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(71) Applicant and
(72) Inventor: **KORNAKER, Kathleen, M.** [US/US]; 16569 Acacia Drive, Strongsville, OH 44136 (US).

(74) Agent: **COLLINS, Forrest, L.**; Post Office Box 41040, Brecksville, OH 44141-0040 (US).

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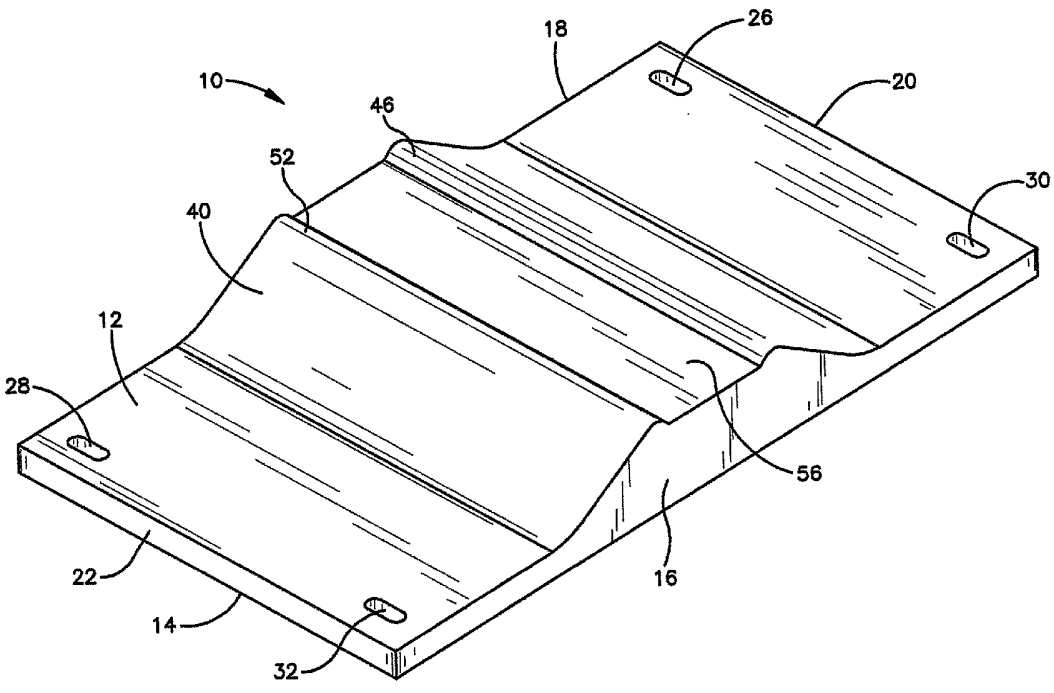
(54) **Title:** CARDIOPULMONORY ASSIST DEVICE



(57) **Abstract:** The present invention deals with a simple device to aid in cardiac compression to assist in reestablishing normal heart rhythm. The design and size of the device is particularly useful in morbidly obese individuals that require cardiac compressions in order to optimize resuscitation efforts.

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14. Field of the Invention.

The present invention deals with individuals in need of cardiopulmonary resuscitation (CPR). The present invention provides an effective method of delivering cardiac compression to individuals in need of such treatment.

15. With the increase in the number of obese people, there is a need to develop and utilize new, bigger and better equipment to care for obese patients. Greater numbers of morbidly obese patients are being treated for high blood pressure, diabetes, sleep apnea, and choose bariatric surgery as a means of weight control. Obese patients are at risk for cardiac arrest whether

they are medical or surgical patients. Cardiopulmonary resuscitation is an effective way to provide artificial circulatory and ventilatory support. It is difficult to perform effective chest compressions on a morbidly obese patient due to excess adipose. The present invention, a cardiopulmonary resuscitation assist device is designed to support the spine and upper thorax in order to improve the effectiveness of chest compression in the event of a cardiac arrest in an obese patient.

16. Description of the art practices.

17. United States Patent 6,709,410 Sherman, et al., March 23, 2004 describes a system for performing chest compression for cardiopulmonary resuscitation. The system includes a motor, drive spool and associated couplings which allow for controlling and limiting the movement of the compressing mechanism and includes a control system for controlling the operation and interaction of the various components to provide for optimal automatic operation of the system.

18. United States Patent 6,699,259 issued to Fogarty, et al., March 2, 2004 suggests a minimally invasive device for performing direct cardiac massage including an inflatable bladder mounted on a rigid inflation tube. The rigid inflation tube is used to push the bladder into the sternocostal space through an incision in the upper abdomen just below the xiphoid process. A tear-away insertion sleeve is provided over the balloon, so that the device may easily be inserted in to the body. The insertion sleeve includes various features that assist in placement of the device and removal of the sleeve. After insertion into the sternocostal space and removal of the insertion sleeve, the bladder is repeatedly inflated and deflated to massage the heart and provide blood flow.

19. United States Patent 6,616,620 issued to Sherman, et al., September 9, 2003 describes a resuscitation device for automatic compression of a victim's chest using a compression belt, which exerts force evenly over the entire thoracic cavity. The belt is constricted and relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression.

20. United States Patent 6,447,465 issued to Sherman, et al., September 10, 2002 suggests system for performing chest compression and abdominal

compression for cardiopulmonary resuscitation. The system includes a motor and gearbox including a system of clutches and brakes which allow for controlling and limiting the movement of compressing mechanisms operating on the chest and the abdomen of a patient

21. United States Patent 6,503,265 issued to Fogarty, et al., January 7, 2003 recites a minimally invasive device for performing direct cardiac massage including an inflatable bladder mounted on a rigid inflation tube. The rigid inflation tube is used to push the bladder into the sternocostal space through an incision in the upper abdomen just below the xiphoid process. After insertion into the sternocostal space, the bladder is repeatedly inflated and deflated to massage the heart and provide blood flow.

