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(54) **PATIENT TRANSPORT APPARATUS**

(71) Applicant: **University of Johannesburg**, Johannesburg (ZA)

(72) Inventors: **Ashton Margarete Moseley**, Johannesburg (ZA); **Dominic White**, Johannesburg (ZA)

(73) Assignee: **University of Johannesburg**, Johannesburg (ZA)

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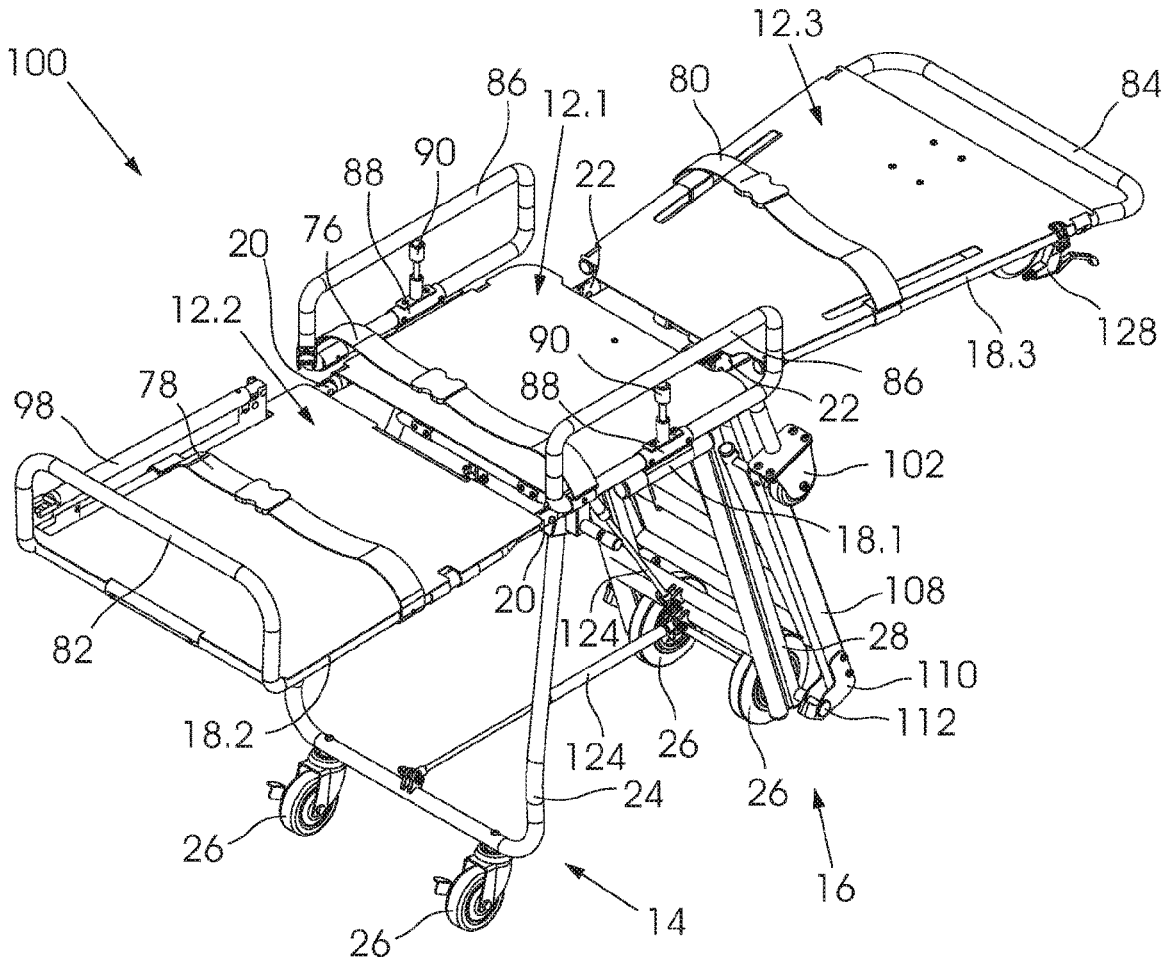
(57) **ABSTRACT**

A patient transport apparatus (**100**, **10**) which is configurable in at least three modes of operation, according to specific operational requirements. The apparatus (**100**, **10**) comprises a patient support assembly **12** and at least a first and second wheel arrangement (**14**, **16**). The patient support assembly **12** comprises a main portion **12.1**, and a first and second portion (**12.2**, **12.3**) extending from opposite sides of the main portion **12.1**. The first and second portions (**12.2**, **12.3**) are independently adjustable relative to the main portion **12.1**. The first and second wheel arrangements (**14**, **16**) are independently adjustable relative to the patient support assembly **12**. The patient transport apparatus (**100**, **10**) is configurable as a stretcher, as a chair (or wheelchair) and as a stair chair, by relative adjustment of the patient support assembly **12** and the first and second wheel arrangements (**14**, **16**).



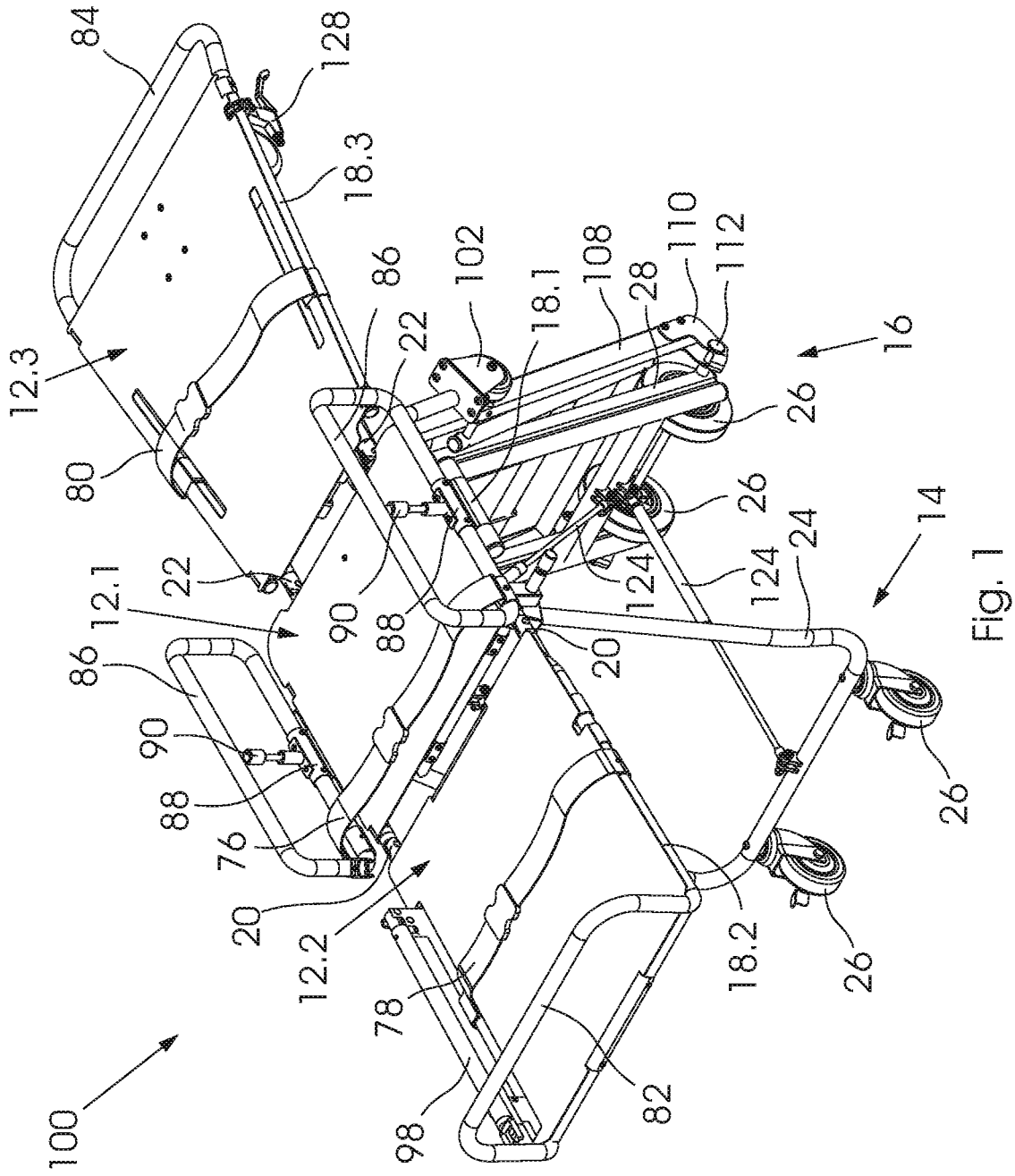

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Fig. 1

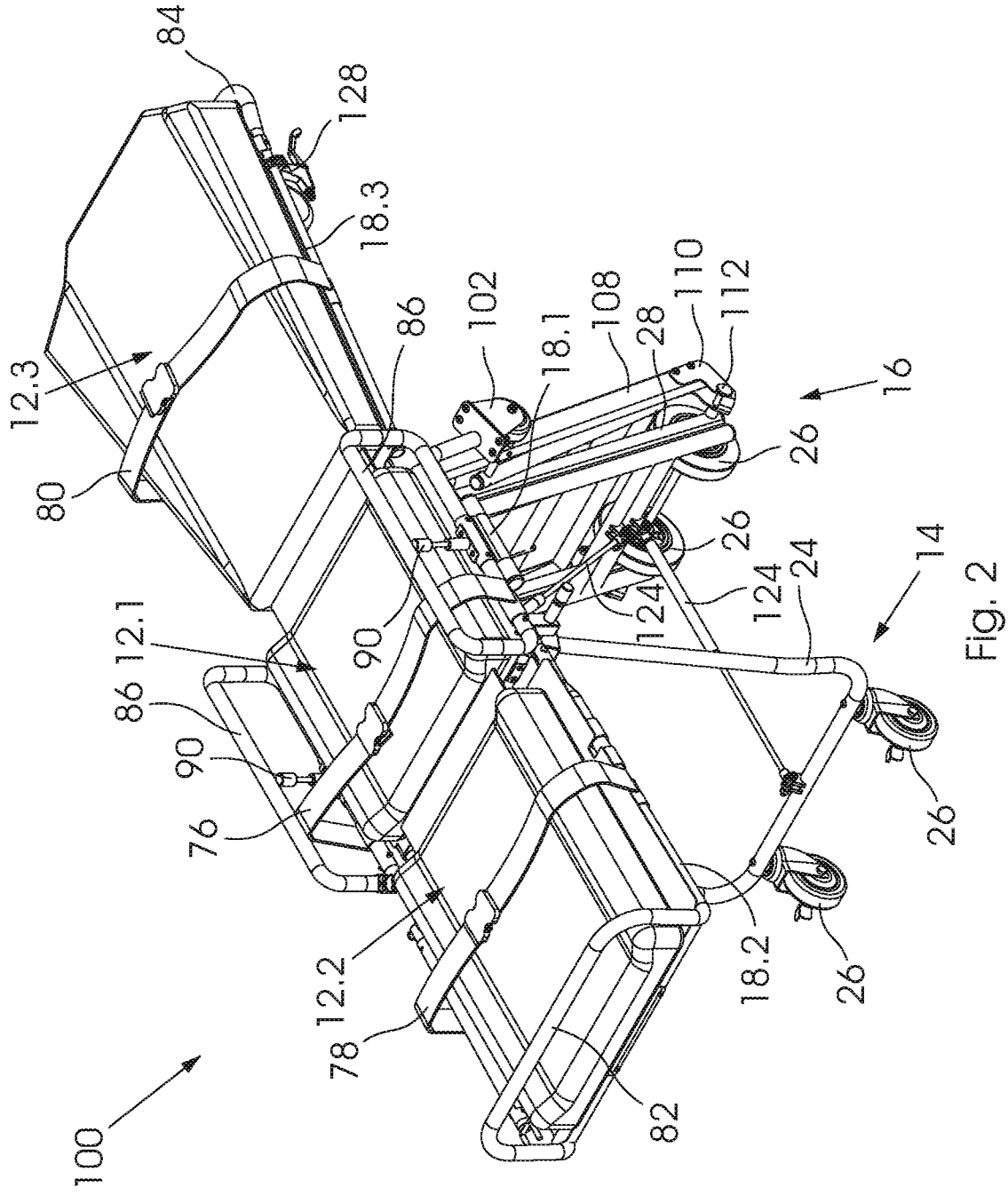
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Fig. 2

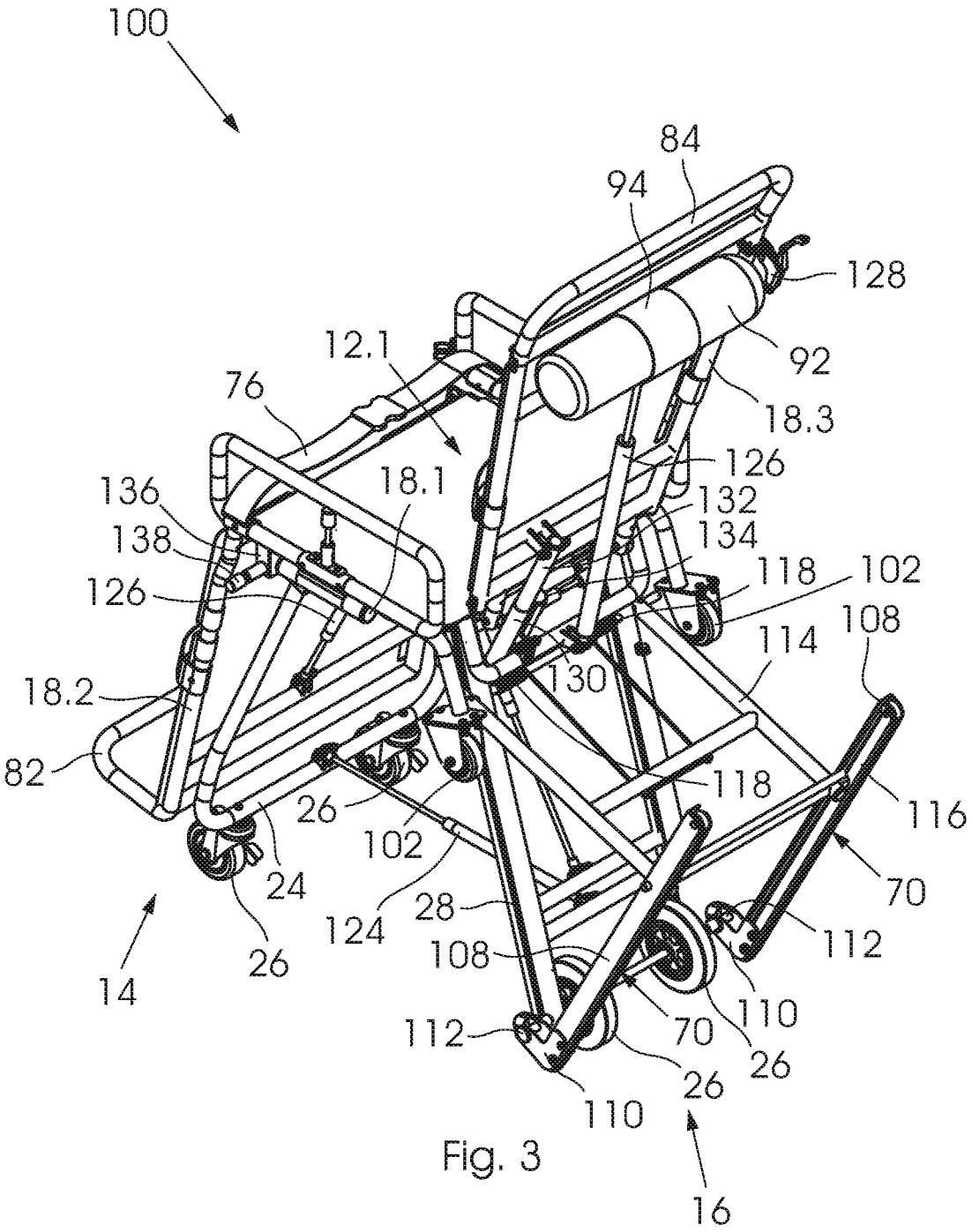
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Fig. 3

