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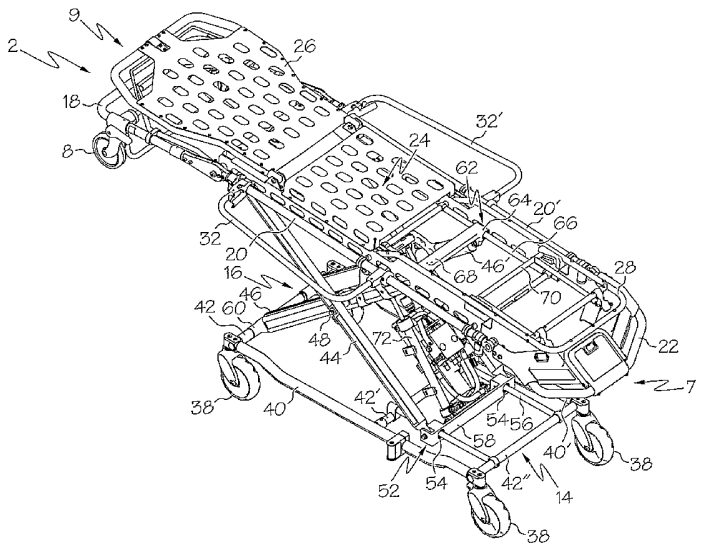
(54) Title: ELECTRO-HYDRAULICALLY POWERED LIFT AMBULANCE COT



(57) Abstract: A collapsible hydraulically operated ambulance cot (2) having a support frame, a wheeled base, a support mechanism (16) disposed therebetween, and a lift system (10) for hydraulically moving the upper (12) frame relative to the lower frame (14) is disclosed. The lift system (10) permits a single attendant to raise the cot (2) from a lowered position to a raised position, and an infinite number of positions therebetween, and to raise the wheeled base relative to the support frame to situate the cot onto an elevated surface such as the transport deck of an ambulance. A manual override is also provided to conserve battery (30) power and as a back-up in no-power situations. It is to be appreciated that the above described manual override mode may be used when raising or lowering the cot (2) without power assist, dropping the undercarriage (11) when unloading from a vehicle, and lifting the undercarriage (11) when loading into a vehicle.

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ELECTRO-HYDRAULICALLY POWERED LIFT AMBULANCE COT

This invention relates to ambulance cots and more particularly to an ambulance cot having an electro-hydraulically, operated collapsible frame structure to facilitate loading of the ambulance cot from the ground and into an ambulance by a single operator.

In order to situate a conventional non-powered ambulance cot into the back of an ambulance, two or more attendants often must lift the cot from a relatively low height of approximately 15 cm (about 6 inches) from the ground to a height of almost 1 meter (about 39 inches). Unfortunately, lifting or raising a loaded ambulance cot from this low height increases the risk to these attendants obtaining a back injury or exacerbating an existing one. This problem is exacerbated when handling and transporting a bariatric patient.

It is against the above background, that the present invention provides a hydraulic lift system to an ambulance cot which will be used to assume all or most of the effort required to lift and/or lower the cot and patient carried thereon. The present invention by providing a power lift ambulance cot for emergency medical services and ambulance-related services addresses the problems associated with the physical strain of raising and lowering a loaded ambulance cot. Accordingly, the present invention has the potential to reduce work related injuries and to reduce the amount of lost work time, as well as therapeutic costs.

Although the present invention is not limited to following specific advantages, it is noted that the present invention allows an attendant to raise or lower a patient with only the touch of a button to activate the hydraulic lift system. When using the hydraulic lift

system of the present invention, the cot will lift a patient up to about 363 kilograms (about 700 pounds), thereby addressing scenarios where attendants may be put into a situation where they can injure their back while handling a bariatric patient.

The present invention uses an x-frame design with two hydraulic lift cylinders for raising and lowering the patient, and for providing a smooth and balanced lift operation to the cot. Since the weight of the patient is taken off the attendants and put onto the hydraulic lift system, both attendants now have the ability to assist in holding the weight at the trailing (operator) end of the cot as it's being loaded into a vehicle. Being able to situate the two attendants at the trailing end of the cot allows for an easier loading of the cot into the vehicle, especially one's with floors higher than about 0.7 meters (about 30 inches). It is also to be appreciated that the present invention has an infinite height adjustment range to meet all of the attendant's needed loading positions in order to transfer a patient to and from the cot.

In one embodiment, an electro-hydraulically powered lift ambulance cot comprising a wheeled base having a first slide member slidably supported by a longitudinally extending lower guide is disclosed. A support frame has a second slide member slidably supported by a longitudinally extending upper guide, and is disposed above the wheeled base. A support mechanism, which supports the support frame relative to the wheeled base, is pivotably connected to the support frame, the wheeled base, the first slide member, and the second slide member. A hydraulic lift system is pivotably mounted at a first end to the first slide member, and at a second end to the support mechanism. A motor is mounted to the cot to pump hydraulic fluid under pressure to the lift system in order to

assist relative movement between the support frame and the wheeled base. Pilot operated check valves "lock" hydraulic cylinders of the lift system in place when the pump is de-energized to maintain the cot in its desired position. A manual override is also provided to conserve battery power and as a back-up in no-power situations. It is to be appreciated that the above described manual override mode may be used when raising or lowering the cot without power assist, dropping the undercarriage when unloading from a vehicle, and lifting the undercarriage when loading into a vehicle.

These and other features and advantages of the invention will be more fully understood from the following description of a preferred embodiment of the invention taken together with the accompanying drawings. It is noted that the scope of the claims is defined by the recitations therein and not by the specific discussion of features and advantages set forth in the present description.

The following detailed description of the embodiments of the present invention can be best understood when read in conjunction with the following drawings, where like structure is indicated with like reference numerals and in which:

FIG. 1 is an illustrated side view of a cot according to the invention situated in a fully elevated position;

FIG. 2 is an illustrated side view of a cot according to the invention in a lowered position;

FIG. 3 is an illustrated elevated perspective view of a first side of a cot according to the invention, with parts removed for ease of illustration;

FIG. 4 is an illustrated trailing (operator) end view of a cot according to the invention with parts removed for ease of illustration;

FIG. 5 is an illustrated elevated perspective view of a cot according to the invention;

FIG. 6 shows a connection diagram of the hydraulic system according to an embodiment of the present invention;

FIG. 7 is an illustrated close-up section view of a trailing (operator) end of a cot according to the present invention; and

FIG. 8 is an illustrated close-up section view of a portion of a cot according to the invention showing a charging connection.

Skilled artisans appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of embodiment(s) of the present invention. Additionally, parts and portion of some elements may be removed to help improve understanding of the embodiments of the present invention.