22. United States Patent 6,536,056 issued to Vrzalik, et al., March 25, 2003 suggests a bariatric treatment system providing a comprehensive array of therapeutic services for the morbidly obese patient. The treatment system generally comprises a stable bed frame upon which is mounted a low air loss therapeutic mattress system. Integrated hardware and software controls provide such therapies as pulsation, percussion, rotation, cardiac chair and Trendelenburg. Means are disclosed whereby the bariatric patient may safely and comfortably enter and exit the bed with relative ease. The bed is adaptable for transport within a hospital, including such features as a transport mode wherein the bed's lateral axis is minimized and battery backup to maintain necessary therapies during patient transport. A plurality of control means are disclosed for simplification of caregiver workload and ease of patient utilization.

23. United States Patent 6,599,258 issued to Bystrom, et al., July 29, 2003 sets out a resuscitation device for automatic compression of victim's chest using a compression belt that exerts force evenly over the entire thoracic cavity. The belt is constricted and relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression. An assembly includes various resuscitation devices including chest compression devices, defibrillation devices, and airway management devices, along with communications

devices and senses with initiate communications with emergency medical personnel automatically upon use of the device.

24. United States Patent 6,699,259 issued to Fogarty, et al., March 2, 2004 describes a minimally invasive device for performing direct cardiac massage including an inflatable bladder mounted on a rigid inflation tube. The rigid inflation tube is used to push the bladder into the sternocostal space through an incision in the upper abdomen just below the xiphoid process. A tear-away insertion sleeve is provided over the balloon, so that the device may easily be inserted in to the body. The insertion sleeve includes various features that assist in placement of the device and removal of the sleeve. After insertion into the sternocostal space and removal of the insertion sleeve, the bladder is repeatedly inflated and deflated to massage the heart and provide blood flow.

25. United States Published Patent Application 20020156401 to Sherman et al., dated October 24, 2002 suggests a system for performing chest compression for cardiopulmonary resuscitation. The system includes a motor, drive spool and associated couplings that allow for controlling and limiting the movement of the compressing mechanism and includes a control system for controlling the operation and interaction of the various components to provide for optimal automatic operation of the system.

26. United States Published Patent Application 20030009115 to Sherman et al., dated January 9, 2003 sets out a system for performing chest compression and abdominal compression for cardiopulmonary resuscitation. The system includes a motor and gearbox including a system of clutches and brakes which allow for controlling and limiting the movement of compressing mechanisms operating on the chest and the abdomen of a patient.

27. United States Published Patent Application 20030105481 to Fogarty, et al., and dated June 5, 2003 sets out a minimally invasive device for performing direct cardiac massage including an inflatable bladder mounted on a rigid inflation tube. The rigid inflation tube is used to push the bladder into the sternocostal space through an incision in the upper abdomen just below the xiphoid process. A tear-away insertion sleeve is provided over the balloon, so that the device may easily be inserted in to the body. The insertion sleeve includes various features that assist in placement of the

device and removal of the sleeve. After insertion into the sternocostal space and removal of the insertion sleeve, the bladder is repeatedly inflated and deflated to massage the heart and provide blood flow.

28. United States Published Patent Application 20030208847 to Vrzalik, et al., dated November 13, 2003 postulates a bariatric treatment system providing a comprehensive array of therapeutic services for the morbidly obese patient is disclosed. The treatment system generally comprises a stable bed frame upon which is mounted a low air loss therapeutic mattress system. Integrated hardware and software controls provide such therapies as pulsation, percussion, rotation, cardiac chair and Trendelenburg. Means are disclosed whereby the bariatric patient may safely and comfortably enter and exit the bed with relative ease. The bed is adaptable for transport within a hospital, including such features as a transport mode wherein the bed's lateral axis is minimized and battery backup to maintain necessary therapies during patient transport. A plurality of control means are disclosed for simplification of caregiver workload and ease of patient utilization.

29. United States Published Patent Application 20040002667 to Sherman, et al., dated January 1, 2004 recites a resuscitation device for automatic compression of a victim's chest using a compression belt which exerts force evenly over the entire thoracic cavity. The belt is constricted and relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression.

30. United States Published Patent Application 20040006290 to Sherman, et al., dated January 8, 2004 suggests a resuscitation device for automatic compression of a victim's chest using a compression belt which exerts force evenly over the entire thoracic cavity. The belt is constricted and relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression.

31. United States Published Patent Application 20040030271 to Sherman, et al., and dated February 12, 2004 provides a resuscitation device for automatic compression of a victim's chest using a compression belt, which exerts force evenly over the entire thoracic cavity. The belt is constricted and

relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression.

32. United States Published Patent Application 20040064054 to Clift dated April 1, 2004 recites an apparatus and techniques are provided for precise measuring and monitoring of certain vital signs of patients that have been difficult to measure especially in emergency situations. A sensor may be used for detecting contraction and expansion in the vascular bed of the lining tissue of the external auditory canal during a cardiac cycle to obtain a better indication of certain physiological parameters. Such a signal generally may be superimposed with an additional signal that is primarily due to breathing activity of the patient. Based on various scenarios different sensors may be used to determine the signal due to breathing activity and thus the physiological parameter of interest may be derived. The signal corresponding to the physiological parameter of interest, for example, blood pressure may then be used to monitor the vital signs or control other medical equipment.

33. United States Published Patent Application 20040073145 to Bystrom dated April 15, 2004 describes a resuscitation device for automatic compression of victim's chest using a compression belt, which exerts force evenly over the entire thoracic cavity. The belt is constricted and relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression. An assembly includes various resuscitation devices including chest compression devices, defibrillation devices, and airway management devices, along with communications devices and senses with initiate communications with emergency medical personnel automatically upon use of the device.

34. United States Published Patent Application 20040167563 to Fogarty, et al., dated August 26, 2004 suggests a minimally invasive device for performing direct cardiac massage including an inflatable bladder mounted on a rigid inflation tube. The rigid inflation tube is used to push the bladder into the sternocostal space through an incision in the upper abdomen just below the xiphoid process. A tear-away insertion sleeve is provided over the balloon, so that the device may easily be inserted in to the body. The insertion sleeve includes various features that assist in placement of the

device and removal of the sleeve. After insertion into the sternocostal space and removal of the insertion sleeve, the bladder is repeatedly inflated and deflated to massage the heart and provide blood flow.

35. United States Published Patent Application 20040193076 to Sherman, et al., and dated September 30, 2004 describes a system for performing chest compression for cardiopulmonary resuscitation. The system includes a motor, drive spool and associated couplings, which allow for controlling and limiting the movement of the compressing mechanism and includes a control system for controlling the operation and interaction of the various components to provide for optimal automatic operation of the system.