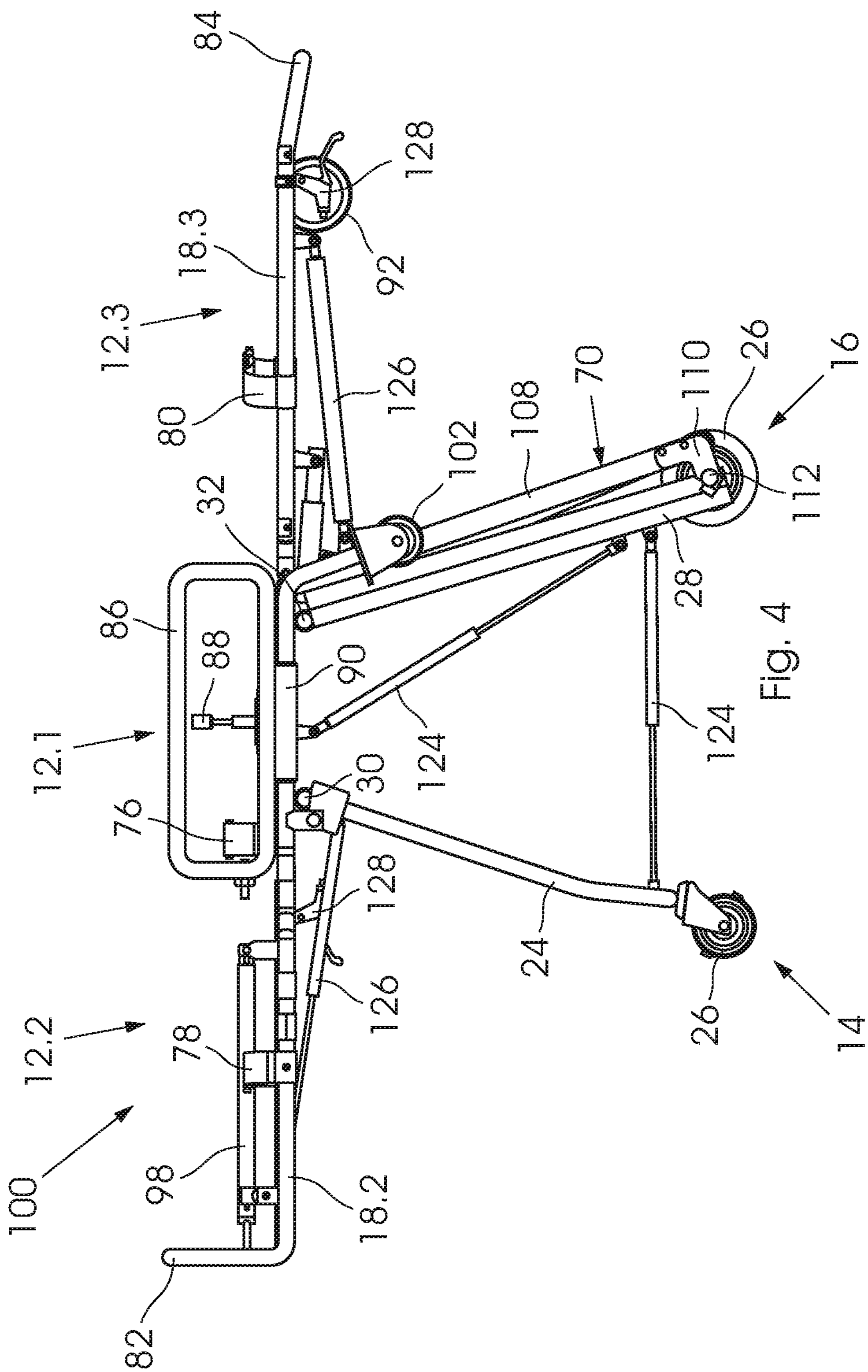
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Fig. 4

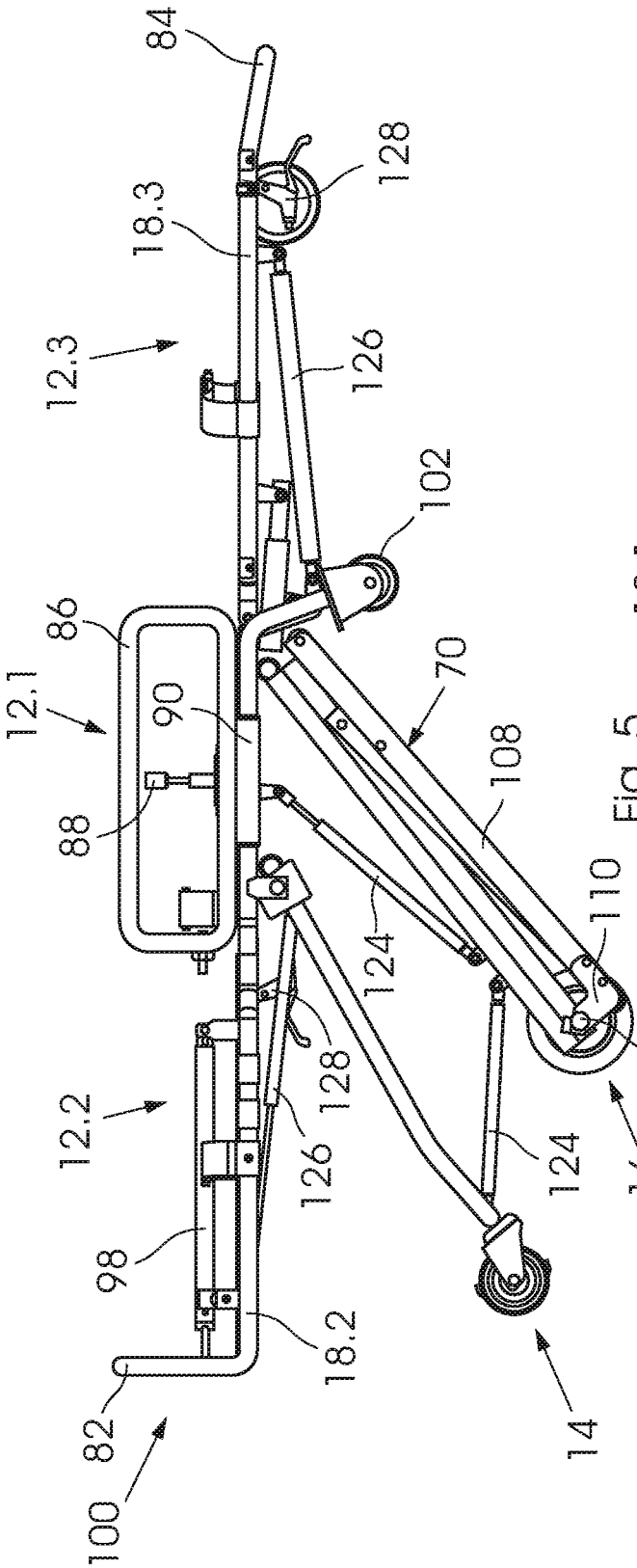
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Fig. 5

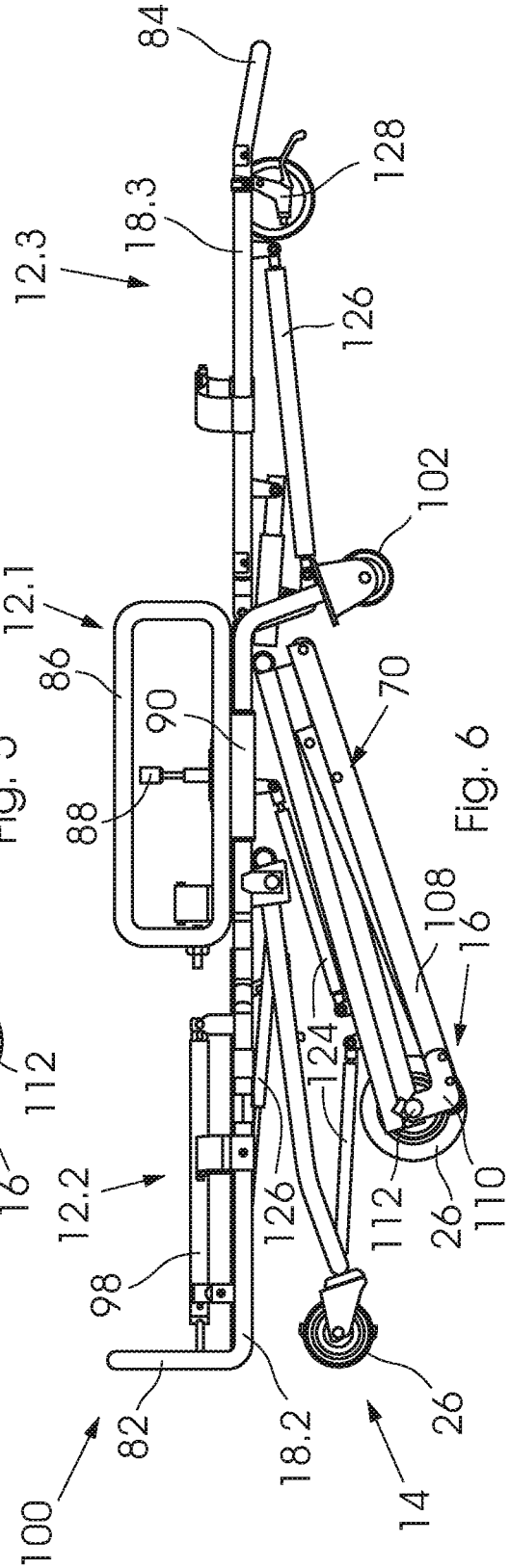
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Fig. 6

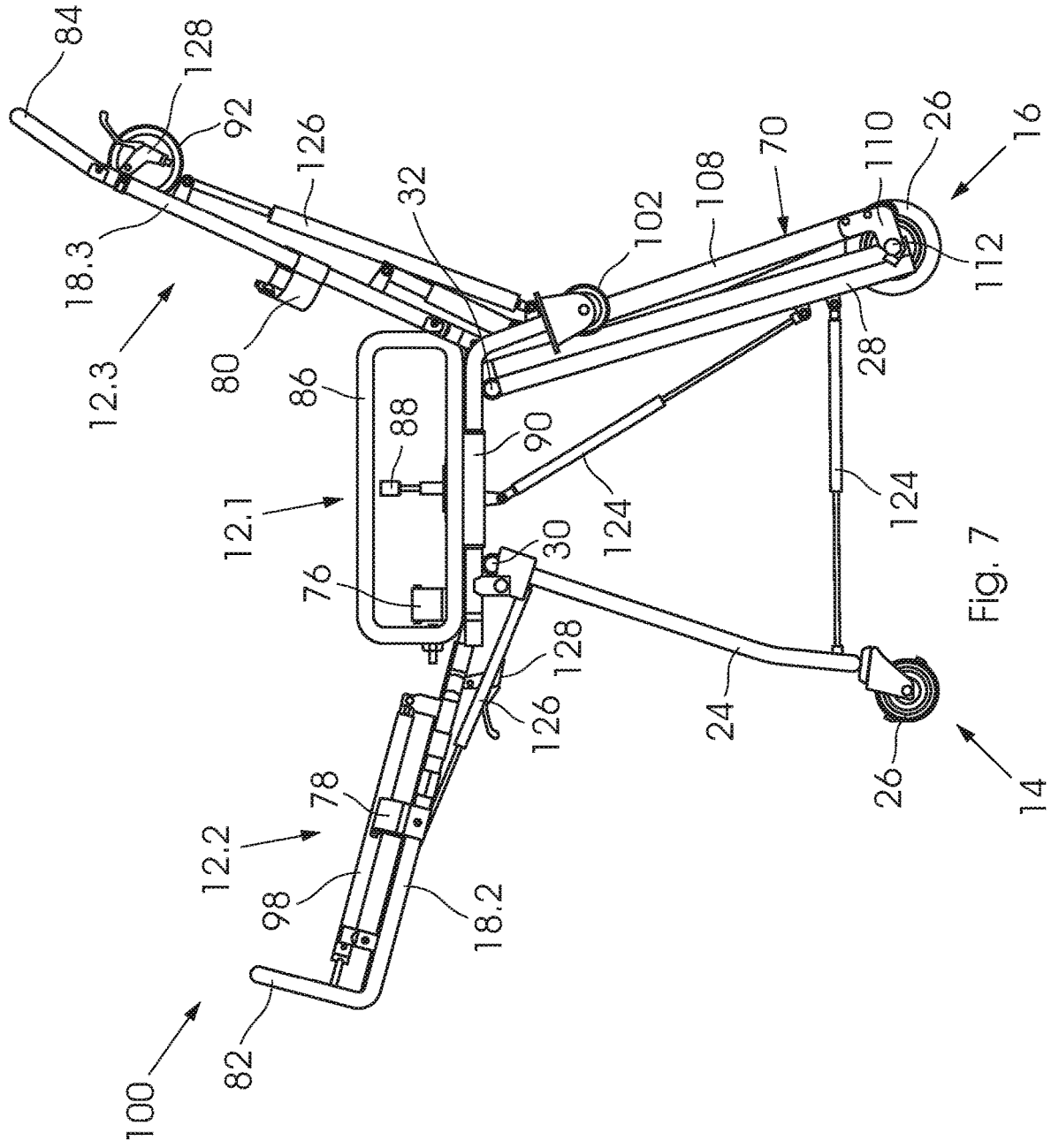
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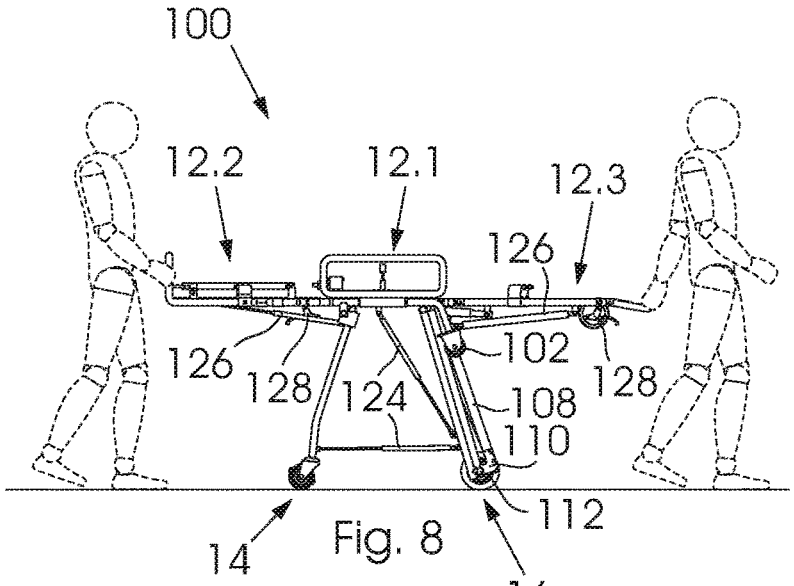
Fig. 7



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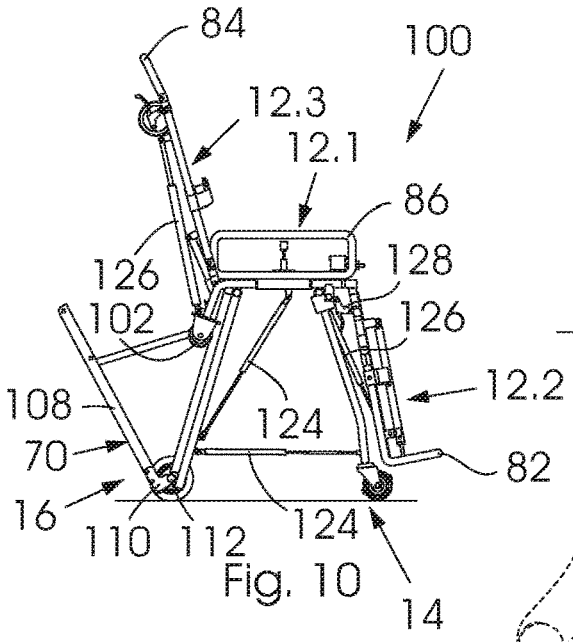