With reference to FIGS. 1-5, a retractable ambulance cot according to one embodiment of this invention is shown generally as **2**. Upon the cot **2** a patient **4** may be supported, and conveniently loaded onto an elevated surface **6**, such as for example, the transport bay of an ambulance. It is to be appreciated that the cot **2** functions at ambulance load heights up to about 0.9 meters (about 34 inches), thereby reducing the physical strain of loading an ambulance cot into an ambulance. Additionally, it is to be appreciated that the cot **2** unloaded weighs less than about 61 kilograms (about 135

pounds). The overall dimensions of the cot **2** is about 2.1 meters (about 83 inches) long by about 0.6 meters (about 24 inches) wide by about 0.33 meters (about 13 inches) high in the fully lowered position, a position illustrated by FIG. 2.

Referring to FIG. 1, the cot **2** is illustrated in a fully elevated position. It is to be appreciated that a single attendant can hold and manipulate the trailing end **7** of the cot **2** in the elevated position in order to rest loading wheels **8** provided at the leading end **9** of the cot onto the elevated surface **6**. Operation of an associated hydraulic lift system, shown generally as **10,** as described herein in a later section, causes the undercarriage to be hydraulically raised to the level of the elevated surface **6** allowing the attendant to transfer the cot **2** thereon in a lowered position, such as depicted by FIG. 2. It is to be appreciated that the cot **2** when situated in a fully lowered position, loading wheels **8** and swivel wheels **38** support the cot **2** upon the elevated surface **6**.

The hydraulic lift system **10** also hydraulically raises the cot **2** from the lowered position to the raised position, and an infinite number of positions therebetween. Pressure in the hydraulic lift system **10** may also be manually released to cause the cot **2** to be lowered from the raised position to the lowered position, and an infinite number of positions therebetween, to conserve battery power and as a back-up in no-power situations. It is also to be appreciated that the above described manual mode may also be used when raising the cot without power assist, dropping the undercarriage when unloading from a vehicle, and lifting the undercarriage when loading into a vehicle.

The undercarriage, generally indicated by symbol **11**, of the cot **2** comprises an upper frame **12**, a lower frame **14**, and a support mechanism shown generally as **16**

disposed therebetween for supporting the upper frame **12** relative to the lower frame **14**. The upper frame **12** is generally rectangular, and in the illustrated embodiment shown by FIG. 3, comprises at the leading end **9**, a leading end frame member **18** coupled to a pair of opposed, longitudinally extending side frame members **20, 20'**. At the trailing end **7**, the side frame members **20, 20'** are coupled rotatably to a trailing end frame member **22**, having a bent U-shape. The frame members **18, 20, 20', and 22** are a tubular material, such as metal, laminate, plastics, or combinations thereof.

In the illustrated embodiment, the leading end frame member **18** is coupled rotatably to the opposed side frame members **20, 20'** and is a drop frame, such as the type disclosed by U.S. Patent No. 6,701,545, a patent commonly assigned to Ferno Washington, Inc., and the disclosure of which is herein fully incorporated by reference. The loading wheels **8** are provided to the leading end frame member **18**.

In one embodiment, the upper frame **12** includes a patient bed shown generally as **24** in FIG. 3, upon which the patient **4** rests, as is illustrated in FIG. 1. The patient bed **24** includes raisable back and leg rests **26** and **28**, respectively. Situated below the back rest **26** is a battery **30**, which is best shown by FIG. 5. Battery **30** provides the necessary power to operate the hydraulic lift system **10** according to the invention, and is rechargeable without being removed from the cot via an electric connection to an external source. It is to be appreciated that the term "battery" includes single cell batteries and multiple cell batteries.

In one embodiment, an electrical connection is made through the use of an extension cord (not shown). In another embodiment, such as illustrated by FIG. 8, an electrical

connection is made through a cot fastening device **200** situated in an emergency vehicle, represented by portion **204**. The cot **2** in the illustrated embodiment provides an electrical contact pad **204** adjacent a fastening member **206** that is mounted to the cot. As shown by FIG. 5, in one embodiment, the electrical contact pads **204** and fastening member **206** are provided to the side frame members **20** and **40**, respectively. In another embodiment the electrical contact pads **204** may be situated with the fastening member **206** on the lower frame **14** of the cot **2**, or vice versa. In any of the embodiments, when the cot **2** is situated into the emergency vehicle and the fastening device **200** releasably securing the fastening member **206,** an electric connection with an external source, such the vehicles electrical system, is made. An electrical connection is made through the use of electrical prongs **208** provided adjacent the fastening device **200**, and which contact the electrical contact pads **204**. It is to be appreciated that movable protective covers may be provided to one or both of the contact pads and electric prongs.

The battery **30**, which in one embodiment provides 24 VDC, 25 amps, provides enough energy to lift and lower the upper frame **12** relative to the lower frame **14** while supporting a patient weighing about 227 kilograms (about 500 pounds) about 20 times before needing a recharge. The number of cycles can be increased by utilizing the manual override, and gravity, to conserve power when lowering the cot from an elevated position (FIG. 1) to a lowered position (FIG. 2). In other embodiments, other voltages and amperes may be used.

As shown by FIG. 3, the upper frame **12** further includes a pair of sidearm supports **32, 32'** which are each rotatably mounted to respective side frame members **20, 20'**. It is

to be appreciated that the pair of sidearm supports **32, 32'** rotate about an axis, which is the central axis of each side frame members **20, 20'**. Each sidearm support **32, 32'** can rotate about 180 degrees from a vertically up position to a nearly vertically down position, or to an outwardly extended position, as is illustrated in FIG. 3.

In another embodiment, the upper frame **12** is a support platform for releasably receiving a multipurpose roll-in cot shown generally as **34** in FIG. 9. The upper frame **12** in this embodiment would be provided without the back and leg rests **26** and **28** (FIG. 3) and would be provided with mounting engagements **36** to support multipurpose roll-in cots such as, for example, the types disclosed by U.S. Patent No. 4,037,871, and PCT Application No. US01/45144 (WO0239944), references commonly assigned to Ferno Washington, Inc., the disclosures of which are herein fully incorporated by reference.

As best illustrated by FIG. 3, the lower frame **14** is generally rectangular, and has a set of swivel wheels **38** at each corner thereof. The wheels **38** may be conventional caster wheels with foot-operated locking mechanisms. The lower frame **14** comprises a pair of longitudinally extending side frame members **40, 40'** separated by three transverse frame members **42, 42'**, and **42''** provided at the loading end, an approximate midsection of the lower frame **14**, and the trailing end, respectively.

The support mechanism **16** is an x-frame that includes a first pair of parallel legs **44, 44'** and a second pair of parallel legs **46, 46'**. Respective ones of the pairs of legs **44, 46** and **44', 46'** are pivotably connected at an intermediate location by a pivot brace or connection **48**. The upper frame **12** is connected to each of the first pair of legs **44, 44'** by a pivot **50** (the pivots on both sides of the frame **12** are the same), which is best shown in

FIG. 1. The lower ends of the first pair of legs **44, 44'** are pivotably connected to the lower frame **14** by a first slide member **52**.