36. United States Published Patent Application 20040215112 to Mollenauer et al., dated October 28, 2004 suggests a resuscitation device for automatic compression of victim's chest using a compression belt, which exerts force evenly over the entire thoracic cavity. The belt is constricted and relaxed through a motorized spool assembly that repeatedly tightens the belt and relaxes the belt to provide repeated and rapid chest compression. An assembly includes various resuscitation devices including chest compression devices, defibrillation devices, and airway management devices, along with communications devices and senses with initiate communications with emergency medical personnel automatically upon use of the device

37. United States Published Patent Application 20040225238 to Sherman, et al., and dated November 11, 2004 recites a resuscitation device for automatic compression of a victim's chest using a compression belt operably attached to a platform upon which a patient rests. In use, the compression belt is wrapped around the patient and at least one spindle operably attached to the platform.

38. The foregoing devices are difficult to employ, often involve invasive procedures, and when cardio-version (electric shock) is utilized must be disconnected to prevent damage to the equipment.

39. To the extent that the foregoing patents and references are relevant to the present invention they are herein incorporated by reference.

40. Summary of the Invention

41. The present invention describes a cardiopulmonary assist device comprising:

a generally rectangular object;

said generally rectangular object having a first generally rectangular flat surface;

said generally rectangular object having a first side area;

said generally rectangular object having a second side area;

said generally rectangular object having a first end region;

said generally rectangular object having a second end region;

said generally rectangular object having a second generally rectangular surface;

said generally rectangular object having a second generally rectangular surface having a raised region thereon a centrally located between the first side area and the second side area.

42. The present invention describes also describes a cardiopulmonary assist device comprising:

a generally rectangular object;

said generally rectangular object having a first generally rectangular flat surface;

said generally rectangular object having a first side area;

said generally rectangular object having a second side area;

said generally rectangular object having a first end region;

said generally rectangular object having a second end region;

said generally rectangular object having a second generally rectangular surface;

said generally rectangular object having a second generally rectangular surface having a raised region thereon a centrally located between the first side area and the second side area;

provided further that the raised region is generally trapezoidal configuration having a trapezoidal base region, a trapezoidal region upper region, a first trapezoidal side and a second trapezoidal side, and;

wherein the generally trapezoidal configuration does not extend to one of the first side area or the second side area.

43. Another aspect of the invention is a method of treating a mammalian subject in need of cardiopulmonary resuscitation comprising placing the mammalian subject in a supine position on a cardiopulmonary assist device having a raised region, such that the cardio-region of the mammalian subject is located above the raised region during at least a portion of the time that cardiopulmonary resuscitation is performed on the mammalian subject.

44. Brief Description of the Drawings

45. The features of the present invention will become apparent to one skilled in the art to which the present invention relates upon consideration of the following description of the invention with reference to the accompanying drawings, wherein:

46. Fig. 1 is a perspective view according to the present invention;

47. Fig. 2 is a plan view according to the present invention;

48. Fig. 3 is an end view according to the present invention;

49. Fig. 4 is a first side view according to the present invention;

50. Fig. 5 is a prior art device;

51. Fig. 6 is a schematic view according to the present invention

52. Fig. 7 is a perspective view of an alternative embodiment similar to Fig. 1 of the present invention;

53. Fig. 8 is a plan view of an alternative embodiment similar to Fig. 2 of the present invention; and,

54. Fig. 9 an alternative embodiment similar to Fig. 4 of the present invention.

55. Detailed Description of the Invention

56. As best seen in Fig. 1 is a cardiopulmonary resuscitation assist device 10. The cardiopulmonary resuscitation assist device 10 has a cardiopulmonary resuscitation assist device upper surface 12. The cardiopulmonary resuscitation assist device 10 also has a cardiopulmonary resuscitation assist device lower surface 14. A cardiopulmonary resuscitation assist device lower end 16 is located between the cardiopulmonary resuscitation assist device upper surface 12 and the cardiopulmonary resuscitation assist device lower surface 14.

57. A cardiopulmonary resuscitation assist device upper end 18 is located in between the cardiopulmonary resuscitation assist device upper surface 12 and the cardiopulmonary resuscitation assist device lower surface 14. The cardio-pulmonary resuscitation assist device 10 has a cardiopulmonary resuscitation assist device first side 20. The cardiopulmonary resuscitation assist device 10 also has a cardiopulmonary resuscitation assist device second side 22.

58. The cardiopulmonary resuscitation assist device 10 is generally rectangular. The cardiopulmonary resuscitation assist device 10 is symmetrical on the cardiopulmonary resuscitation assist device upper surface 12. The cardiopulmonary resuscitation assist device 10 is also symmetrical on the cardiopulmonary resuscitation assist device lower surface 14.

59. The cardiopulmonary resuscitation assist device 10 may be conveniently formed from one or more materials. As a practical matter it is preferred that the cardiopulmonary resuscitation assist device 10 be formed from a single material such as a plastic. Such formation of the cardiopulmonary resuscitation assist device 10 may be accomplished by injection molding. The cardiopulmonary resuscitation assist device 10 is generally formed such that it is a non-resilient. Conveniently, the cardio-pulmonary resuscitation assist device 10 is electrically non-conductive.

60. The cardiopulmonary resuscitation assist device 10 has a cardio-pulmonary resuscitation assist device first handgrip 26 along the cardiopulmonary resuscitation assist device first side 20. The cardiopulmonary resuscitation assist device 10 has a cardiopulmonary

resuscitation assist device second handgrip 28 along the cardiopulmonary resuscitation assist device second side 22. The cardiopulmonary resuscitation assist device 10 has a cardiopulmonary resuscitation assist device third handgrip 30 located along the cardiopulmonary resuscitation assist device first side 20. The cardiopulmonary resuscitation assist device 10 has a cardiopulmonary resuscitation assist device fourth handgrip 32 located along the cardiopulmonary resuscitation assist device second side 22. The various handgrips extend through the cardiopulmonary resuscitation assist device upper surface 12 to the cardiopulmonary resuscitation assist device lower surface 14.