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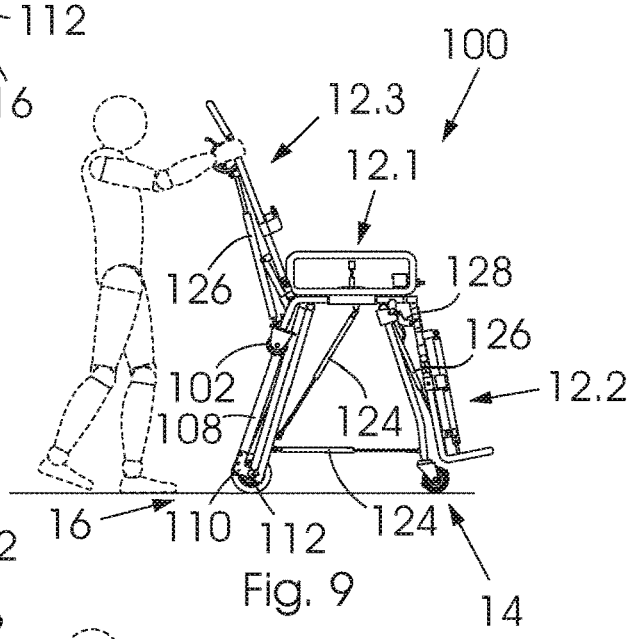

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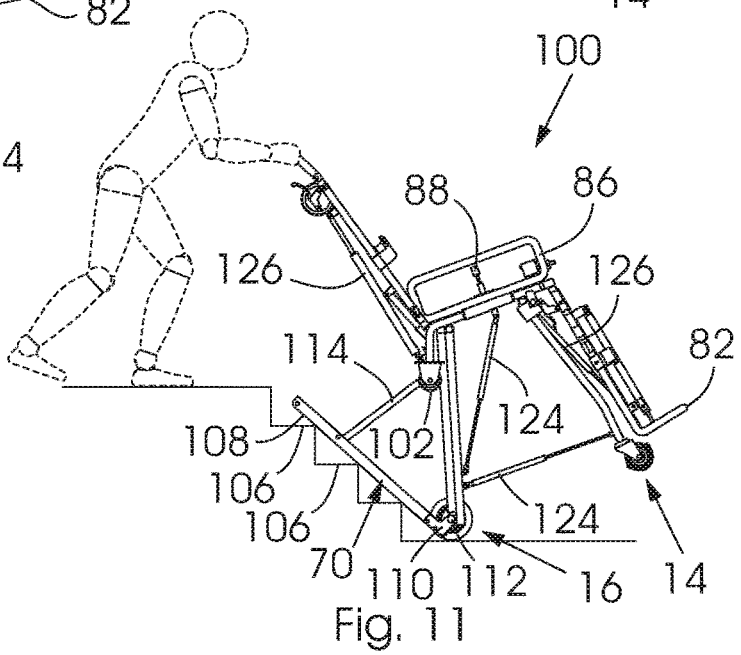

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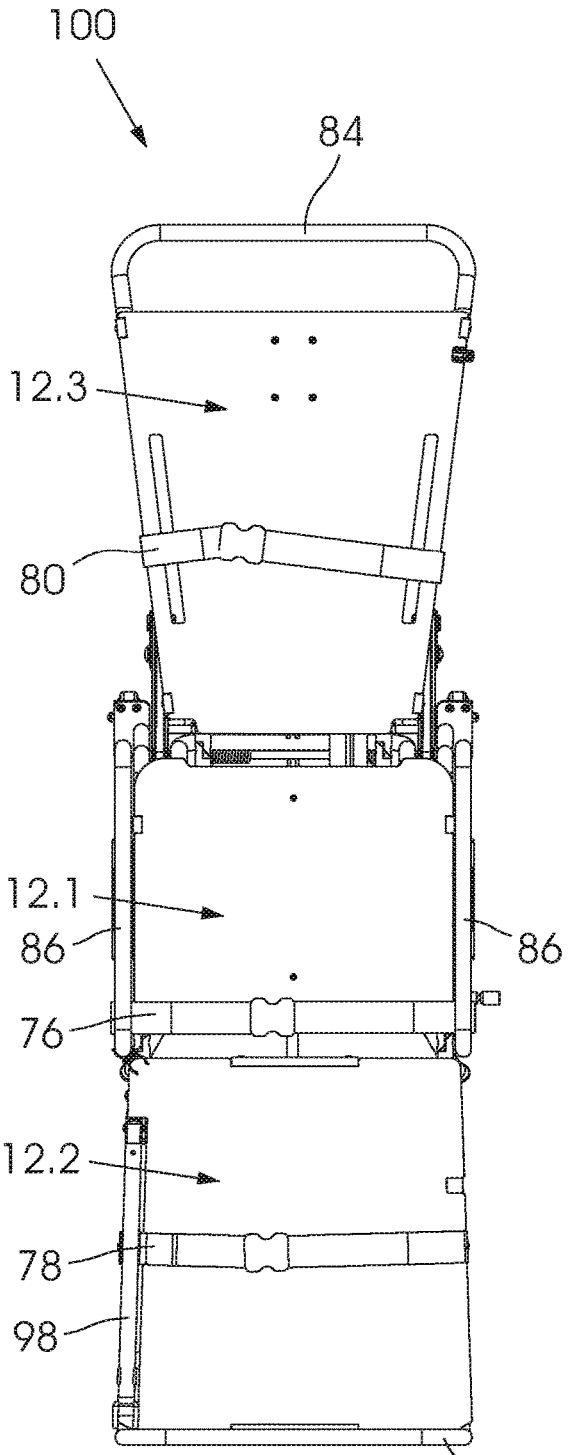

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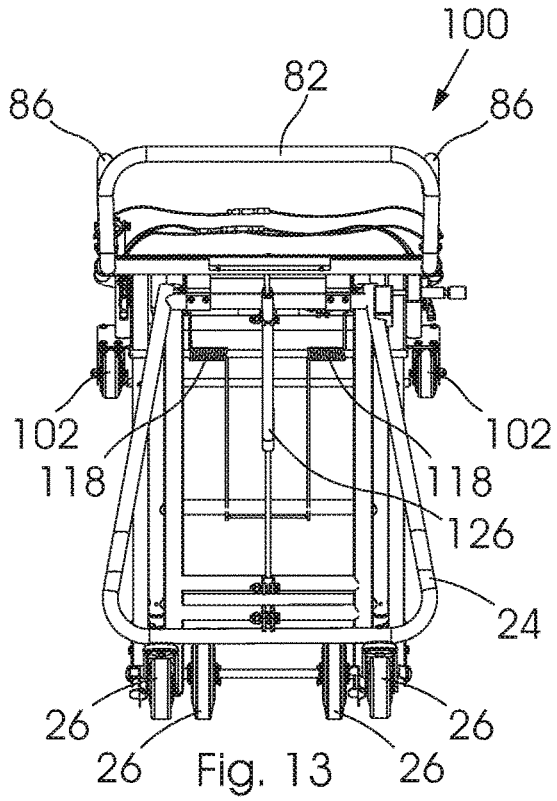

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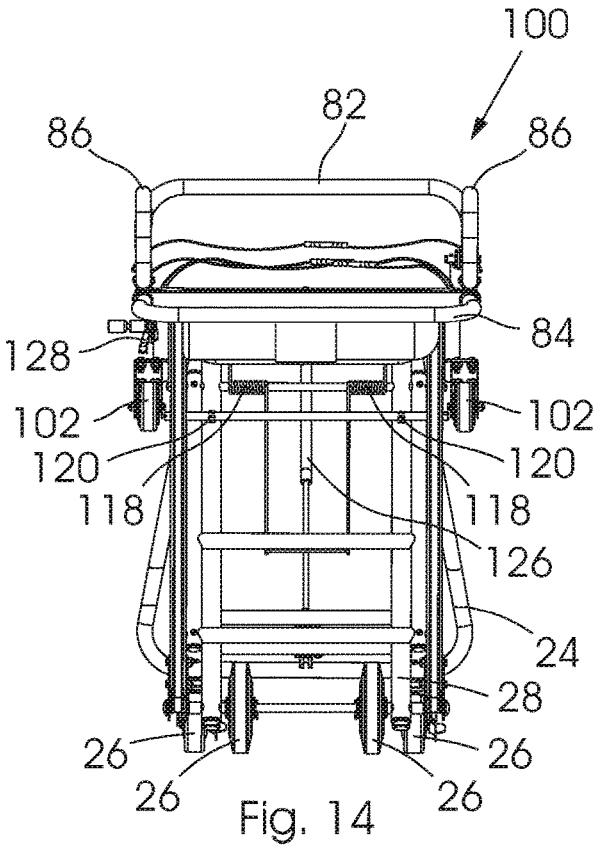

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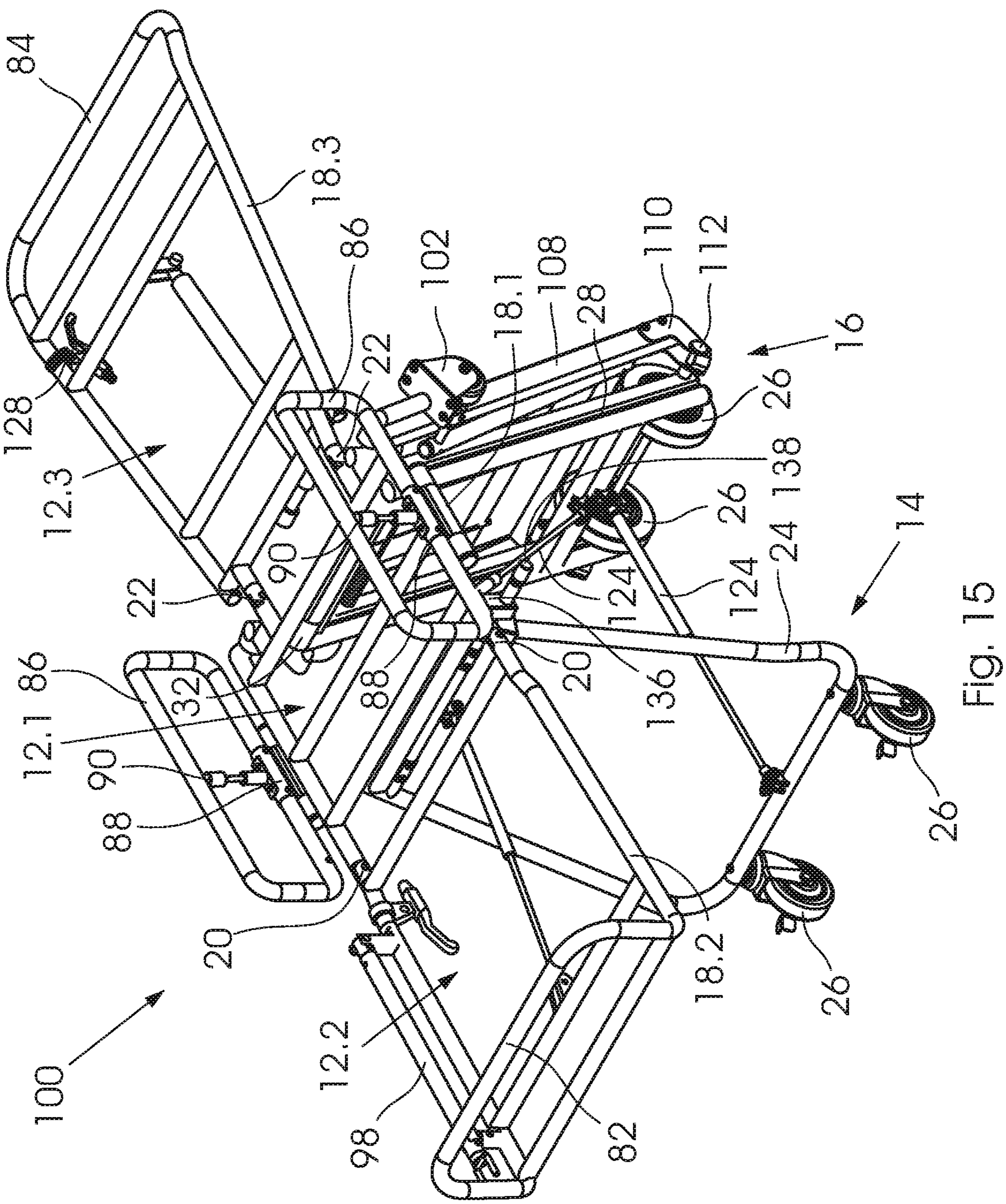
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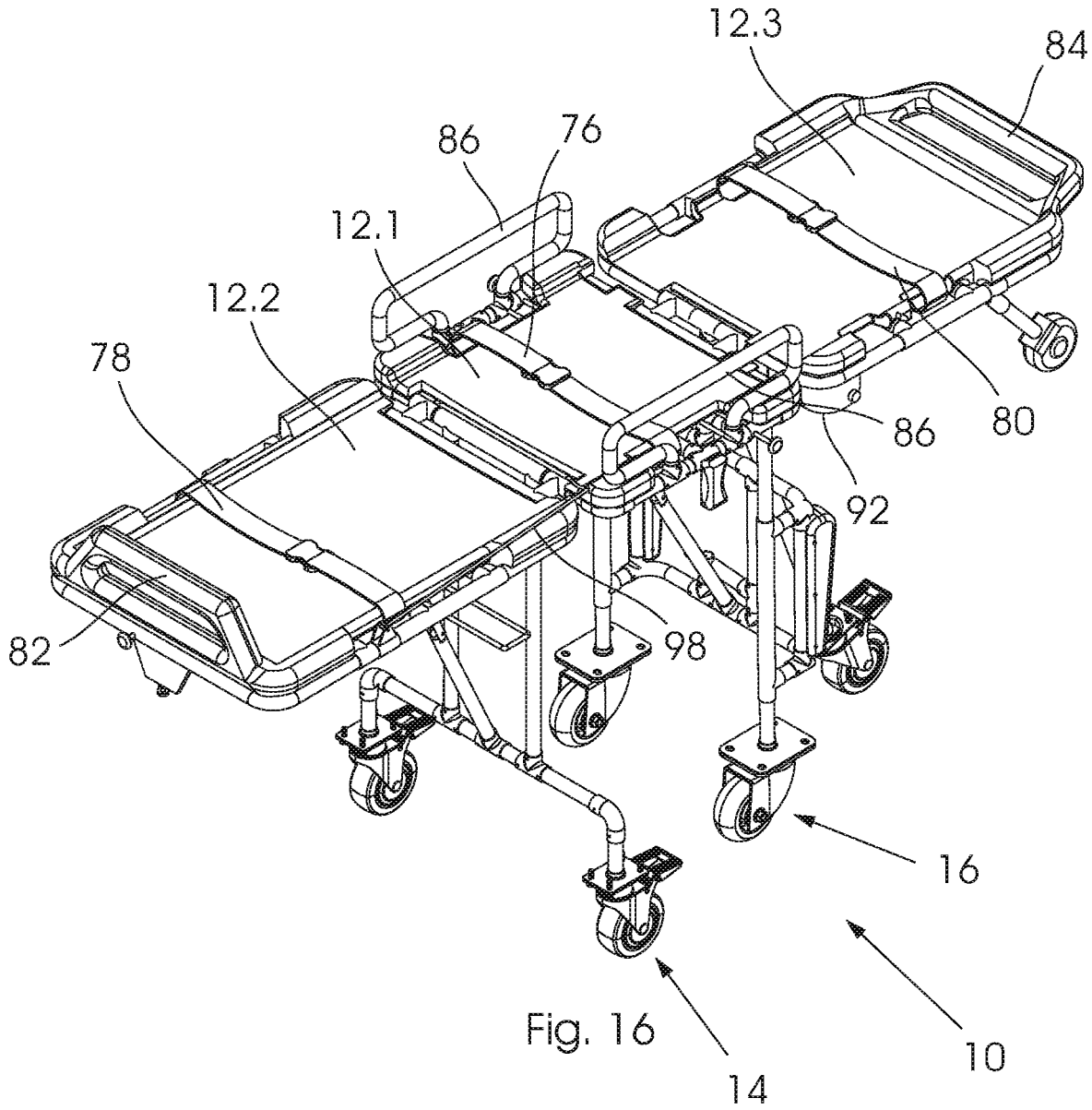