With reference to FIG. 3, the first slide member shown generally as symbol **52** comprises linear bearings **54** slidably supported by longitudinally extending bearing supports or guide **56** and mounted to a bracket **58**. If desired, linear bearings **54** and bracket **58** may be a unitary component. As illustrated, the guide **56** is mounted between the transverse frame members **42'** and **42''** of the lower frame **14**. The lower ends of the first pair of legs **44, 44'** are also pivotably mounted to bracket **58**. The lower ends of the second pair of legs **46, 46'** are pivotably connected to the leading transverse frame member **42** of the lower support frame **14** also by pivots **60**. The upper ends of the second pair of legs **46, 46'** are pivotably connected to upper frame **12** by a second slide member shown generally as **62**. The second slide member **62** comprises linear bearings **64** slidably supported by longitudinally extending bearing supports or guide **66**, and a bracket **68** upon which the upper ends of the second pair of legs **46, 46'** are pivotably mounted. The guide **66** is mounted to the upper frame **12** via a laterally extending brace **70**.

The hydraulic lift system **10** is also pivotably mounted between the second pair of legs **46, 46'** and the first slide member **52**. As best illustrated by FIG. 4, the lift system **10** utilizes a pair of hydraulic cylinders **72, 72'**. The lower ends of the cylinders **72** are pivoted off bracket **58** and move along with the first slide member **52**. The upper ends of the cylinders **72, 72'** are pivoted off a bar attachment **74** mounted between the second pair of legs **46, 46'** above the pivot braces or connections **48**. The bar attachment **74** mounted above the connections **48** provides a mechanical advantage at the beginning of the lift

sequence, wherein slightly less than about 1.8 kilograms (about 4 pounds) of mechanical lift is needed per about 0.45 kilograms (about 1 pound) of patient.

Accordingly, in one exemplary embodiment, based upon utilizing a pair of 2.54 cm (1-inch) diameter hydraulic cylinders with about 25.4 cm (about 10 inches) of stroke and a working pressure of about 13.8 MPa (about 2000 psi), the cot **2** is able to lift a patient weighing about 317.5 kilograms (about 700 pounds). As also best illustrated by FIG. 4, an electro-hydraulic system **76** of the hydraulic lift system **10** is provided to the cot **2** between the pair of hydraulic cylinders **72, 72'**. As illustrated in FIG. 5, a protective cover **210** is provided enclosing the electro-hydraulic system **76**. The electro-hydraulic system **76** is discussed in greater detail hereafter in reference to FIG. 6.

As can be seen in the FIG. 6, the electro-hydraulic system **76**, which serves to hydraulically actuate the vertically adjustable ambulance cot **2**, comprises a power unit **78** having an electric motor **80**, powered by battery **30** (FIG. 1), driving a pump **82** for supplying the hydraulic fluid from a reservoir **84**, and a hydraulic control circuit **86**. The power unit **78** is operable in two directions to supply hydraulic fluid from the reservoir **84** (through a respective filter **88** or **88'** and respective pair of check valves **90, 98** or **90', 98'**) to either a first branch **92** or a second branch **94** of the control circuit **86**. In the illustrated embodiment, check valves **98, 98'** are pilot controlled check valves. Also as illustrated, the pump **82** is in fluid connection between the pairs of check valves **90, 90'** and **98, 98'** along with a back pressure circuit **95** provided upstream thereof. The backpressure circuit **95** ensures a more smooth and even movement of the hydraulic cylinders without a sharp jerking motion, and includes a spring-controlled unloading valve **96** and a low pressure

relief valve **104**. The low pressure relief valve **104** is set to relieve back pressures in excess of about 1,034 kiloPascals (about 150 psi).

In the first branch **92** of the control circuit **86**, which extends from the power unit **78** to the extension side of the cylinders **72, 72'**, a high pressure relief valve **100** is positioned, which is set to relieve line pressures in excess of 13.8 MPa (2000 psi). Downstream from the high pressure relief valve **100** is positioned an adjustable compensating feed valve **102**. The feed valve **102** provides a wide range of advance and retract feeds, thereby ensuring that the hydraulic fluid is provided to the cylinders **72, 72'** in at a controlled and safe rate. However, a bypass check value **103** is provided around feed vale **102** to ensure that suitable fluid flow is provided to the extension side of the hydraulic cylinders **72, 72'**, thereby ensuring a smooth extension of cylinders **72, 72'** when lifting under power a patient situated on the cot **10**.

Additionally, the bypass check valve **103** ensures a vacuum does not form on the extension side of the hydraulic cylinders **72, 72'** when manually raising the cot **2** which is explained more fully in a later section. The hydraulic cylinders **72, 72'** are under power when the motor **80** is operated to supply fluid under pressure to the first branch **92** in order to extend the cylinders **72, 72'**, thereby raising the upper frame **12** of the cot **2** relative to the lower frame **14**. In one embodiment, the rate of the hydraulic fluid supply to the first branch **92** from the power unit **78** is about 3 liters per minute (about 0.80 GPM).

In the second branch **94**, which is parallel to said first branch **92** and which extends between the retraction side of the cylinders **72, 72'** and the power unit **78**, a high pressure relief valve **105** is positioned, which is set to relieve line pressures in excess of 13.8 MPa

(2000 psi). Downstream from the high pressure relief valve **105** is positioned pilot controlled check valve **98'**. The motor **80** is operated to supply fluid under pressure to the second branch **94** in order to retract the cylinders **72, 72'**, thereby lowering the upper frame **12** relative to the lower frame **14**. In one embodiment, the rate of the hydraulic fluid supply to the second branch **94** from the power unit **78** is about 2.3 liters per minute (about 0.6 GPM).

Between the first branch **92** and the second branch **94**, are located a pair of hand operated spring-return valves **106, 106'**, used to manually lower or raise the cot **2**. The outlets of the hand-operated spring-return valves **106, 106'** dump to the reservoir **84**. A check valve **108**, which flows only in the feed direction of the second branch **94**, ensures a vacuum does not form on the bottom side of the hydraulic cylinders **72, 72'** when manually lowering the cot **2** via operating the hand-operated spring-return valves **106, 106'**.

Taking as an initial position of the cot **2** at the lowered position thereof, the pump **82** of the power unit **78** pumps the fluid into the first branch **92**, through the associated pilot control check valve **98**, to the pressure compensated feed valve **102** and through the bypass check value **103**. It is to be appreciated that supplying hydraulic fluid to the first branch **92** also opens the check valve **98'** in the second branch **94** to permit the hydraulic fluid to flow from the bottom of the cylinders **72, 72'** back to the inlet of the pump **82**.

When the pressure required for lifting the cylinders **72, 72'** has been reached, the cylinders **72, 72'** will be accelerated continuously and slowly until it has reached its maximum speed depending on the properties of the fluid flow and pressure drop. In the

course of this process, the pressure in the first branch **92** up to the inlet of the feed valve **102** and through bypass check valve **103** will exceeds the pressure in the cylinders **72, 72'** as the amount of fluid delivered by the pump **82** is larger than the maximum amount of fluid flowing through the feed valve **102** and bypass check value **103**. Accordingly, the excessive amount of fluid in the first branch **92** is then discharged into the reservoir **84** by being dumped via feed valve **102**. It follows that a constant lifting movement is carried out until the power unit **78** is switched off.