61. The various handgrips are of a sufficient size to permit movement of the cardiopulmonary resuscitation assist device 10 beneath an obese patient as later described. The handgrips are intended as a matter of convenience and are not required for the cardiopulmonary resuscitation assist device 10 to function.

62. Extending from the cardiopulmonary resuscitation assist device upper surface 12 of the cardiopulmonary resuscitation assist device 10 is a cardio-pulmonary resuscitation assist device raised region 40. The cardiopulmonary resuscitation assist device raised region 40 has a cardiopulmonary resuscitation assist device raised region first ridge 46. The cardiopulmonary resuscitation assist device raised region 40 also has a cardiopulmonary resuscitation assist device raised region second ridge 52. Located between the cardiopulmonary resuscitation assist device raised region first ridge 46 and the cardiopulmonary resuscitation assist device raised region second ridge 52 is a cardiopulmonary resuscitation assist device trough 56.

63. As best seen in Fig. 2, the cardiopulmonary resuscitation assist device raised region 40 is devised such that when an obese patient may be placed on the cardiopulmonary resuscitation assist device 10. The cardiopulmonary resuscitation assist device trough 56 is thus of a sufficient width to accommodate the obese patient. A space of several inches exists for the cardiopulmonary resuscitation assist device trough 56 between the cardiopulmonary resuscitation assist device raised region first ridge 46 and cardiopulmonary resuscitation assist device raised region second ridge 52.

The distance between cardiopulmonary resuscitation assist device raised region first ridge 46 and cardiopulmonary resuscitation assist device raised region second ridge 52 is such that the scapulae of a patient placed on the cardiopulmonary resuscitation assist device raised region 40 are located outward of the respective cardiopulmonary resuscitation assist device raised region ridges 46 and 52.

64. The cardiopulmonary resuscitation assist device raised region first ridge 46 and the cardiopulmonary resuscitation assist device raised region second ridge 52 are generally rounded to avoid injury to an obese patient positioned on the cardiopulmonary resuscitation assist device 10. The size of the cardiopulmonary resuscitation assist device 10 is conveniently 28 inches by 16 inches. The height of the cardiopulmonary resuscitation assist device raised region first ridge 46 from the cardiopulmonary resuscitation assist device lower surface 14 is about 1.5 to about 6 times the distance from the cardiopulmonary resuscitation assist device lower surface 14 to the cardiopulmonary resuscitation assist device trough 56.

65. As best seen in Fig. 5 is a prior art board 90. The prior art board 90 has a flat surface 92. The prior art board 90 may simply be a piece of plywood in a rectangular shape.

66. A patient 100 is shown positioned on the prior art board 90. The patient 100 has a patient spinal column 110. The patient also has a scapula 114 and a scapula 116. The patient 100 has a heart 120.

67. Cardiac and respiratory arrest is a risk for obese patients. When a patient undergoes cardiac arrest cardiopulmonary resuscitation is performed. The cardiopulmonary resuscitation involves as one aspect the compression of the heart region to provide blood flow through the body of cardiac arrest patient. The morbidly obese present great difficulty in receiving cardiac compression. The difficulty arises because the morbidly obese have an excess of adipose tissue that deflects and absorbs the force delivered by the person performing the cardiac compression.

68. A best seen in Fig. 5 the patient 100 will receive a force A 1 applied manually to provide the cardiac compression portion of cardiopulmonary resuscitation. The force A 1 is applied directly over the patient heart 120 of

the patient 100. As the prior art board 90 has a flat surface 92 there is nothing to stop the force A 1 from the urging toward the force lines B 1 and C 1. That is, the large amounts of adipose tissue in the patient permit deflection and absorption of the force A 1 such that heart is not effectively compressed.

69. Accordingly, the patient 100 loses most of the force A 1 applied to the patient heart 120 of the patient 100. The same situation occurs when any flat surface is utilized to perform cardiopulmonary resuscitation.

70. As seen in Fig. 6 a patient 100 has the cardiopulmonary resuscitation assist device 10 positioned such that the patient's heart 120 is between the cardiopulmonary resuscitation assist device raised region second ridge 52 and the cardiopulmonary resuscitation assist device trough 56. When the force A is applied to the cardiac region of the patient 100 positioned on the cardiopulmonary resuscitation assist device 10 the deflection of the force A in the direction of B and C is considerably less as the adipose tissue is less inclined to move freely.

71. The effect of the present invention is to permit the force to be applied effectively to the patient's heart 120 without undue deflection or absorption of the force by the adipose tissue of the patient 100.

72. As seen in Figs. 7 through 9 is an alternative embodiment of the present invention. A cardiopulmonary resuscitation assist device extension 200 is present on the cardiopulmonary resuscitation assist device 10. The cardiopulmonary resuscitation assist device extension 200 may be molded integrally with the remainder of the cardiopulmonary resuscitation assist device 10. The cardiopulmonary resuscitation assist device extension 200 may also be fixed to the cardiopulmonary resuscitation assist device 10 by screws, swage fitted, or by adhesive (not shown).

73. The cardiopulmonary resuscitation assist device extension 200 has a cardiopulmonary resuscitation assist device extension beveled edge 206 and a cardiopulmonary resuscitation assist device extension rounded edge 218. The cardiopulmonary resuscitation assist device extension 200 reduces the potential of hyperextension of the head and neck region when used with a patient 100.

74. From the above description of the invention, those skilled in the art will perceive improvements, changes and modifications. Such improvements, changes and modifications within the skill of the art are intended to be covered by the appended claims.

75. What is claimed is:

Claim 1. A cardiopulmonary assist device comprising:

a generally rectangular object;

said generally rectangular object having a first generally rectangular flat surface;

said generally rectangular object having a first side area;

said generally rectangular object having a second side area;

said generally rectangular object having a first end region;

said generally rectangular object having a second end region;

said generally rectangular object having a second generally rectangular surface;

said generally rectangular object having a second generally rectangular surface having a raised region thereon a centrally located between the first side area and the second side area.

Claim 2. The cardiopulmonary assist device according to claim 1, wherein the raised region is generally trapezoidal configuration having a trapezoidal base region, a trapezoidal region upper region, a first trapezoidal side and a second trapezoidal side.