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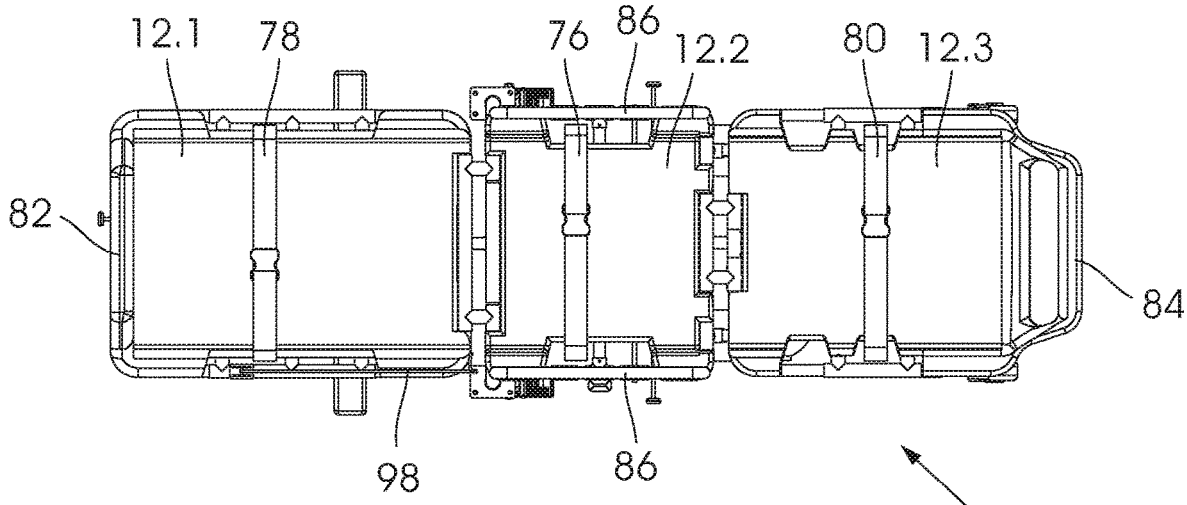
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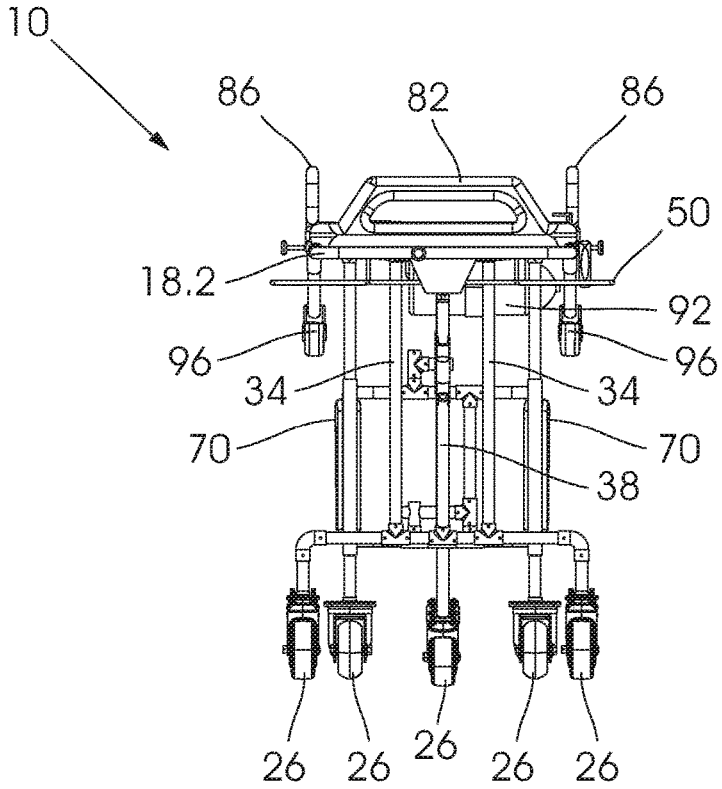
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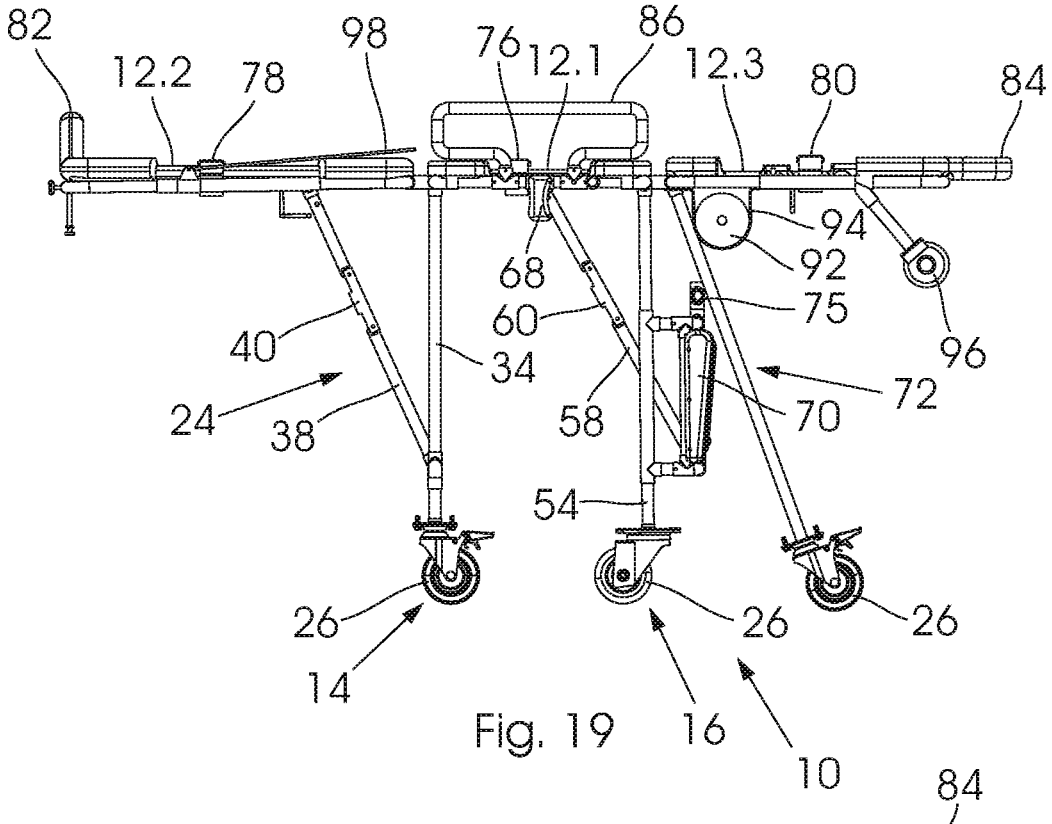
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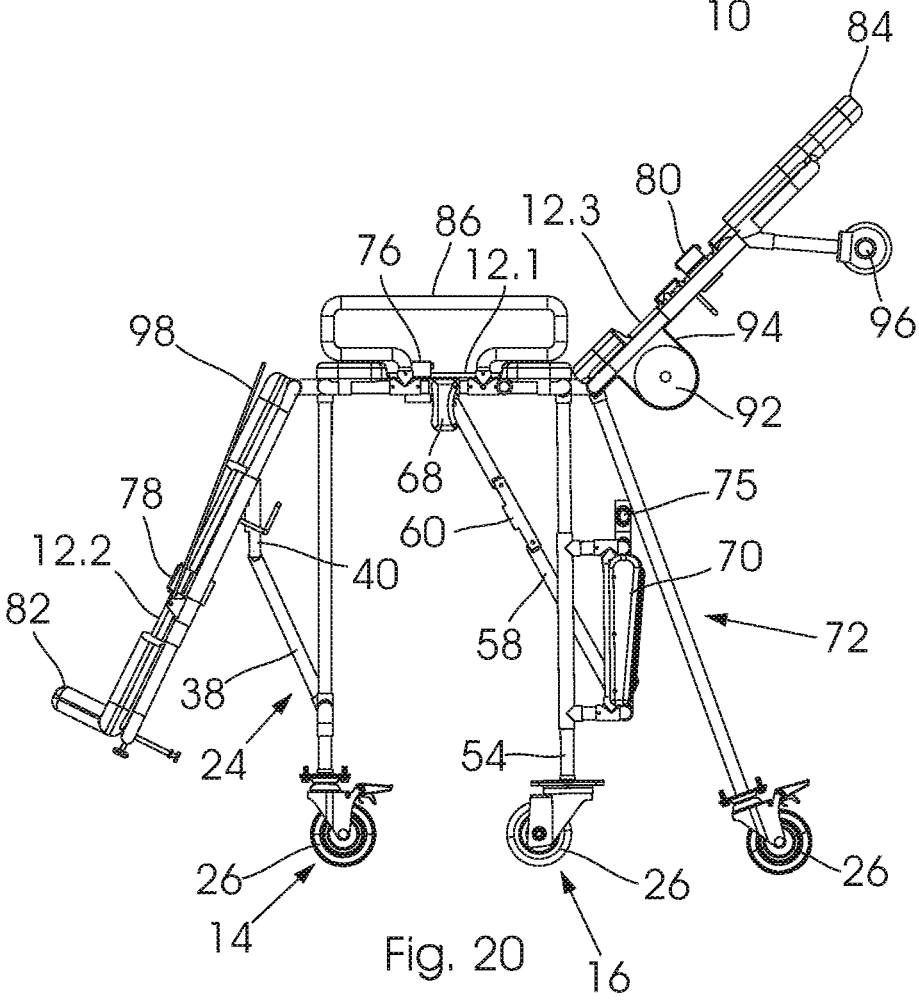
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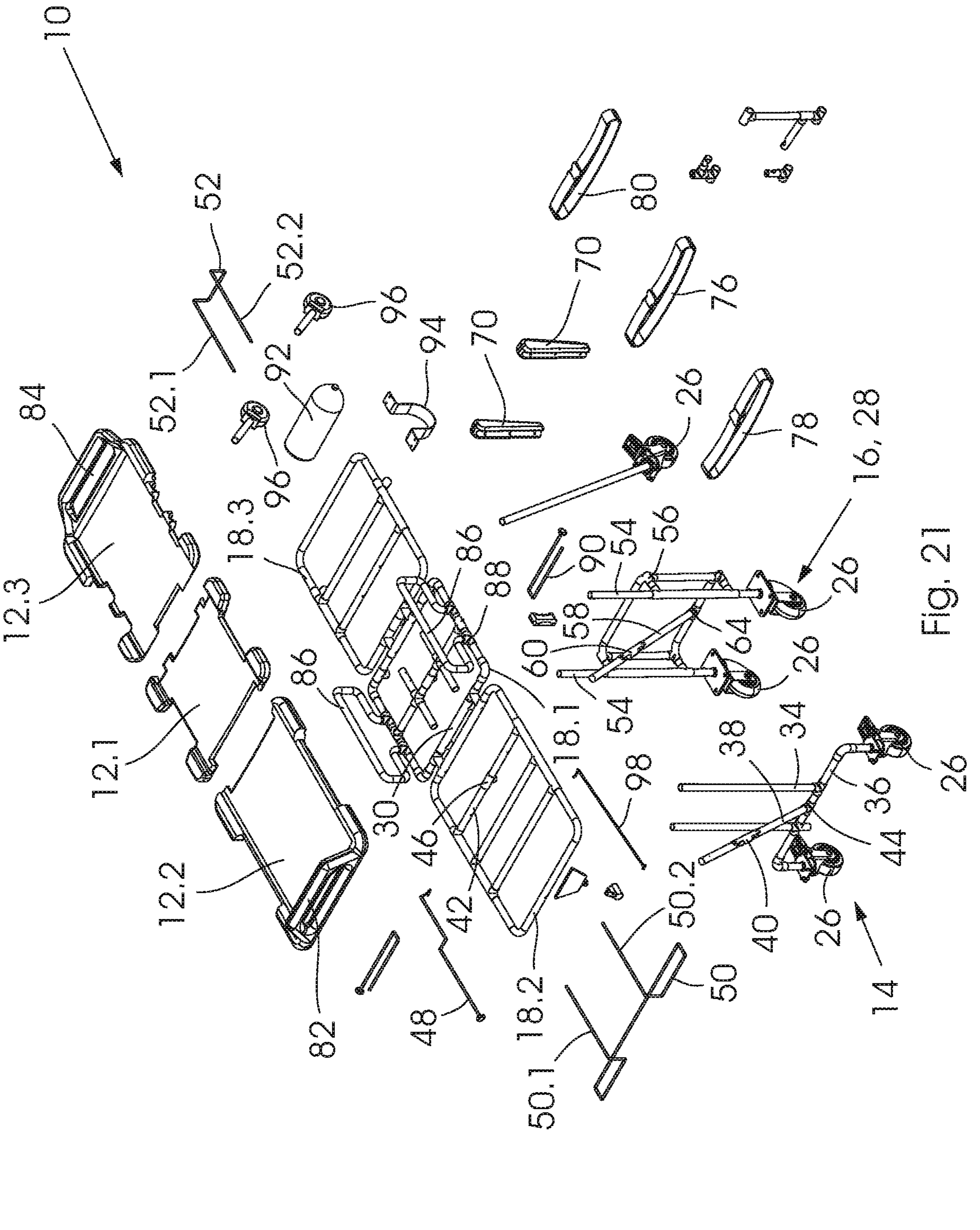
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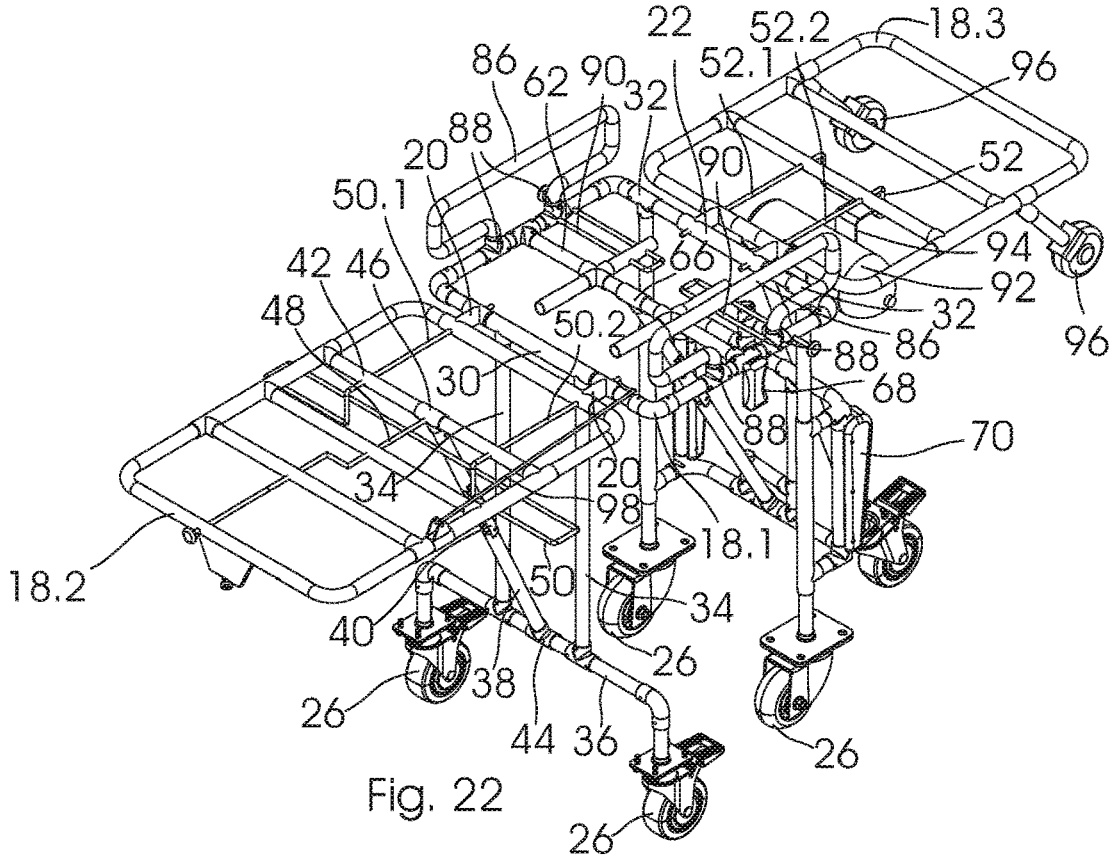
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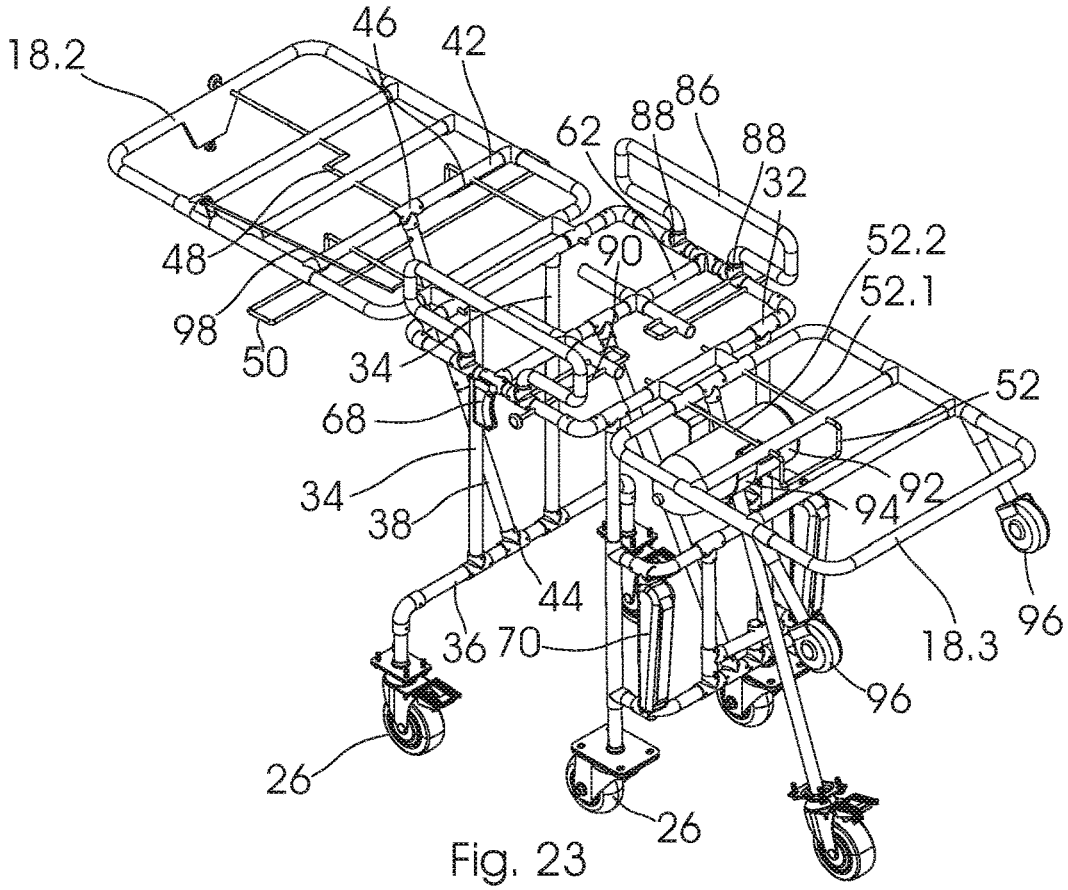
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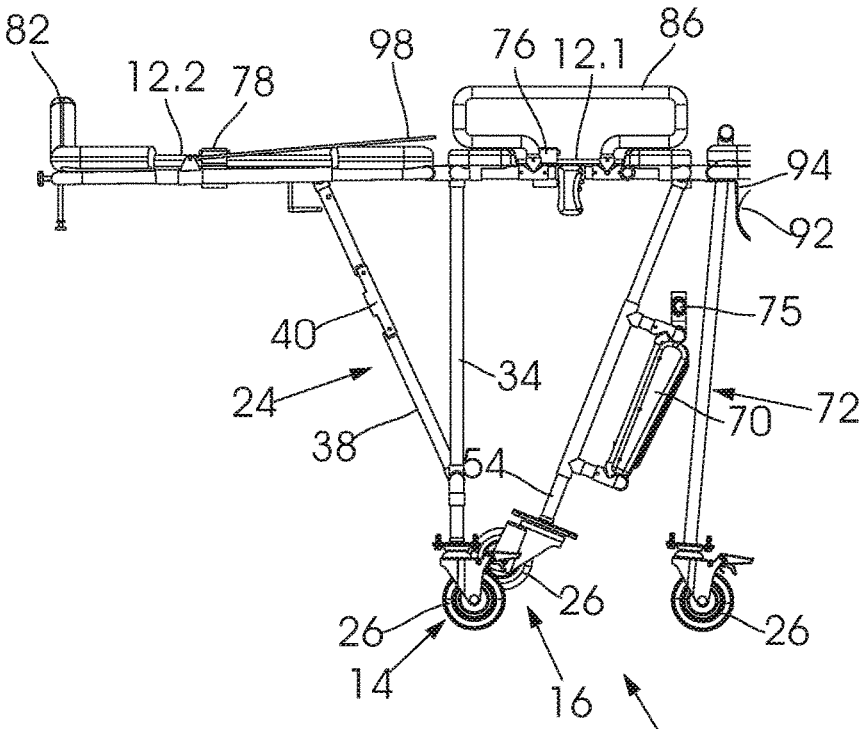
Fig. 23