A short time after switching off the power unit **78**, such as when reaching the desired level for the upper frame **12** of the cot **2**, the pilot operated check valve **98** in the first branch **92** remains closed as long as the pressure at its inlet does not exceed the pressure in the cylinder or is opened by operating the power unit in the opposite direction. Hence, the cylinders **72, 72'**, are prevented from retracting. Exactly the opposite takes place in the second branch **94** when lowering the upper frame **12** by operating power unit in the reverse direction.

Turning to FIG. 7, an illustrated close-up section view of a trailing (operator) end **7** of the cot **2** according to the present invention is shown. As illustrated, the trailing (operator) end **7** of the cot provides the end frame member **22**, which has a bent U-shape, and like the leading end frame member **18** (FIG. 3), is also a drop frame with a plurality of locking positions. It is to be appreciated that the trailing end frame member **22** can be raised or lowered with two hands, and along with its bent U-shape, thereby provides additional lifting points for better ergonomics and fewer injuries, and reduces overall length of the cot for easier maneuverability in confined spaces.

Provided to the trailing end frame member **22** is an on/off button **212** used to energize the motor **80** in the power unit **78** (FIG. 6) with battery **30** (FIG. 1). A battery charge indicator **214** is also provided, which indicates battery state of charge. Relatively large thumb control switches **216, 216'** used to control the up and down operation of the cot **2**, are also provided to the trailing end frame member **22**. It is to be appreciated that the U-shape of the trailing end frame member **22** and the relatively large thumb control switches **216, 216'**, provide for a wide range of hand sizes and gripping points along the frame member **22** , thereby making it easier for two operators to load the cot while both sets of hands are holding the cot from the trailing (operator) end **7**. An actuator **218** for the manual operation mode of the cot **2** is also provided at the trailing (operator) end **7**.

While the invention has been described by reference to certain preferred embodiments, it should be understood that numerous changes could be made within the spirit and scope of the inventive concepts described. For example, all relief valves may be variably adjusted, and that although in one embodiment the above mentioned pressures are suitable, other system pressures may be used without departing from the scope and spirit of the invention. Accordingly, it is intended that the invention not be limited to the disclosed embodiments, but that it have the full scope permitted by the language of the following claims.

CLAIMS

1. A hydraulically powered lift ambulance cot comprising:

a wheeled base having a first slide member slidably supported by a longitudinally extending lower guide;

a support frame having a second slide member slidably supported by a longitudinally extending upper guide, said support frame is disposed above said wheeled base;

a support mechanism which supports said support frame relative to said wheeled base, said support mechanism is pivotably connected to said support frame, said wheeled base, said first slide member, and said second slide member;

a hydraulic lift system pivotably mounted at a first end to said first slide member, and at a second end to said support mechanism; and

a battery provided to said cot to supply electricity to the hydraulic lift system in order to assist relative movement between said support frame and said wheeled base.

2. The hydraulically powered lift ambulance cot according to claim 1, wherein said support frame forms a bed having an adjustable head end, and said battery releasably mounted below said head end.

3. The hydraulically powered lift ambulance cot according to claim 1 wherein the first slide member comprises linear bearings slidably supported by the lower guide and mounted to a bracket upon which the lower ends of a first pair of legs of said support mechanism pivotably mounted.

4. The hydraulically powered lift ambulance cot according to claim 1, wherein the second slide member comprises linear bearings slidably supported by the upper guide and a bracket upon which first ends of a second pair of legs of the support mechanism pivotably mounted.

5. The hydraulically powered lift ambulance cot according to claim 1 wherein the first slide member comprises linear bearings slidably supported by the lower guide and mounted to a bracket upon which the lower ends of a first pair of legs of said support mechanism pivotably mounted, and wherein the second slide member comprises linear bearings slidably supported by the upper guide and a bracket upon which first ends of a second pair of legs of the support mechanism pivotably mounted.

6. The hydraulically powered lift ambulance cot according to claim 1, wherein said support mechanism is an x-frame that includes a first pair of parallel legs and a second pair of parallel legs, respective ones of the pairs of legs are pivotably connected at an intermediate location by a pivot brace.

7. The hydraulically powered lift ambulance cot according to claim 1, wherein said support mechanism is an x-frame that includes a first pair of parallel legs and a second pair of parallel legs, respective ones of the pairs of parallel legs are pivotably connected at an intermediate location by a pivot brace, and said lift system is pivotably mounted at said second end to said first pair of parallel legs above each said pivot brace.

8. The hydraulically powered lift ambulance cot according to claim 1, wherein said support mechanism includes a first pair of elongated legs having a first end pivotably connected to said first slide member and a second end pivotably connected to said support frame, and a second pair of elongated legs having a first end pivotably connected to said base and a second end pivotably connected to said second slide member, respective ones of said first and second pairs of elongated legs being pivotably connected to one another each by a pivot connection.

9. The hydraulically powered lift ambulance cot according to claim 1, wherein the hydraulic lift system comprises two hydraulic cylinders, wherein lower ends of the cylinders are pivoted off the first slide member and move said first slide member to adjust the vertical position between the support frame and wheeled base.

10. The hydraulically powered lift ambulance cot according to claim 1, wherein the hydraulic lift system comprises two hydraulic cylinders, wherein lower ends of the cylinders are pivoted off a bracket of the first slide member and move said first slide

member to adjust the vertical position between the support frame and wheeled base, and upper ends of the cylinders are pivoted off a bar attachment mounted offset from and above pivot connections between respective ones of pairs of parallel legs of said support mechanism.

11. The hydraulically powered lift ambulance cot according to claim 1, wherein said hydraulic system comprising:

at least one cylinder for vertically adjusting the ambulance cot;

a power unit having a bi-directional pump;

a control circuit having a first branch in fluid connection with both the pump and an extension side of the at least one cylinder, a second branch in fluid connection with both the pump and a retraction side of the at least one cylinder, and a pair of hand-operated spring-return valves in fluid connection between the first and second branches.

12. The hydraulically powered lift ambulance cot according to claim 11, wherein said first branch comprises a pressure compensated feed valve, a bypass check valve around said pressure compensated feed valve, and a pressure relief valve.

13. The hydraulically powered lift ambulance cot according to claim 11, wherein said second branch comprises a pressure relief valve.

14. The hydraulically powered lift ambulance cot according to claim 11, wherein each output side of the pair of hand-operated spring-return valves is in fluid connection with a check valve in fluid connection with the second branch.

15. The hydraulically powered lift ambulance cot according to claim 11, wherein the power unit provides about 3 liters per minute (about 0.8 GPM) to the first branch, and about 2.3 liters per minute (about 0.6 GPM) to the second branch.

16. The hydraulically powered lift ambulance cot according to claim 11, wherein the power unit check valves are pilot operated.

17. The hydraulically powered lift ambulance cot according to claim 11, wherein the pair of pressure relief valve are set to relieve at about 11,032 kiloPascals (about 1600 psi) and about 13,790 kiloPascals (about 2000 psi), respectively.