Claim 3. The cardiopulmonary assist device according to claim 1, wherein the generally trapezoidal configuration does not extend to one of the first side area or the second side area.

Claim 4. The cardiopulmonary assist device according to claim 1, wherein the raised region is from about 1.5 to 6 times the width of the first end region or the second end region.

Claim 5. The cardiopulmonary assist device according to claim 2, wherein the trapezoidal upper region has a first peak area, a second peak area, and a trough located between the first peak area and the second peak area.

Claim 6. The cardiopulmonary assist device according to claim 1, which is a single formed structure.

Claim 7. The cardiopulmonary assist device according to claim 1, which is generally non-flexible.

Claim 8. The cardiopulmonary assist device according to claim 1, having one or more openings, for when in use, to permit a hand grasping action in at least one opening.

Claim 9. A cardiopulmonary assist device comprising:

a generally rectangular object;

said generally rectangular object having a first generally rectangular flat surface;

said generally rectangular object having a first side area;

said generally rectangular object having a second side area;

said generally rectangular object having a first end region;

said generally rectangular object having a second end region;

said generally rectangular object having a second generally rectangular surface;

said generally rectangular object having a second generally rectangular surface having a raised region thereon a centrally located between the first side area and the second side area;

provided further that the raised region is generally trapezoidal configuration having a trapezoidal base region, a trapezoidal region upper region, a first trapezoidal side and a second trapezoidal side, and;

wherein the generally trapezoidal configuration does not extend to one of the first side area or the second side area.

Claim 10. The cardiopulmonary assist device according to claim 9, wherein the raised region is from about 1.5 to 6 times the width of the first end region or the second end region.

Claim 11. The cardiopulmonary assist device according to claim 9, wherein the trapezoidal upper region has a first peak area, a second peak area, and a trough located between the first peak area and the second peak area.

Claim 12. The cardiopulmonary assist device according to claim 9, which is a single formed structure.

Claim 13. The cardiopulmonary assist device according to claim 9, which is generally non-flexible.

Claim 14. The cardiopulmonary assist device according to claim 9, having one or more openings, for when in use, to permit a hand grasping action in at least one opening.

Claim 15. A method of treating a mammalian subject in need of cardiopulmonary resuscitation comprising placing the mammalian subject in a supine position on a cardiopulmonary assist device according to claim 1, such that the cardio-region of the mammalian subject is located above the raised region during at least a portion of the time that cardiopulmonary resuscitation is performed on the mammalian subject.

Claim 16. A method of treating a mammalian subject in need of cardiopulmonary resuscitation comprising placing the mammalian subject in a supine position on a cardiopulmonary assist device according to claim 9, such that the cardio-region of the mammalian subject is located above the raised region during at least a portion of the time that cardiopulmonary resuscitation is performed on the mammalian subject.

Claim 17. The method according to claim 16, wherein the respective scapula of the mammalian subject are located outward of the respective first peak area, and the second peak area.

Claim 18. The cardiopulmonary assist device according to claim 1, having at least one cardiopulmonary resuscitation assist device extension extending downward from at least one lengthwise end of said cardiopulmonary resuscitation assist device raised region toward said first generally rectangular flat surface.

Claim 19. The cardiopulmonary assist device according to claim 9, having at least one cardiopulmonary resuscitation assist device extension extending downward from at least one lengthwise end of said cardiopulmonary resuscitation assist device raised region toward said first generally rectangular flat surface.