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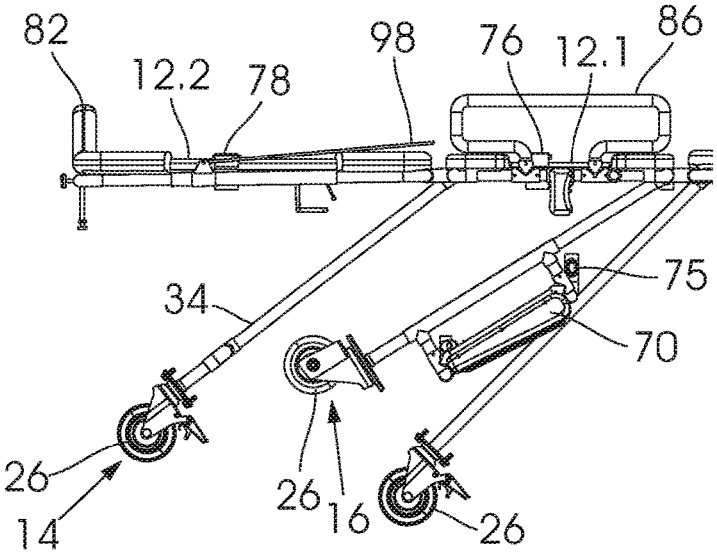

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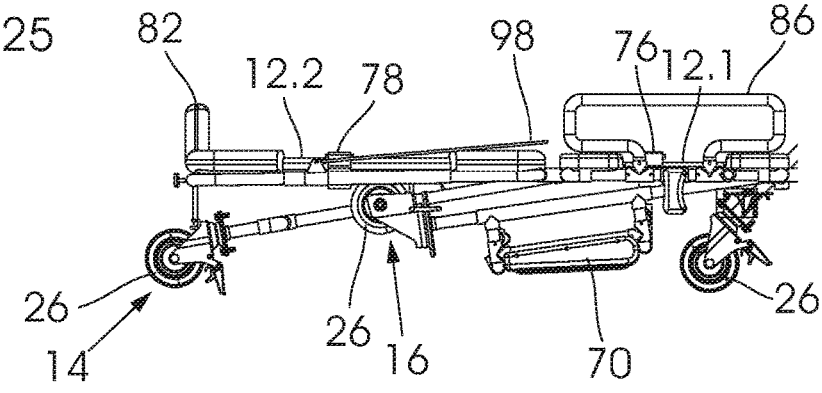

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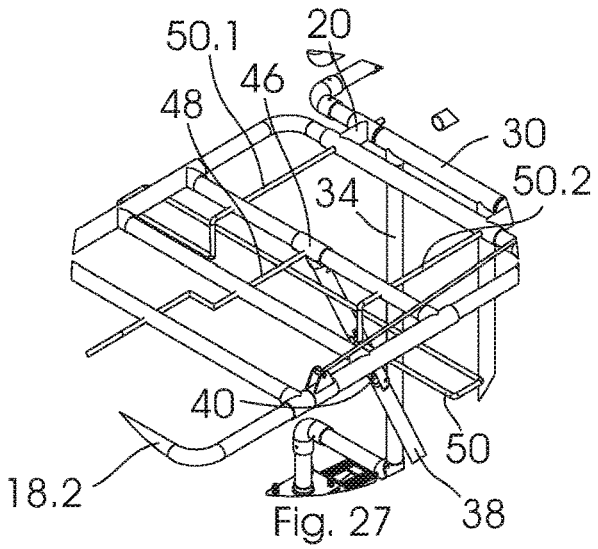

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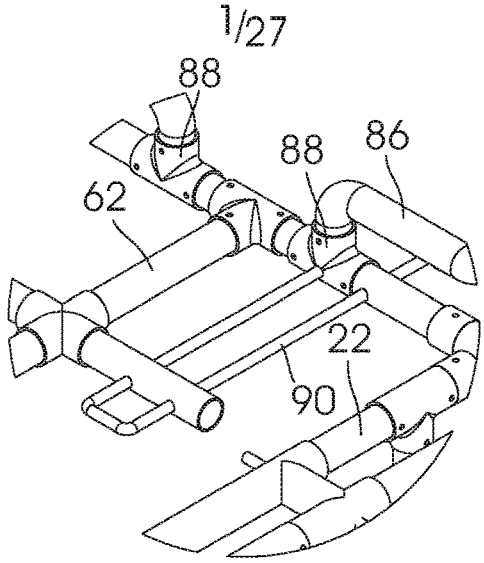

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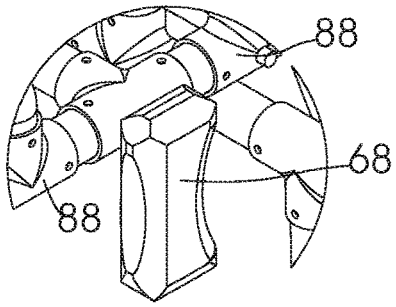

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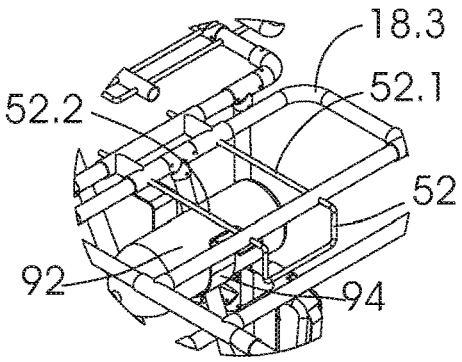


Fig. 30

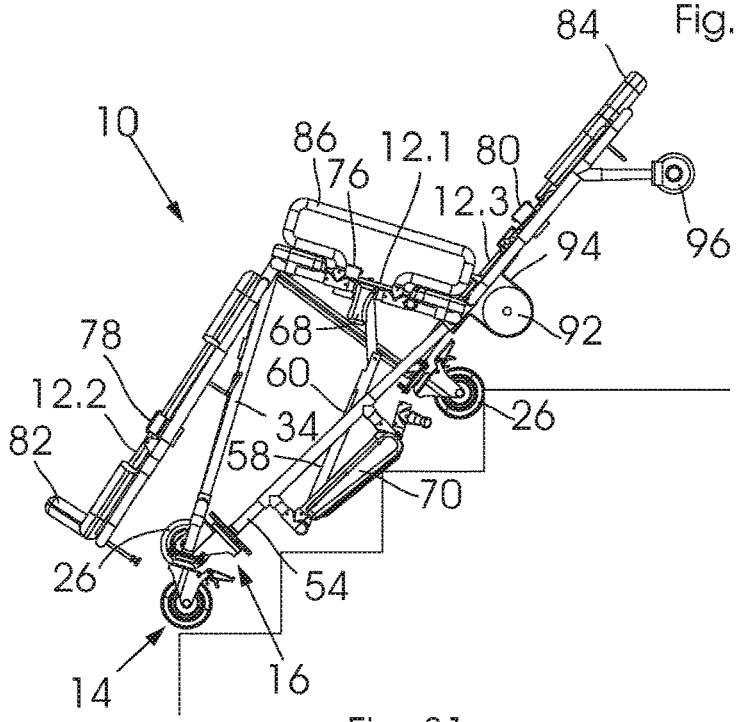


Fig. 31

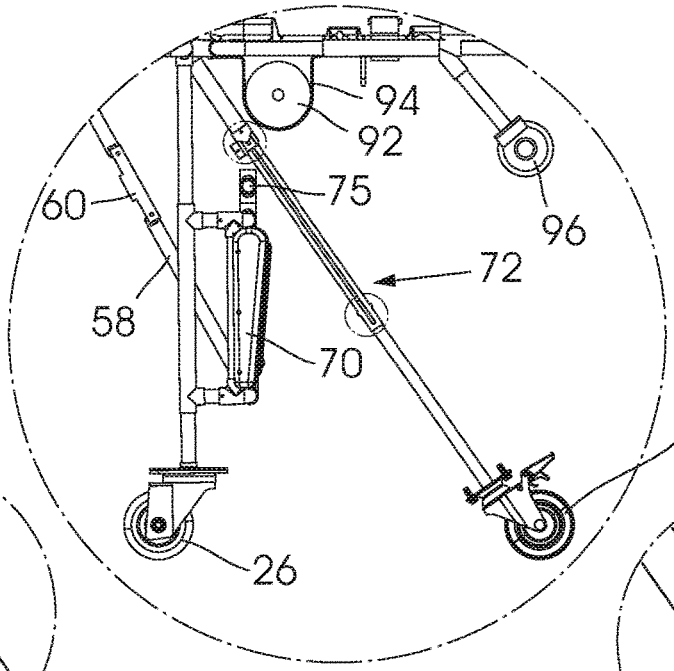


Fig. 32

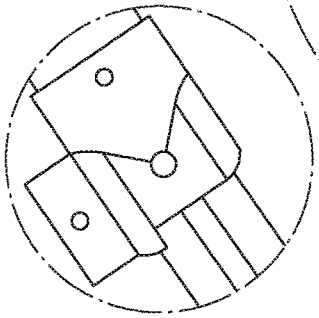


Fig. 33

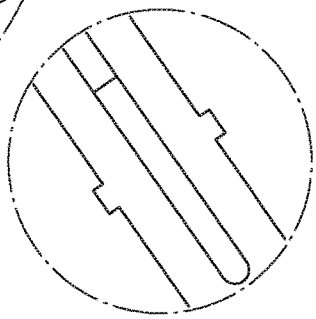
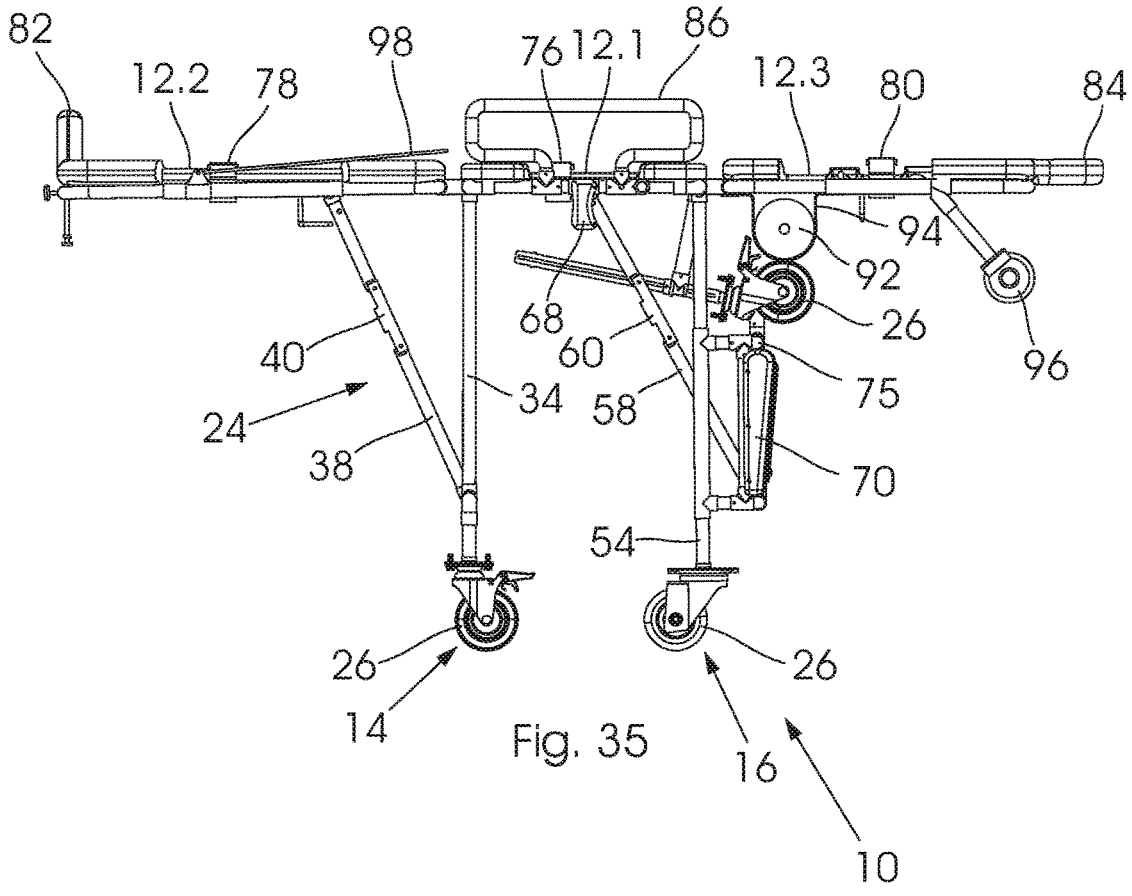