18. The hydraulically powered lift ambulance cot according to claim 1, further comprising a fastening device provided to a first side frame member of said cot and electrical contact pads provided to a second side frame member of said cot, said electrical contact pads are configured to make an electrical connection between an external source and said battery when said cot is releasably secured in an emergency vehicle by said fastening device.

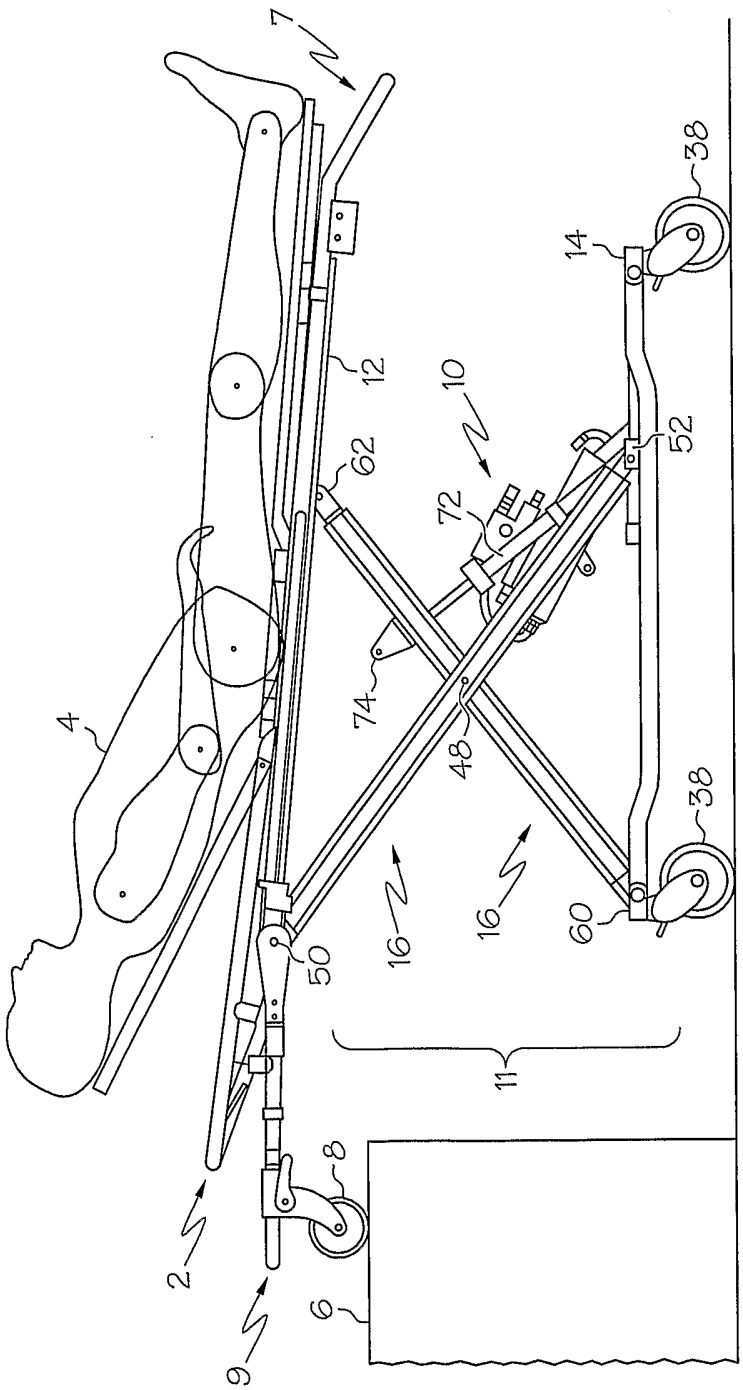


FIG. 1

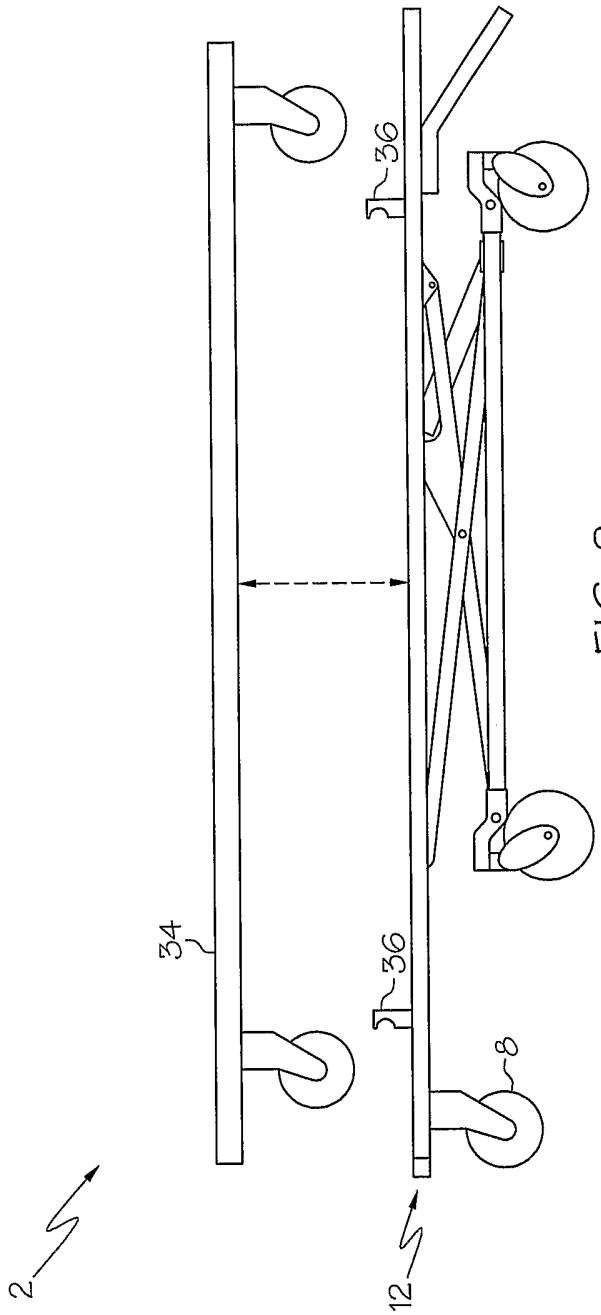
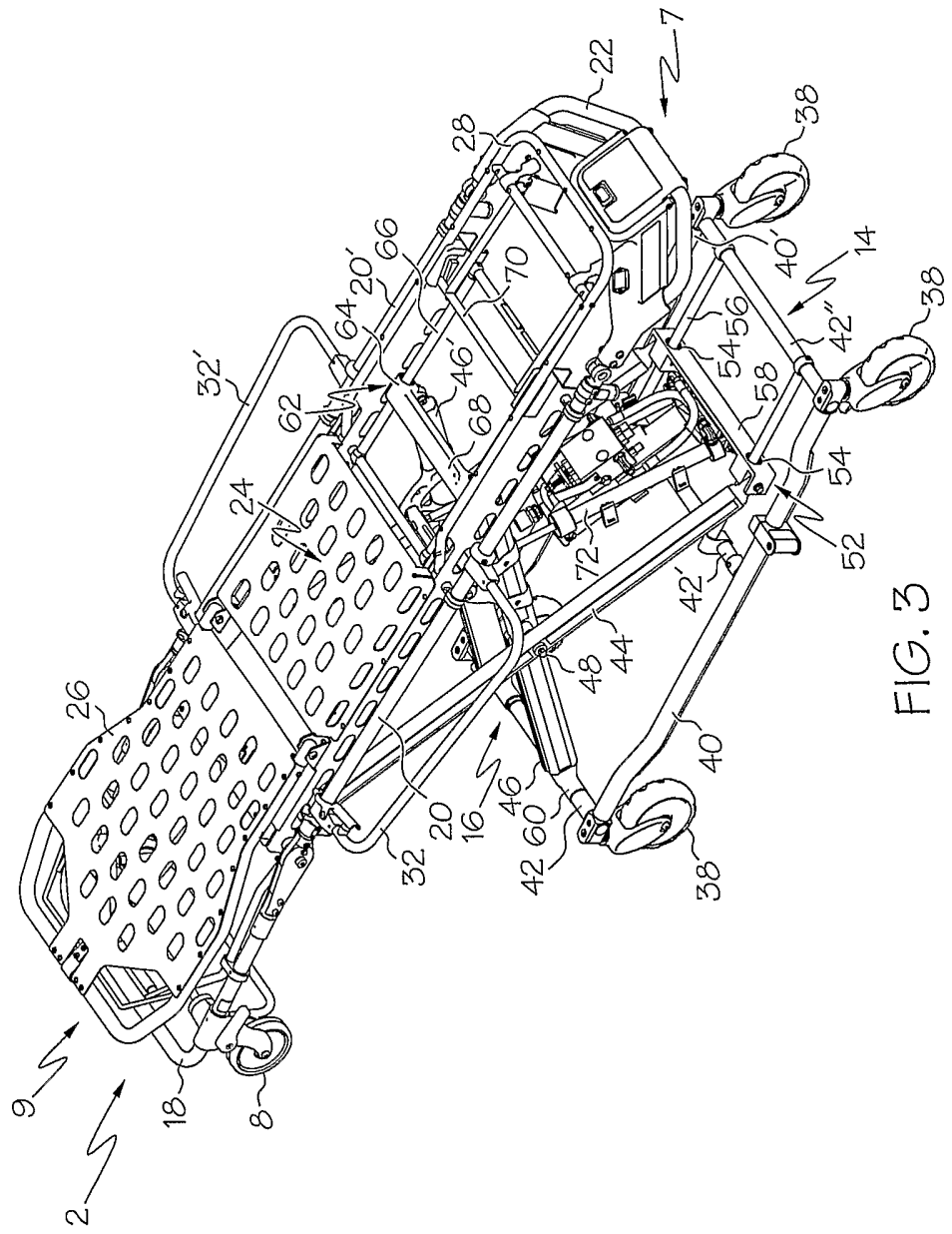