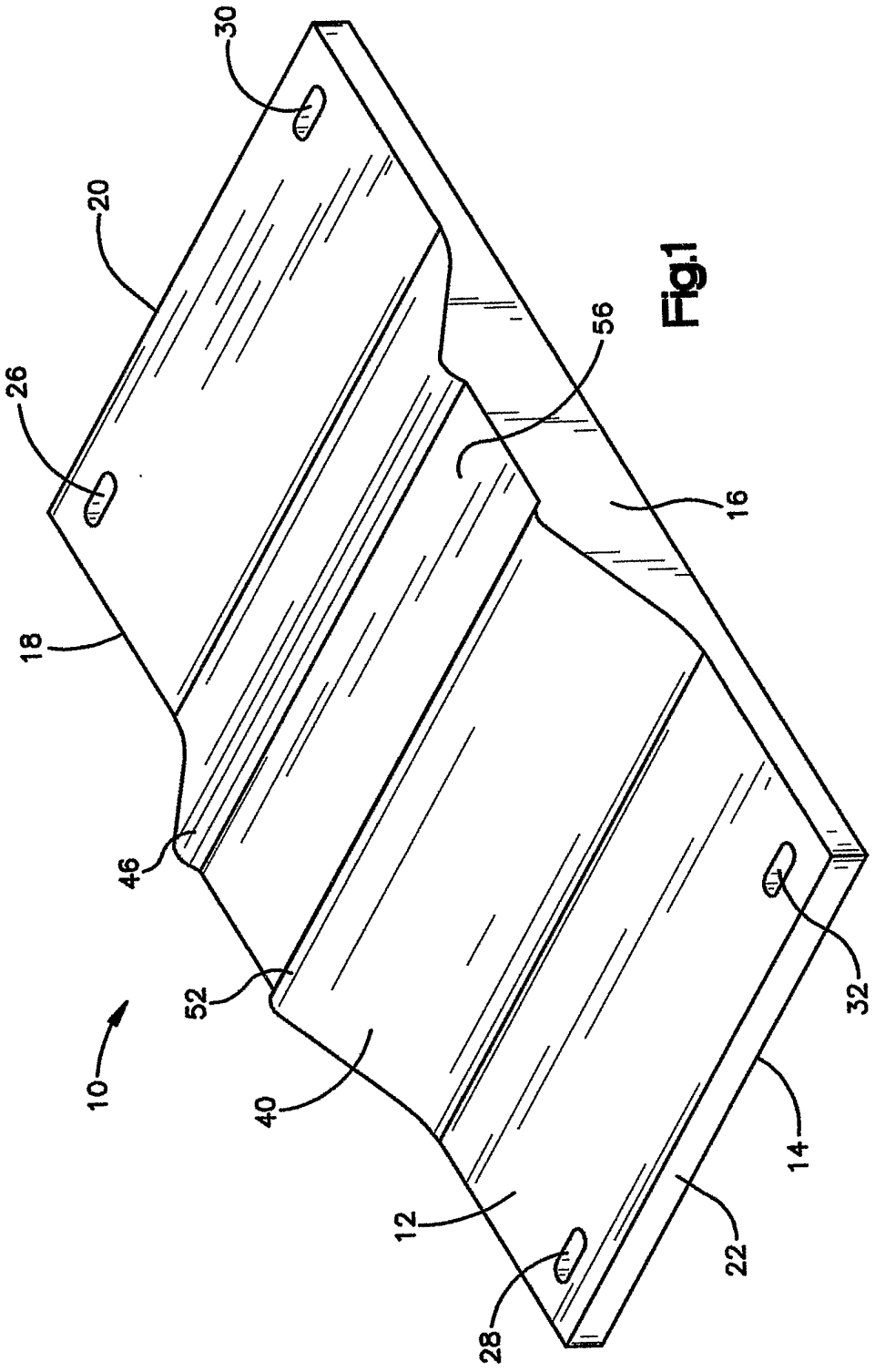

Fig.1

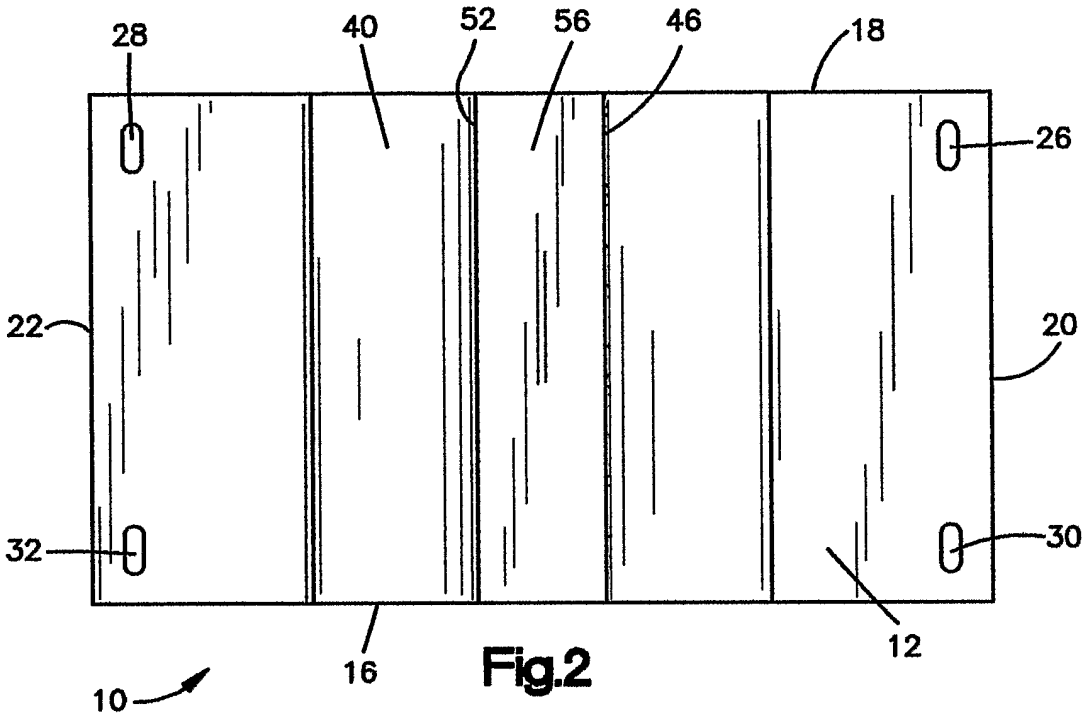

Fig.2

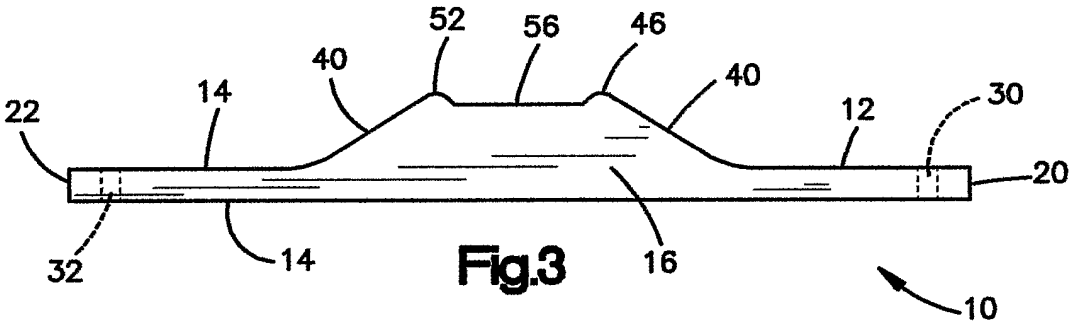

Fig.3

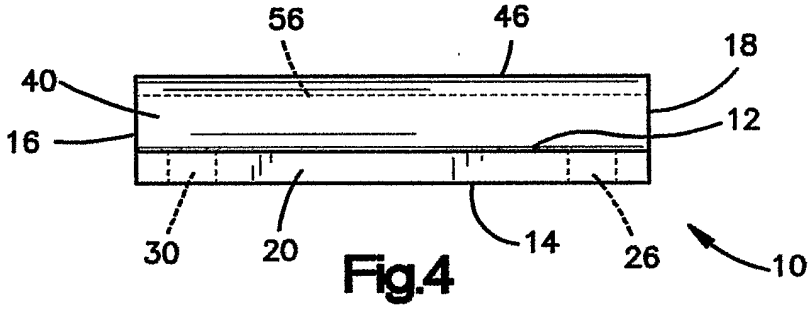