Fig. 34



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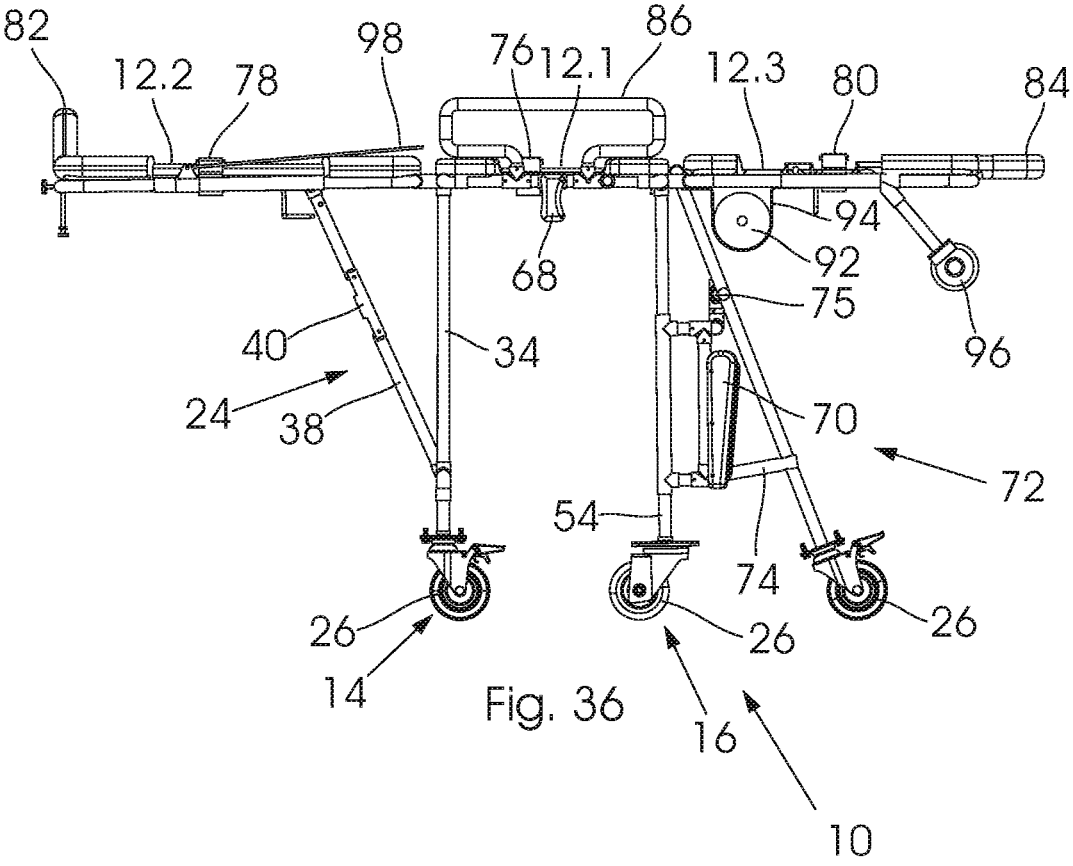
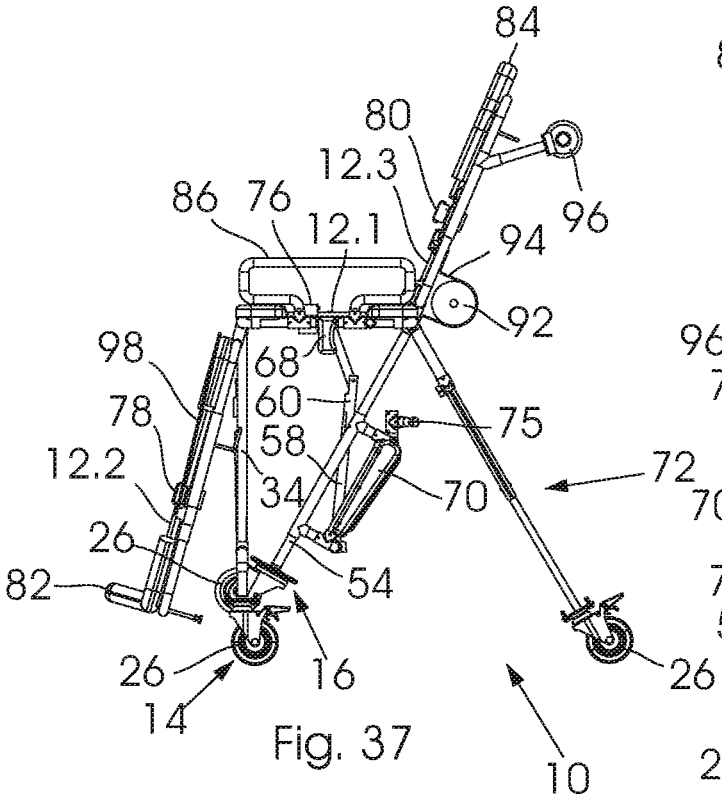


Fig. 36



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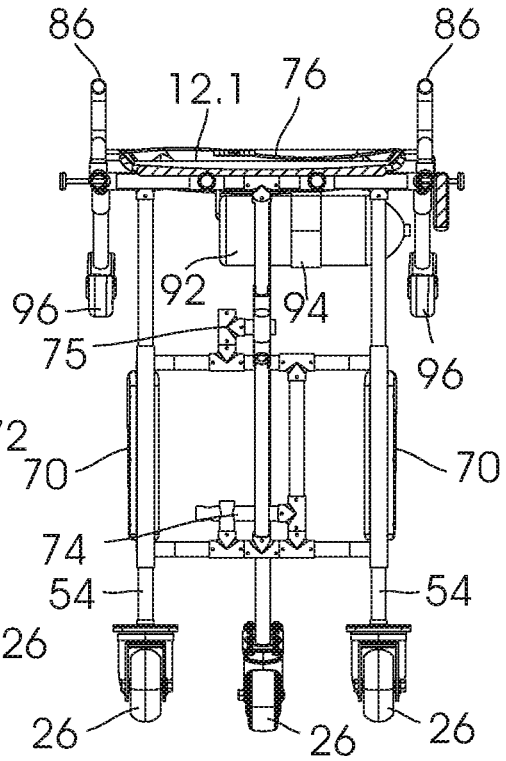

Fig. 38

PATIENT TRANSPORT APPARATUS

BACKGROUND TO THE INVENTION

[0001] This invention relates to a patient transport apparatus, and in particular to a patient transport apparatus that can be configured in various modes of operation, according to specific operational requirements.

[0002] The use of wheelchairs, stair chairs and stretchers to support and/or transport patients, is well known. The selection of a type of transportation apparatus is often made based on the physical condition of the patient (in other words, the type and severity of injuries of a patient) and the transportation needs of the patient (such as whether an ambulance will be used, whether stairs have to be scaled, whether the patient needs to be transported over uneven terrain or confined spaces, and the like).

[0003] Various requirements need to be met, based on the specific transportation needs of the patient. For instance, when transported via ambulance, a patient transport apparatus needs to incorporate patient restraint features, foot and arm rests and the like. Wheels of the apparatus need to be foldable to facilitate loading of the apparatus into the ambulance. Furthermore, equipment carrying features, such as fittings for carrying oxygen equipment and an IV hook, need to be included.

[0004] In cases where the patient needs to be transported along a staircase, a surface supporting the patient needs to be angularly adjustable relative to wheels/tracks of the transport device.

[0005] In other cases, especially in cases where the patient suffers with respiratory issues, the patient needs to be kept in a so-called "Fowler's position". The Fowler's position is a standard position, in which a patient is seated in a semi-sitting position with knees either bent or straight. This position promotes chest expansion while minimizing gravitational pressure on the chest region of the patient.

[0006] In some cases, mobility and agility are important, such as when transporting a patient around tight corners and through corridors. In such cases, a transport apparatus needs to be foldable. This also aids when the apparatus needs to be transported in a vehicle, such as an ambulance. When it comes to emergency medical services ("EMS"), it should be noted that ambulances are specifically adapted to transport patients supported by a stretcher. Ambulances are specifically adapted to secure such stretchers in place during transportation. Therefore, if the patient is transported to the ambulance by way of an apparatus other than a stretcher, such as a wheelchair, the patient needs to be transferred to a stretcher before the patient can be transported by way of the ambulance. This is time consuming, and, in cases where the injuries of the patient are severe, may be cause further injury to the patient.

[0007] Even though some solutions to some of the requirements set out above have been proposed in isolation, a need still exists for a transportation apparatus that provides a solution that, at least to a degree, addresses all of the needs at once. Therefore, in order to meet such needs, the transport apparatus needs to be adjustable between various configurations, whilst being lightweight. A need also exists for a low-cost transport apparatus.

[0008] It is accordingly an object of the invention to provide a patient transport apparatus that will, at least partially, address the above disadvantages.

[0009] It is also an object of the invention to provide a patient transport apparatus which will be a useful alternative to existing transport apparatuses.

SUMMARY OF THE INVENTION

[0010] In accordance with a first aspect of the invention there is provided a patient transport apparatus comprising:

[0011] a patient support assembly, comprising a main portion, and a first and second portion extending from opposite sides of the main portion, which first and second portions are independently adjustable relative to the main portion;

[0012] at least a first and second wheel arrangement which are adjustable, and in some cases independently adjustable, relative to the patient support assembly,

[0013] wherein patient transport apparatus may be configured in at least a first, second and third configuration, by adjustment of at least some of the first portion, the second portion, the first wheel arrangement and the second wheel arrangement.

[0014] Furthermore, the patient transport apparatus may be configured: i) as a stretcher when configured in the first configuration; ii) as a chair when configured in the second configuration; and iii) as a stair chair when configured in the third configuration.

[0015] The patient transport apparatus may be adapted as an emergency medical services (EMS) transport apparatus.

[0016] When the patient transportation apparatus is configured in the first configuration, the main portion and first and second portions of the patient support assembly may be substantially aligned and supported by the first and second wheel arrangements in a substantially horizontal orientation. A substantially horizontal orientation will be taken to include an orientation which is substantially parallel to a surface on which the apparatus is supported, even though not horizontal. A vertical orientation may be perpendicular to a substantially horizontal orientation.

[0017] When the patient transportation apparatus is configured in the second configuration, the first and second portions may be pivoted relative to the main portion of the patient support assembly, which main support portion may be supported by the first and second wheel arrangements in a substantially horizontal orientation. The first portion may be pivoted downward, and the second portion may be pivoted upward.

[0018] The patient transport apparatus may further include at least a first, but typically also a second, stair engagement device which may operatively be configured in a position to engage a stair, when the patient transport apparatus is configured in the third configuration.

[0019] The first stair engagement device may be fitted to a stair engagement subframe, which in turn, may be fitted to the second wheel arrangement. The second wheel arrangement may include a second wheel subframe, and the stair engagement subframe may be pivotably fixed to a bottom portion of the second wheel subframe. The stair engagement subframe may pivotably be displaceable between a folded configuration and an operative configuration.

[0020] The stair engagement subframe may be disposed at an angle of about 35 degrees from vertical, when in the operative configuration.

[0021] The apparatus may furthermore comprise a brace which may extend between the second wheel subframe and the stair engagement subframe when the stair engagement

subframe is configured in the operative configuration. The brace may be provided for supporting the stair engagement subframe in the operative configuration.

[0022] A part of the brace may be received within a slot formed on the stair engagement subframe. The brace may bias the stair engagement subframe towards the operative configuration.

[0023] A torsion spring located between the brace and the second wheel subframe may be provided to cause the brace to bias the stair engagement subframe towards the operative configuration.

[0024] A retaining mechanism may be provided for releasably retaining the brace when the stair engagement subframe is in the folded configuration, thereby retaining the stair engagement subframe in the folded configuration (against the bias).

[0025] The first portion of the patient support assembly may pivotably be displaceable from about 80 degrees below a level of the main portion of the patient support assembly, to about 15 degrees above the level of the patient support assembly.

[0026] The second portion of the patient support assembly may pivotably be displaceable from a level of the main portion of the patient support assembly, to about 90 degrees above the level of the patient support assembly.

[0027] The second portion of the patient support assembly may be locked at about 65 degrees above a level of the main portion of the patient support assembly. The first portion may be pivoted downward between 65 and 80 degrees relative to the main portion when the patient transport apparatus is configured in the third configuration.

[0028] The first portion may be pivoted downward by between 65 and 80 degrees relative to a level of the main portion of the patient support assembly, and the second portion may be pivoted upward by between 65 degrees and 90 degrees relative to the level of the main portion of the patient support assembly, when the patient transport apparatus is configured in the second configuration.

[0029] The first wheel arrangement, when locked in position by the respective locking arrangement, may be locked at an angle of between 60 and 80 degrees relative to a surface on which the apparatus is supported, and may therefore slant forwards. The second wheel arrangement may be locked at an angle of between 60 and 80 degrees relative to a surface on which the apparatus is supported, and may therefore slant backwards. The slanting of the first and second wheel arrangements may lend stability to the apparatus.

[0030] In an alternative arrangement, when the patient transportation apparatus is configured in the third configuration, at least one of the first and second wheel arrangements may be displaced relative to the main portion of the patient support assembly, thereby to support the main portion of the patient support assembly in a substantially horizontal position when the patient transport apparatus is situated on a flight of stairs.

[0031] The first and second support portions of the patient support assembly may be pivoted relative to the main support assembly, when the patient transport apparatus is configured in the second and/or third configurations.

[0032] The patient transportation apparatus may be configurable in a fourth configuration, in which the second portion of the patient support assembly is pivoted upward relative to the main portion of the patient support assembly, while the first portion of the patient support assembly is provided substantially aligned with the main portion of the patient support assembly or pivoted slightly upward (typically around 15 degrees upward) relative to the main portion of the patient support assembly. When the patient transport apparatus is supported in the fourth configuration, the patient may be supported in a Fowler's position.

[0033] The patient transport apparatus may comprise a first locking mechanism to lock the first portion of the patient support assembly relative to the main portion of the patient support assembly, and a second lock mechanism to lock the second portion of the patient support assembly relative to the main portion of the patient support assembly.

[0034] The first wheel arrangement may be pivotably fixed relative to the patient support assembly. The first wheel arrangement may comprise a first wheel sub-frame and a first set of wheels. The first wheel sub-frame may comprise a first wheel sub-frame locking mechanism, for fixing a position of the first wheel sub-frame relative to the patient support assembly. The first set of wheels may comprise a first and second castor. At least one of the first and second castors may comprise a castor lock mechanism with which the specific castor may be locked in position.

[0035] The second wheel arrangement may be pivotably fixed relative to the patient support assembly. The second wheel arrangement may comprise a second wheel sub-frame and a second set of wheels. The second wheel sub-frame may comprise a second wheel sub-frame locking mechanism, for fixing a position of the second wheel sub-frame relative to the patient support assembly or may be interconnected with the first wheel subframe. The second set of wheels may comprise a third and fourth castor. At least one of the third and fourth castors may comprise a castor lock mechanism with which the specific castor may be locked in position.

[0036] The main portion and first and second portions of the patient support assembly may include a main support sub-frame, first support sub-frame and second sub-frame, respectively.

[0037] The first and second wheel sub-frames may both be pivotably fixed to the main support sub-frame.

[0038] The second wheel sub-frame may comprise a stair engagement device. The stair engagement device may be mounted to the second wheel sub-frame.

[0039] The stair engagement device may comprise a first and second contact surface which, in use, may be provided for engaging an edge of a stair, when the patient transport apparatus is in the third configuration. The first and second contact surfaces may be formed by an endless belt or track. Each of the first and second contact surfaces may be supported by a first and second pulley.

[0040] The first wheel arrangement may be displaceable between a folded configuration and an unfolded configuration.

[0041] The second wheel arrangement may be displaceable between a folded configuration and an unfolded configuration.

[0042] The second wheel arrangement may be displaceable to an intermediate configuration between the folded and unfolded configurations, when the patient transport apparatus is configured in the third configuration.