FIG. 2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42"
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8
2

FIG. 3

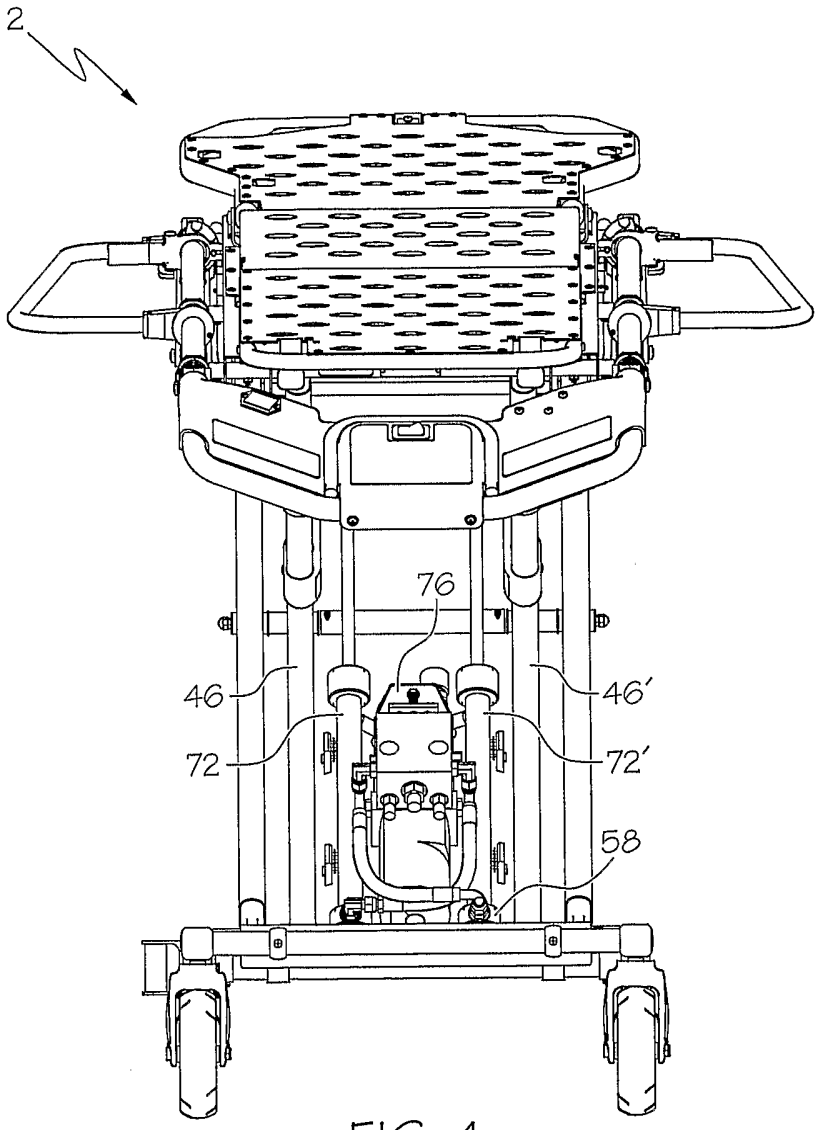