Fig.4

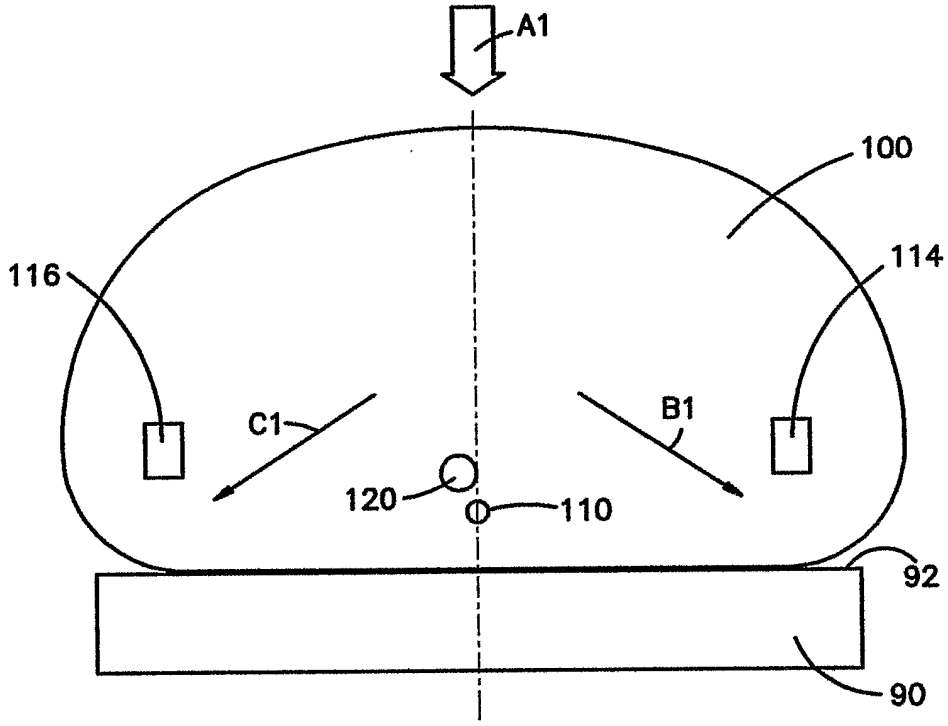

Fig.5
PRIOR ART

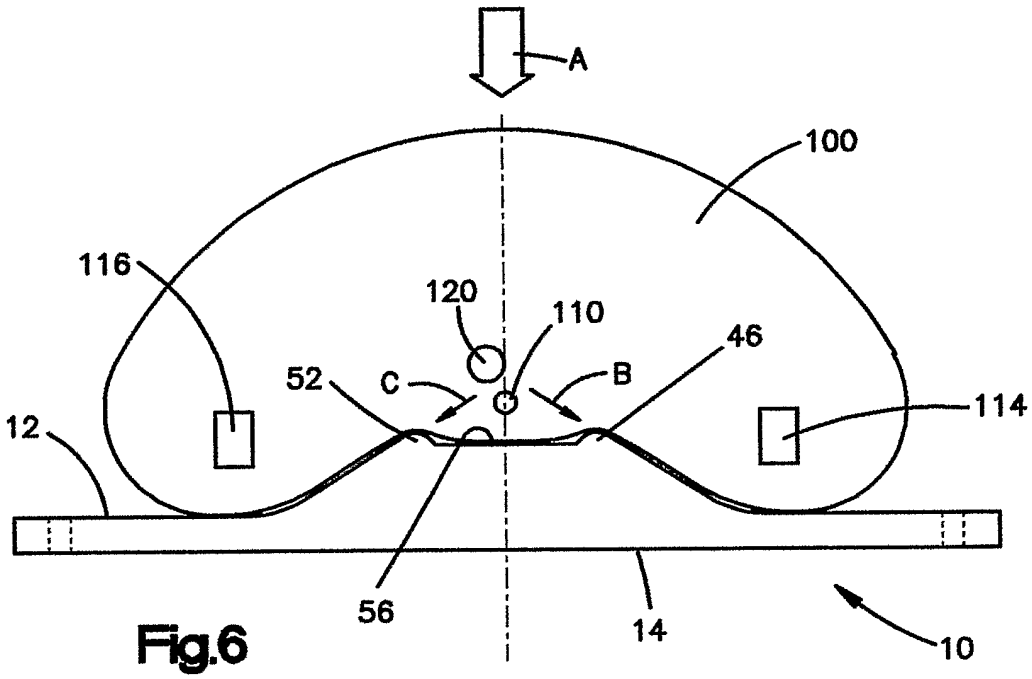

Fig.6

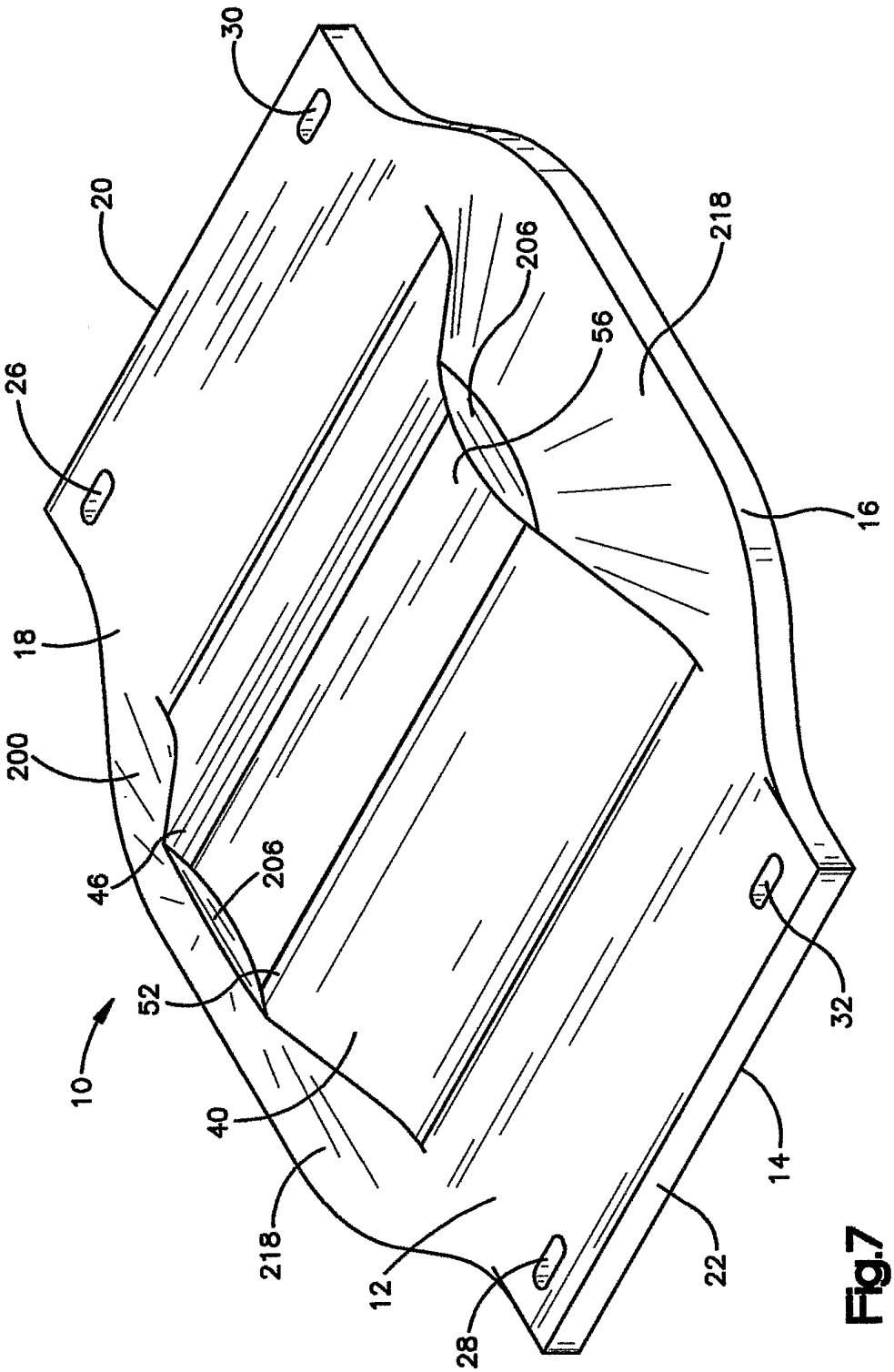

Fig.7