[0043] The arrangement of the first and second wheel assemblies may be such that the second wheel arrangement may be inhibited from being displaced beyond the intermediate configuration, when the first wheel arrangement is

located in the unfolded configuration. The second wheel sub-frame may butt against the first wheel sub-frame when the second wheel arrangement is configured in the intermediate configuration and the first wheel arrangement is configured in the unfolded configuration.

[0044] The configuration of the first and second wheel assemblies may be such that when the second wheel sub-frame butts against the first wheel sub-frame, the second wheel sub-frame may be held at a predetermined angle, facilitating the main portion of the patient support assembly to be supported in a substantially horizontal configuration when the patient support apparatus is located on stairs.

[0045] The patient transport apparatus may comprise a stabiliser wheel arrangement extending in the direction of the second portion of the patient support assembly. The stabiliser wheel arrangement may comprise a stabiliser wheel frame and a caster.

[0046] A connecting member may be provided between the second wheel sub-frame and the stabiliser wheel arrangement for releasably locking the second wheel arrangement and the stabiliser wheel arrangement together.

[0047] The connecting member may be pivotably fixed to the second wheel sub-frame.

[0048] The patient transport apparatus may comprise at least a first patient securing device, for securing the patient relative to the patient support assembly. The patient securing device may comprise a first belt, in use, extending over a mid-section of a body of the patient, thereby securing the patient to the main portion of the patient support assembly. A position of the first belt may be adjustable relative to the patient support assembly.

[0049] The patient transport apparatus may furthermore comprise a second and third patient securing device, for securing the patient relative to the patient support assembly.

[0050] The second patient securing device may comprise a second belt, in use, extending over a lower portion of the body of the patient, thereby securing the patient to the first portion of the patient support assembly.

[0051] The third patient securing device may comprise a third belt, in use, extending over a torso of the patient, thereby securing the patient to the second portion of the patient support assembly. The patient support assembly may include a first and a second set of lugs or alternatively a sliding cavity or slot on each side. The third patient securing device may be received through a specific one of the sets of lugs or be displaceable within the sliding cavity or slot, to accommodate different positions of the third patient securing device relative to the patient support assembly. The patient transport apparatus may comprise a footrest against which feet of a patient may rest in use. The footrest may prevent the patient from sliding from the patient support assembly.

[0052] The footrest may include a handle with which the patient transport apparatus may be manoeuvred in use.

[0053] The patient transport apparatus may furthermore comprise a first and second arm rest. The first and second arm rests may be adjustable and may be releasably locked in position in an upright orientation.

[0054] The patient transport apparatus may comprise a push handle.

[0055] The patient transport apparatus may provide for the storage of equipment, such as oxygen tanks and may include an oxygen tank storage mechanism. The patient transport apparatus may furthermore comprise an intravenous hook.

[0056] The main portion and first and second portions of the patient support assembly may be covered by high density foam.

[0057] Alternatively, the main portion and first and second portion of the patient support assembly may comprise moulded plastic portions.

[0058] Frame portions of the patient transport apparatus may be manufactured from tubular members, such as aluminium, stainless-steel tube members or a combination thereof. Tube members may be interconnected by means of elbow members, T-members, pivotable tubular members or connecting pivotable members.

BRIEF DESCRIPTION OF THE DRAWINGS

[0059] The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

[0060] FIG. **1** shows a front top perspective view of a patient transport apparatus in accordance with a first example embodiment of the invention, in a first configuration in which the patient transport apparatus is configured as a stretcher, and in which some detail is omitted to reveal normally concealed detail;

[0061] FIG. **2** shows a further front top perspective view of the patient transport apparatus of FIG. **1**;

[0062] FIG. **3** shows a rear perspective view of the patient transport apparatus of FIG. **1**, in a third configuration in which the patient transport apparatus is configured as a stair chair;

[0063] FIG. **4** shows a side view of the patient transport apparatus of FIG. **1**, in the first configuration;

[0064] FIG. **5** shows a side view of the patient transport apparatus of FIG. **1**, in which a first and second wheel arrangements are in the process of being configured in a folded configuration, to allow transportation of the apparatus in an ambulance;

[0065] FIG. **6** shows a side view of the patient transport apparatus of FIG. **1**, in which the first and second wheel arrangements are configured in the folded configuration;

[0066] FIG. **7** shows a side view of the patient transport apparatus of FIG. **1**, in the fourth configuration, in which a patient is, in use, supported in a Fowler's position;

[0067] FIG. **8** shows a side view of the patient transport apparatus of FIG. **1**, in use, in the first configuration;

[0068] FIG. **9** shows a side view of the patient transport apparatus of FIG. **1**, in use and in a second configuration in which the patient transport apparatus is configured as a wheelchair;

[0069] FIG. **10** shows a side view of the patient transport apparatus of FIG. **1**, in the third configuration;

[0070] FIG. **11** shows a side view of the patient transport apparatus of FIG. **1**, in the third configuration, in use, while traversing a set of stairs;

[0071] FIG. **12** shows a top view of the patient transport apparatus of FIG. **1**, in the first configuration;

[0072] FIG. **13** shows front view of the patient transport apparatus of FIG. **1**, in the first configuration;

[0073] FIG. **14** shows rear view of the patient transport apparatus of FIG. **1**, in the first configuration;

[0074] FIG. **15** shows a perspective view of the patient transport apparatus of FIG. **1**, in which further detail has been omitted to reveal detail of structural components thereof;

[0075] FIG. **16** shows a front top perspective view of a second example embodiment of the patient transport apparatus in accordance with the invention, in a first configuration in which the patient transport apparatus is configured as a stretcher;

[0076] FIG. **17** shows a top view of the patient transport apparatus of FIG. **16** in the first configuration;

[0077] FIG. **18** shows a front view of patient transport apparatus of FIG. **16** in the first configuration;

[0078] FIG. **19** shows a side view of the patient transport apparatus of FIG. **16** in the first configuration;

[0079] FIG. **20** shows a side view of the patient transport apparatus of FIG. **16** in a second configuration in which the patient transport apparatus is configured as a wheelchair;

[0080] FIG. **21** shows a n exploded top perspective view of the patient transport apparatus of FIG. **16**;

[0081] FIG. **22** shows a front top perspective view of the patient transport apparatus of FIG. **16**, from which a patient support surface has been removed in order better to show detail of the patient transport apparatus, and particularly support frames, lock mechanisms, and wheel subframes of the patient transport apparatus;

[0082] FIG. **23** shows a rear top perspective view of the patient transport apparatus of FIG. **16**, with similar components removed therefrom as in FIG. **22**;

[0083] FIG. **24** shows a side view of a front portion of the patient transport apparatus of FIG. **16**, wherein a second wheel arrangement has been pivoted from an unfolded configuration, which is shown in FIGS. **16** to **23**, in the direction of a folded configuration, and towards an intermediate configuration;

[0084] FIG. **25** shows a side view of a front portion of the patient transport apparatus of FIG. **16**, wherein a first and second wheel arrangements have been pivoted from an unfolded configuration, which is shown in FIGS. **16** to **23**, in the direction of a folded configuration;

[0085] FIG. **26** shows a side view of a front portion of the patient transport apparatus of FIG. **16**, wherein the first and second wheel arrangements have been pivoted to the folded configuration;

[0086] FIG. **27** shows a detailed perspective view of a first support frame and a first and second locking arrangement of the patient transport apparatus of FIG. **16**;

[0087] FIG. **28** shows a detailed perspective view of an arm rest lock member of the patient transport apparatus of FIG. **16**;

[0088] FIG. **29** shows a detailed perspective view of a fourth locking arrangement of the patient transport apparatus of FIG. **16**;

[0089] FIG. **30** shows a detailed perspective view of a third locking arrangement of the patient transport apparatus of FIG. **16**;

[0090] FIG. **31** shows a side view of the patient transport apparatus of FIG. **16**, configured as a stair chair, and in use, travelling down a stairway;

[0091] FIG. **32** shows a partial side view of the patient transport apparatus of FIG. **16**, configured as a stretcher;

[0092] FIG. **33** shows a detailed view of a part of a telescopic stabilizer wheel arrangement of the patient transport apparatus of FIG. **16**;

[0093] FIG. **34** shows a detailed view of a part of a telescopic stabilizer wheel arrangement of the patient transport apparatus of FIG. **16**;

[0094] FIG. **35** shows a side view of the patient transport apparatus of FIG. **16**, in which a length of the stabilizer wheel arrangement has been reduced;

[0095] FIG. **36** shows a side view of the patient transport apparatus of FIG. **16**, configured as a stretcher, and in which a connecting member is used to fix a position of a stabilizer wheel arrangement relative to a second wheel arrangement;

[0096] FIG. **37** shows a side view of the patient transport apparatus of FIG. **16**, configured as a chair, in which the second wheel arrangement is configured in an intermediate position, and wherein the stabiliser wheel arrangement provides support for a rear portion of the patient transport arrangement; and

[0097] FIG. **38** shows sectioned front view of the patient transport apparatus of FIG. **16**, showing detail of the connecting member.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0098] Before any embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Unless specified or limited otherwise, the terms "mounted", "connected", "engaged" and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings and are thus intended to include direct connections between two members without any other members interposed therebetween and indirect connections between members in which one or more other members are interposed therebetween. Further, "connected" and "engaged" are not restricted to physical or mechanical connections or couplings. Additionally, the words "lower", "upper", "upward", "down" and "downward" designate directions in the drawings to which reference is made. The terminology includes the words specifically mentioned above, derivatives thereof, and words or similar import. It is noted that, as used in this specification and the appended claims, the singular forms "a," "an," and "the," and any singular use of any word, include plural referents unless expressly and unequivocally limited to one referent. As used herein, the term "include" and its grammatical variants are intended to be non-limiting, such that recitation of items in a list is not to the exclusion of other like items that can be substituted or added to the listed items.

[0099] Referring to the figures, in which like numerals indicate like features, a first non-limiting example of a patient transport apparatus (or just "apparatus") in accordance with the invention is generally indicated by reference numeral **100** (in FIGS. **1** to **15**). A second non-limiting example of a patient transport apparatus in accordance with the invention is generally indicated by reference numeral **10** (in FIGS. **16** to **38**). It will be appreciated that the first and second example embodiments of the apparatus (**100**, **10**) share certain common (though not necessarily physically

identical) features, which are in some instances designated by like numerals. The common features, when designated by like reference numerals, will be discussed with reference to one of the example embodiments only, and it will be appreciated that each feature performs a similar function in respect of the other example embodiment, even though not described or discussed, unless otherwise mentioned.

[0100] As will become apparent from the description that follows, both the apparatuses (**100**, **10**) are adapted to act as emergency medical services (EMS) patient transport apparatuses, and various components and aspects of the apparatuses (**100**, **10**) are specifically designed and adapted for this purpose.

[0101] With reference to FIGS. **1** to **15**, the apparatus **100** comprises a patient support assembly (generally designated by reference numeral **12**) which comprises of a main portion **12.1**, a first portion **12.2** and a second portion **12.3**. The main portion **12.1** is located centrally, and between the first and second portions (**12.2** and **12.3**). The first and second portions (**12.2** and **12.3**) therefore extend on opposite sides of the main portion **12.1**. The first and second portions (**12.2** and **12.3**) of the patient support assembly **12** are independently and pivotably adjustable relative to the main portion **12.1**. This independent adjustability of the first and second portions (**12.2** and **12.3**) facilitates the configuration of the apparatus **100** in various predetermined configurations, as will be described in more detail below.

[0102] The apparatus **100** further comprises a first wheel arrangement **14** and a second wheel arrangement **16**. The first and second wheel arrangements (**14** and **16**) are adjustable relative to each other, and also adjustable relative to the patient support assembly **12**. In the case of apparatus **100**, the first and second wheel arrangements may also, by means of being interconnected by gas struts (as is described more fully below) be adjustable as a unit. In the case of the second example embodiment apparatus **10**, independent adjustability of the wheel arrangements plays a vital role in the configuration of the apparatus **10** in the various configurations (as discussed more fully below).

[0103] The adjustability of the first and second portions (**12.2** and **12.3**) of the patient support assembly **12** and the adjustability of the first and second wheel arrangements (**14**, **16**) facilitate configuring the apparatus **100** in three or more configurations.

[0104] When the apparatus **100** is configured in the first configuration, the apparatus **100** is configured as a stretcher (typically shown in FIGS. **1**, **2**, **4**, **8** and **12** to **15**). When the apparatus **100** is configured in the second configuration, the apparatus **100** is configured as a chair or more particularly, a wheelchair (typically shown in FIG. **9**). When the apparatus **100** is configured in the third configuration, the apparatus **100** is configured as a "stair chair" (typically shown in FIGS. **3**, **10** and **11**). These configurations, and the hardware provided to facilitate these configurations, and interchangeability between these configurations, are discussed in more detail below.

[0105] The main portion **12.1**, the first portion **12.2** and the second portion **12.3** are associated with a main support frame **18.1**, a first support frame **18.2** and a second support frame **18.3**, respectively.

[0106] The first support frame **18.2** is pivotably attached to the main support frame **18.1**, by means of a first pivot member **20**, while the second support frame **18.3** is pivotably attached to the main support frame **18.1** by means of a second pivot member **22**.

[0107] The first wheel arrangement **14** comprises a first wheel subframe **24** and a pair of wheels or casters (generally indicated by reference numeral **26**), while the second wheel arrangement **16** comprises a second wheel subframe **28**, also fitted with a pair of wheels or casters **26**.

[0108] The first and second wheel arrangements (**14**, **16**) are pivotably fixed relative to the support assembly **12**. More particularly, the first and second wheel subframes (**24**, **28**) are pivotably fixed relative to the support assembly **12**. The first wheel subframe **24** is attached or fixed to the main support frame **18.1** by means of a first subframe pivot member **30** and the second wheel subframe **28** is attached or fixed to the main support frame **18.1** by means of second subframe pivot members **32**.

[0109] The first wheel arrangement **14** is displaceable between a folded configuration (shown in FIG. **6**) in which the first wheel arrangement **14** is folded forwards (or flat), and an unfolded configuration (typically shown in FIG. **4**, for example).

[0110] Similarly, the second wheel arrangement **16** is displaceable between a folded configuration (shown in FIG. **6**) in which the second wheel arrangement **16** is folded forwards (or flat), and an unfolded configuration (typically shown in FIG. **4**, for example).

[0111] When the first and second wheel arrangement (**14**, **16**) are in the folded configuration, the first and second wheel arrangement (**14**, **16**) lie substantially flat relative to the patient support assembly **12**, enabling the apparatus **100** to be received within an ambulance. The apparatus **100** is provided with support wheels **102** which support the patient support assembly **12** when the apparatus is received in the ambulance. The support wheels **102** are mounted to, or extend from, the main support frame **18.1**. This allows the second patient support assembly **12.3** to be pivoted upwards when the apparatus **100** is located in the ambulance, such as when a patient needs to be supported in the Fowler position (as discussed more fully below).

[0112] When the apparatus **100** is configured in the first configuration (which is typically shown in FIGS. **1**, **2**, **4**, **8** and **12** to **15**) the apparatus is configured as a stretcher, and the first and second portions (**12.2** and **12.3**) of the patient support assembly **12** are substantially aligned with each other and with the main portion **12.1**. The first and second wheel arrangements (**14** and **16**) now support the patient support assembly substantially horizontally.

[0113] When the apparatus **100** is configured in the second configuration (which is typically shown in FIG. **9**) the apparatus is configured as a wheelchair, allowing the patient to be supported in a seated position. Now, the first and second portions (**12.2** and **12.3**) of the patient support assembly **12** are pivoted relative to each other and relative to the main portion **12.1**. The first and second wheel arrangements (**14** and **16**) support the main portion **12.1** of the patient support assembly **12** substantially horizontally. The first portion **12.2** of the patient support assembly **12** is pivoted downwards (typically by about 80 degrees) and supports lower limbs of the patient, while the second portion **12.3** of the patient support is pivoted upwards (by between 0 and 90 degrees, but typically by between 65 and 85 degrees) and supports an upper body or torso of the patient. In some cases, the first portion **12.2** may be retained in a

substantially horizontal orientation or may even be pivoted slightly upwards (typically by up to 15 degrees) should this be required, resulting in apparatus **100** being configured in the fourth configuration (typically shown in FIGS. **4** and **7**).

[0114] When the apparatus **100** is configured in the third configuration the apparatus is configured as a "stair chair", allowing the patient to be supported in a seated position, whilst transporting the patient down a stairway. The patient support assembly **12** is configured similar as discussed above in respect of the second configuration (wherein the apparatus **100** is configured as a wheelchair). However, for ergonomic purposes, the second support portion **12.3** is now typically pivoted upwards by about 65 degrees.