FIG. 4

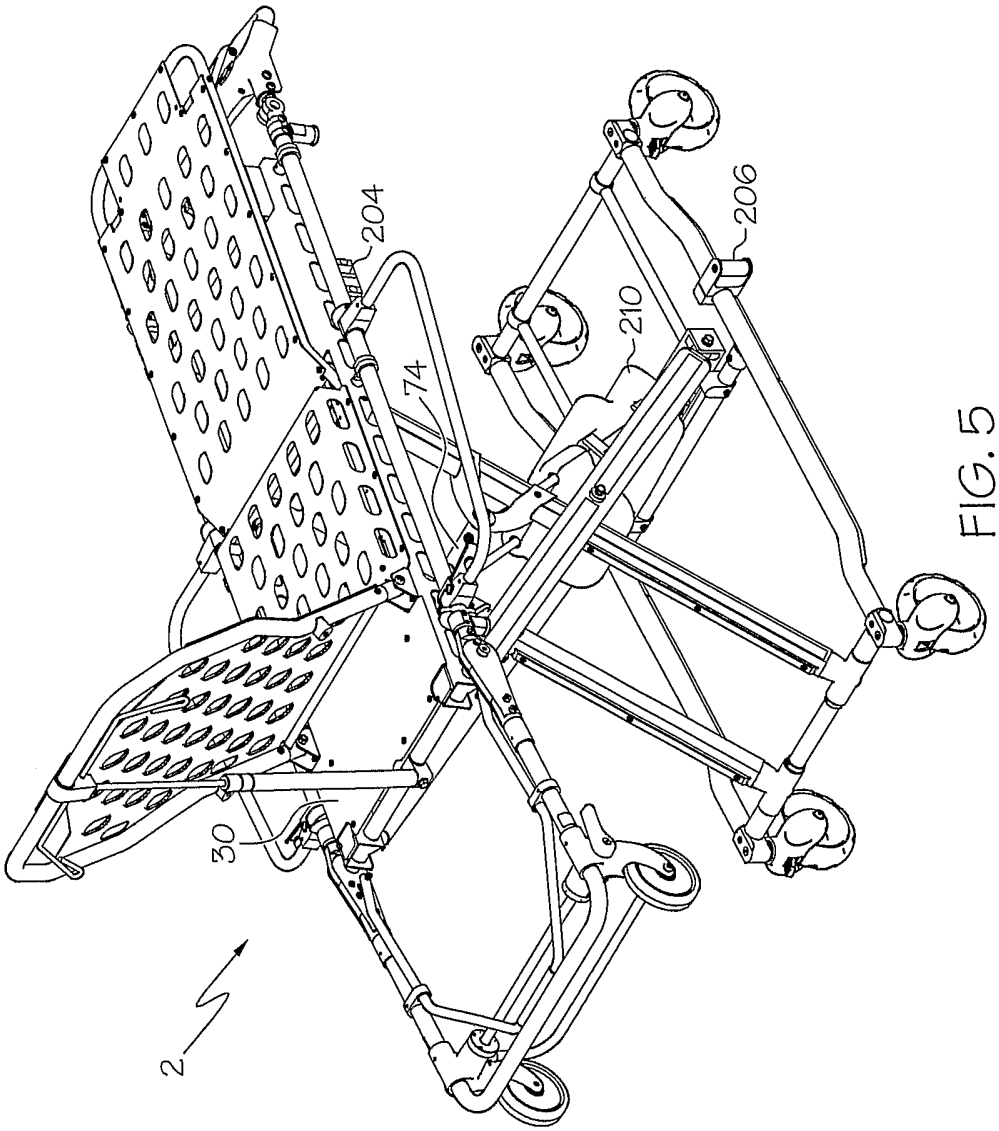

FIG. 5

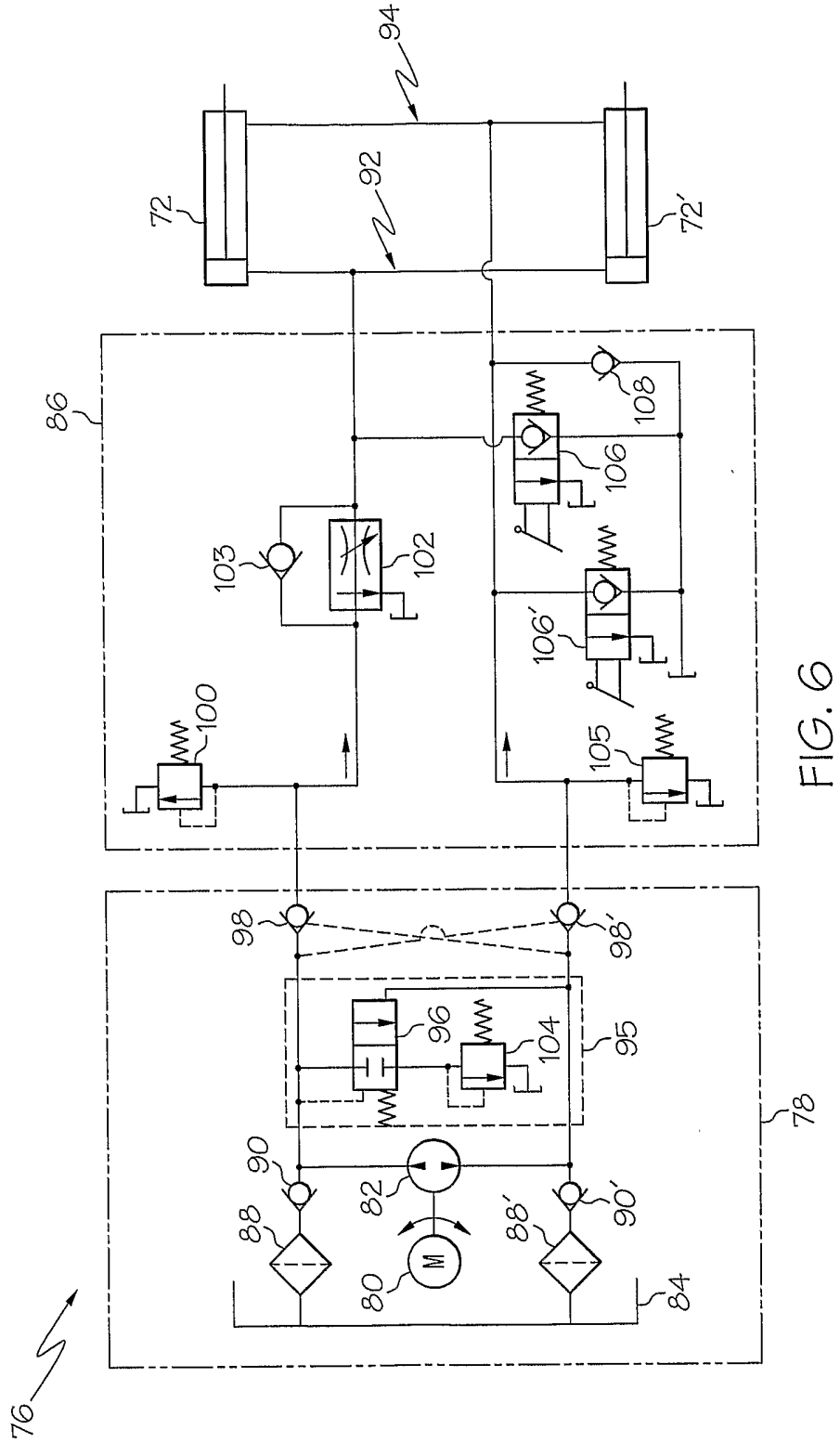
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FIG. 6

