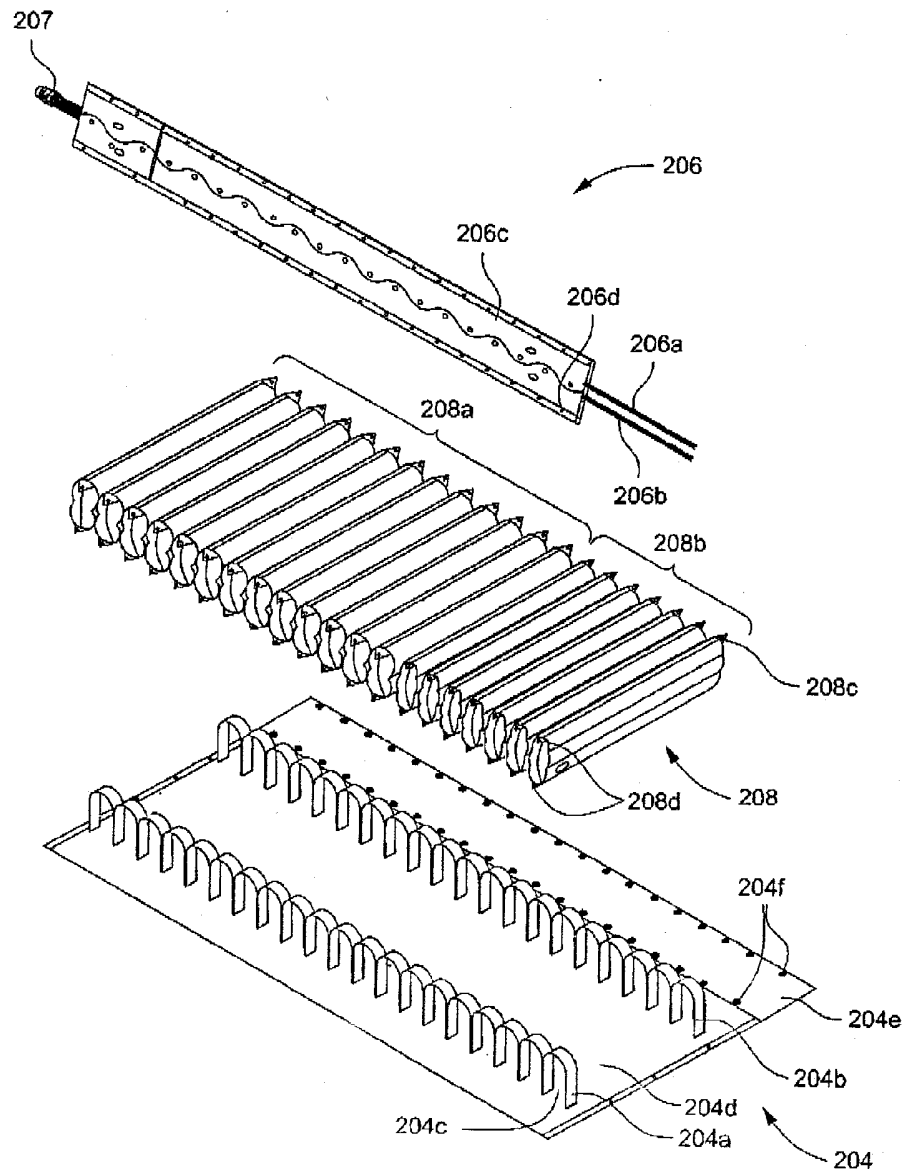


Fig. 4