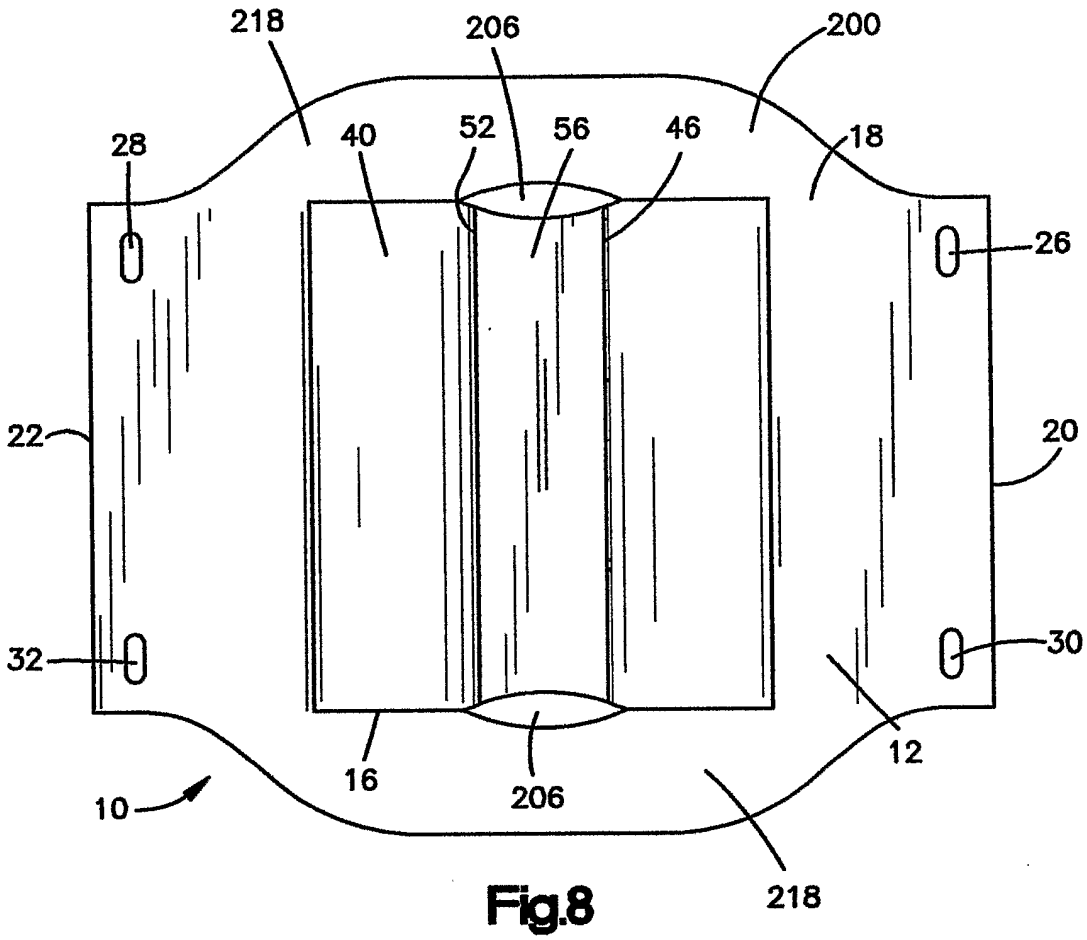
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Fig.8

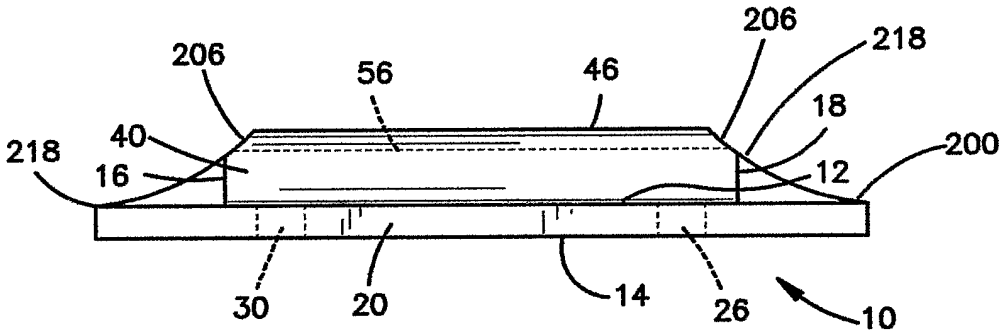
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Fig.9