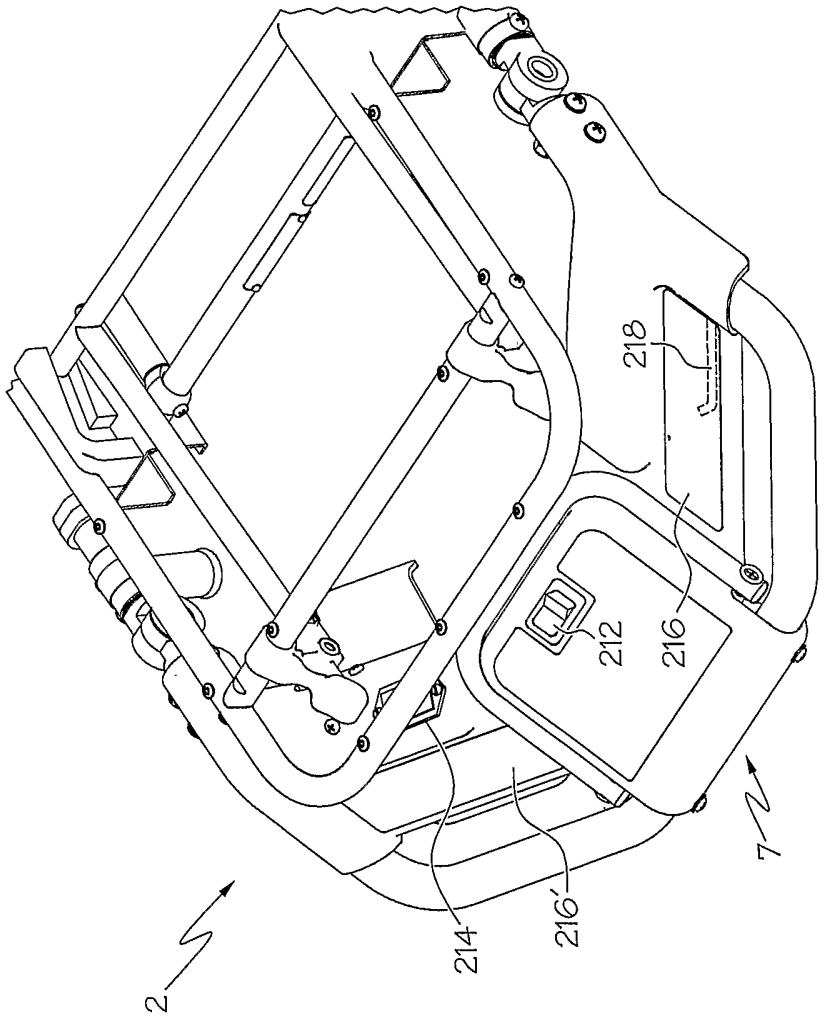

FIG. 7

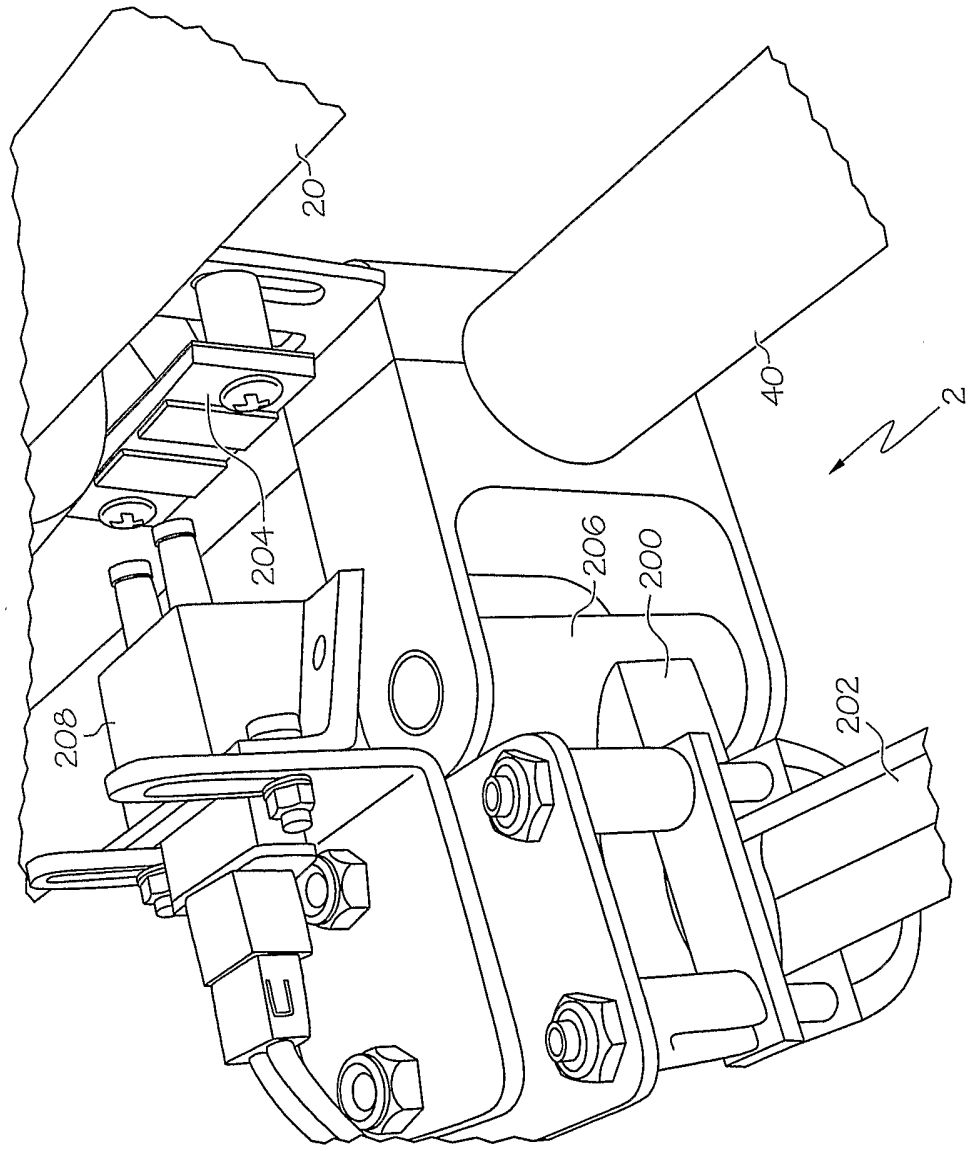

FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2005/019547

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61G1/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/080172 A1 (MITCHELL DONALD E ET AL) 29 April 2004 (2004-04-29) figure 2 paragraphs '0025! - '0028!	1-10,18
Y	GB 2 390 062 A (* FERNO) 31 December 2003 (2003-12-31) figure 6 claim 1	1-10,18
A	US 4 078 269 A (WEIPERT ET AL) 14 March 1978 (1978-03-14) figure 2	1,11-17
A	GB 2 368 317 A (* LEEC LIMITED) 1 May 2002 (2002-05-01) figure 2	1

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 September 2005	05/10/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Girard, O

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2005/019547

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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