[0115] The apparatus **100** comprises at least a first, but typically also a second stair engagement device **70**. In use, when the apparatus **100** is configured in the third configuration, the first and second stair engagement devices **70** are configured in a position to engage edges of a stair **106**. The stair engagement device comprises a first and second contact surface which, in use, are provided for engaging the edge of the stair **106** (typically as shown in FIG. **11**). The first and second contact surfaces are each formed by an endless belt or a track, each supported by a first and second pulley. The length of the contact surface of the stair engagement device **70** is such that at least two consecutive stairs **106** are spanned in use, thereby allowing the apparatus **100** to be supported in relatively smooth fashion, when traversing a set of stairs **106**.

[0116] In use, and as shown in FIGS. **3** and **10**, the stair engagement device **70** is arranged at a predetermined angle (typically about 35 degrees relative to the first support portion **12.1** or relative to a vertical plane) to ensure that the main patient support portion **12.1** is supported in a substantially horizontal (or slightly slanted backwards) orientation when the apparatus **100** (configured as a stair chair) is located on the set of stairs **106** (as shown in FIG. **11**).

[0117] Some distinct differences exist between the first and second example embodiments of the apparatus (**100**, **10**) when it comes to the third configuration.

[0118] The apparatus **100** includes a stair engagement subframe **108**, to which the first and second stair engagement devices **70** are fixed. The stair engagement subframe **108** is pivotably fixed to a bottom portion of the second wheel subframe **28**, by means of first and second stair engagement subframe pivots **110**. The stair engagement subframe **108** is pivotably displaceable between a folded configuration (typically shown in FIG. **4**) and an operative configuration (typically shown in FIGS. **3**, **10** and **11**). It will be understood that the stair engagement subframe **108** is configured in the operative configuration whenever the apparatus **100** is configured in the third configuration.

[0119] The stair engagement subframe pivots **110** are substantially L-shaped, such that the point **112** about which the stair engagement subframe **108** pivots, is spaced perpendicularly from the contact surfaces. This spaces the contact surfaces away from the second wheel subframe **28** (when the stair engagement subframe **108** is configured in the operative configuration), to prevent interference between the wheels **26** of the second wheel arrangement **16** and the stairs **106**.

[0120] A brace **114** is pivotably fixed to a top portion of the second wheel subframe **28** and extends to the stair engagement subframe **108**. The brace **114** is provided for supporting the stair engagement subframe **108** when in the operative configuration. Ends of the brace **114** are slidably received in an axially extending track or slot **116** of the stair engagement subframe **108**.

[0121] A first and second torsion spring **118** extends between the brace **114** and the second wheel subframe **28**, such that the brace biases the stair engagement subframe **108** towards the operative configuration.

[0122] A retaining clip **120** is provided for releasably retaining the stair engagement subframe **108** in the folded configuration (against the bias) when the apparatus **100** is not configured in the third configuration.

[0123] It will be appreciated that the brace **114** is provided for transferring forces between the stair engagement devices and the second wheel subframe **28**, thereby supporting the weight of the apparatus **100** (and that of the patient) when the apparatus is located on a set of stairs **106** and inhibits the stair engagement subframe **108** from collapsing.

[0124] The apparatus **100** comprises a number of gas struts. Firstly, gas struts **124** are provided between the first and second wheel arrangements (**14**, **16**) and between the second wheel arrangement **16** and the main portion **12.1**, to aid in unfolding the wheel arrangements and lifting the apparatus up into an operable configuration.

[0125] Secondly, a lockable gas strut **126** is arranged between the first wheel arrangement **14** and the first portion **12.2**, for supporting and locking the first portion **12.2** in various positions relative to the main portion **12.1**. Similarly, a lockable gas strut **126** is arranged between the second wheel arrangement **16** and the second portion **12.3**, for supporting and locking the second portion **12.3** in various positions relative to the main portion **12.1**. Each lockable strut **126** is associated with a release handle **128** which, when actuated, allows adjustment of the lockable strut **126**. The release handles **128** may be located on either side of the apparatus, depending on a layout of the ambulance and the position of a paramedic or operator relative to the apparatus within the back of an ambulance.

[0126] A lock mechanism (which is best shown in FIG. **3**) is provided for locking the second portion **12.3** in one or more specific predetermined positions relative to the main portion **12.1**. The lock mechanism comprises a pivotably mounted sleeve **130** fixed relative to the second wheel subframe **28**, and a pivotably mounted member **132** slidably received therein, which member is connected to the second support frame **18.3**. In use, a spring-loaded pin **134** extends through a hole in the sleeve **130** and into a hole in the member **132**. The pin **134** may have a handle or may be an L-shaped lever to facilitate easy handling thereof. The lock mechanism may be positioned on either side of the apparatus, depending on the layout of the ambulance and the position of the paramedic or operator within the ambulance.

[0127] A similar lock mechanism may be provided for locking the first wheel arrangement **14** and thereby also the second wheel arrangement **16** in the unfolded configurations. The lock however comprises of two machined blocks. A first machined block **136** secured onto the main support frame **18.1**, while a second block (not shown) is secured onto the first wheel sub frame **24**. In use, a spring-loaded pin **138** extends through a hole in the first block (located on the main support frame **18.1**) into a locating hole in the second block (located on the first wheel sub frame **24**). When not in use, the spring-loaded pin is released from the second block while remaining in the first block, therefore resulting in the spring-loaded pin remaining in a compressed position on the

second block's surface, while the first and second wheel arrangements are in the folded configuration. When the first and second wheel arrangements are unfolded, the pin moves on the surface of the second block until locating in the locating hole of the second block. The pin may once again comprise a handle or may be an L-shaped lever to facilitate easy handling thereof.

[0128] In addition to the lock mechanisms above, it will be appreciated that the lockable gas struts may also serve as locking arrangements for the various displaceable parts, and that the lockable gas struts may allow locking at various positions.

[0129] Typically, an ambulance may be adapted for facilitating use of the apparatus **100**. In this regard, an ambulance lock may be mounted to a floor portion of the ambulance, with which the apparatus **100** may be secured relative to the ambulance. More specifically, the ambulance lock may be arranged to clamp onto a side portion of the main support frame **18.1** or alternatively the first support frame **18.2** (so as not to interfere with any of the other subframes, mechanisms or hardware associated with the wheel arrangements of the apparatus **100**).

[0130] Since the apparatus **100** is configured as an EMS apparatus, various patient securing devices are provided with which the patient is, in use, secured relative to the apparatus **100**.

[0131] This includes a first adjustable belt **76** which, in use, extends over a mid-section of the patient, securing the patient relative to the main support frame **18.1**. The position of the first adjustable belt **76** relative to the main portion **12.1** is adjustable to accommodate different anatomies of the patients.

[0132] The apparatus also includes a second and third adjustable belt (**78**, **80**). A set of sliding cavities or slots are provided to receive the third adjustable belt **80** relative to the patient support assembly **12**, to accommodate varying lengths of patients. It will be understood that the most suitable position within the sliding cavity or slot through which the third belt **80** is received in use will be selected so that the belt will run over a torso of the patient, and may differ, depending on whether the patient is a child or an adult.

[0133] Towards a foot-end of the apparatus **100**, a footrest **82** with an integrated handle is provided. The footrest **82** is provided for preventing the patient from sliding from the patient support assembly **12**, whilst enabling medical personnel to manoeuvre the apparatus **100**. A push handle **84** is provided at a head end of the apparatus **100**, also for manoeuvring the apparatus **100**, and when transporting a patient down a flight of stairs.

[0134] The apparatus **100** is provided with a first and second arm rest **86**, pivotably fixed to either side of the main support frame **18.1** via arm rest hinge members **88**. Arm rest locking members **90** are provided for locking the arm rests **86** in an upright position.

[0135] When the arm rest lock members **90** are unlocked, the arm rests **86** may be pivoted downward to facilitate easy transfer of the patient from the apparatus **100** to another bed, such as a hospital bed or a spinal board. When the arm rests **86** are pivoted to the upward position and locked in place, the arm rests **86** may be used to secure a spinal board supporting the patient (when the apparatus is configured in the "stretcher" configuration. The arm rests **86** are manufactured from tubular members, and may be used to hook equipment, such as heart monitors onto.

[0136] The apparatus **100** facilitates the storage of medical equipment. In this regard, an oxygen tank **92** may be fixed to the apparatus by means of an oxygen tank storage bracket **94**. Furthermore, a bracket **98** is provided for housing intravenous (IV) treatment equipment (not shown).

[0137] The patient support assembly **12** is typically manufactured from moulded plastic components. Alternatively, the patient support assembly **12** may be covered with high density foam or a mattress to provide cushioning for a patient received thereon. A metal plate, such as an aluminium plate, may provide support and rigidity to the foam or mattress.

[0138] Frame portions of the apparatus **100** are manufactured from tubular members, such as aluminium or stainless-steel tube members or a combination thereof. These tube members are interconnected by means of elbow members, T-members, pivotable tubular members as well as connecting pivotable members, and fastened by tubular rivets, hollow rivets, pop rivets and various bolts, or are bent into shapes as shown.

[0139] The patient transport apparatus **100** is also configurable in a fourth configuration, in which the second portion of the patient support assembly is pivoted relative to the main portion **12.1** of the patient support assembly, while the first portion of the patient support assembly is provided substantially aligned with the main portion of the patient support assembly, or pivoted slightly upwards (typically, up to 15 degrees upwards). When the patient transport apparatus is supported in the fourth configuration, the patient may be supported in a Fowler's position (as shown in FIGS. **4** and **7**).

[0140] Reference is now made to the second example embodiment of the apparatus **10**, and particularly, FIGS. **16** to **38**.

[0141] Now, the second wheel arrangement **16** is configurable in an intermediate configuration, which is between the folded and unfolded configurations. As discussed more fully below, the second wheel arrangement **16** is configured in the intermediate configuration when the apparatus **10** is configured as a stair chair.

[0142] The second wheel arrangement **16** is retained in the intermediate configuration, by the first wheel arrangement **14**. It will therefore be understood that the first wheel arrangement **14** needs to remain in the unfolded configuration, for the second wheel arrangement **16** to be configured in the intermediate configuration.

[0143] The second wheel arrangement **16** is configured into the intermediate configuration by pivoting the second wheel arrangement **16** forwards from the unfolded configuration, towards the folded configuration, until further pivoting thereof is inhibited by interference of the second wheel subframe **28** with the first wheel subframe **24**.

[0144] The geometries of the first and second wheel subframes (**24**, **28**) are such that the second wheel subframe **28** is arranged at a predetermined angle (again, about 35 degrees) relative to the main portion **12.1** of the support assembly **12** when the second wheel arrangement is in the intermediate configuration. This predetermined angle is calculated to allow the main portion **12.1** of the support assembly **12** to be supported substantially horizontally or slight backwards when a patient is transported up or down a flight of stairs, using the apparatus **10**.

[0145] As is best shown in FIG. **18**, the first wheel subframe **24** comprises two main support members **34** which, at one end thereof, are fixed to the main support frame **18.1** via the first subframe pivot member **30**. At a second end, the two main support members **34** are interconnected by a cross member **36**, which extends beyond the width of the two main support members **34**. A brace member **38** comprising a pivot arrangement **40** extends between the cross member **36** and a first support cross member **42** of the first support frame **18.2**. The brace member **38** is pivotably connected to the cross member **36** and the support cross member **42**, by means of a first pivot T-member **44** and a second pivot T-member **46**, respectively.

[0146] Also, as shown in FIGS. **22** and **27**, the first wheel arrangement **14** comprises a first locking arrangement **48**, while the first support frame **18.2** comprises a second locking arrangement **50**.

[0147] The first locking arrangement **48** is provided for inhibiting pivoting movement of the second pivot T-member **46** relative to the first support cross member **42**. The first locking arrangement **48** comprises a rod which, when in a locked configuration, is received through an opening through the second pivot T-member **46**, thereby inhibiting pivoting movement thereof.

[0148] The second locking arrangement **50** is provided for inhibiting pivoting of first support frame **18.2** relative to main support frame **18.1** and comprises two parallel rod sections (designated by reference numerals **50.1** and **50.2**). When the second locking arrangement **50** is provided in a locked configuration, the two parallel rod sections (**50.1** and **50.2**) are received in openings extending through the first pivot members **20**, thereby inhibiting pivoting thereof.

[0149] Various configurations of the apparatus **10** can be achieved by configuring the first and second locking mechanisms in various combinations. For example, when both the first and second locking arrangements (**48** and **50**) are in a locked configuration, the main support frame **18.1** and the first support frame **18.2** (and therefore the main portion **12.1** and the first portion **12.2** of the patient support surface) are aligned.

[0150] When the first locking arrangement **48** is in an unlocked configuration, and the second locking arrangement **50** is in the locked configuration, the first wheel arrangement **14** can be configured in the folded position, such as when loaded into an ambulance.

[0151] When the first locking arrangement **48** is in the locked configuration, and the second locking arrangement **50** is in the unlocked configuration, the first support portion may be pivoted downward, such as when the apparatus **10** is configured as a wheelchair. This is facilitated by pivot arrangement **40** (as can be seen in FIG. **20**).

[0152] A third locking arrangement **52**, having two parallel rod sections (designated by reference numerals **52.1** and **52.2** respectively) is provided for locking the second support frame **18.3** relative to the main support frame **18.1**. Again, the first and second parallel rod sections (**52.1** and **52.2**) extend through the second pivot member **22** when in the locked position. Provision is made for locking the second support frame **18.3** at various inclinations relative to the main support frame **18.1**, to support the upper body of the patient at various angles, such as a flat angle (when the apparatus **10** is configured as a stretcher) and an upright angle (which may be between 45 degrees and 90 degrees relative to the main support frame **18.1**) when the apparatus is configured as a wheelchair or a stair chair.

[0153] The second wheel subframe **28** comprises two main support members **54**, connected pivotably to the main support frame **18.1** via the second subframe pivot members **32**. The main support members **54** are interconnected by a stair engagement frame **56**. A second brace member **58** having a second pivot arrangement **40** extends between a support member of the stair engagement frame **56** and a cross member **62** of the main support frame **18.1**. The second brace member **58** is pivotably fixed to the support member of the stair engagement frame **56** via a third pivot T-member **64** and to the member **62** of the main support frame **18.1** via a fourth pivot T-member **66**.

[0154] A fourth locking arrangement **68** extends inside the cross member **62**, and is provided, when arranged in a locked configuration, for locking the second wheel subframe **28** in the unfolded configuration.

[0155] The apparatus **10** comprises a stair engagement device **70** (which is essentially similar to the stair engagement device described above in respect of the first example embodiment), which is fitted to the stair engagement frame **56**. It will be understood that the stair engagement device **70** is arranged at a predetermined angle when the second wheel subframe **28** is held in the intermediate configuration.

[0156] The wheels **26** of the first wheel arrangement **14** are spaced apart by a greater distance than the wheels **26** of the second wheel arrangement **16**, to prevent interference with the wheels of the first and second wheel arrangements (**14**, **16**) when the second wheel arrangement **16** is configured in the intermediate configuration, or when both the first and second wheel arrangements (**14**, **16**) are in the folded configurations.

[0157] The apparatus **10** comprises a stabiliser wheel arrangement **72** extending in a direction away from the second wheel arrangement **16**. The stabiliser wheel arrangement **72** comprises a stabiliser wheel frame and a caster.

[0158] A connecting member **74** is provided between the second wheel subframe **28**, and more particularly the stair engagement frame **56** and the stabiliser wheel arrangement **72** for releasably locking the second wheel arrangement **16** and the stabiliser wheel arrangement **72** together, when the second wheel arrangement **16** is in the unfolded configuration.

[0159] As is best illustrated in FIGS. **32** to **34**, the stabilizer wheel frame is telescopic and is provided for performing various functions. Firstly, the stabilizer wheel arrangement **72** balances out the stretcher and wheelchair when in motion. The connecting member **74** is now used to lock the stabilizer wheel arrangement **72** in place (as best shown in FIG. **36**).

[0160] Furthermore, while the second wheel arrangement **16** is pivoted towards the intermediate position, but before apparatus **10** is supported on the stairs by the stair engagement device **70**, the rear end of the device **10** is supported and held up by the stabilizer wheel arrangement **72**. This is shown best in FIG. **37**.

[0161] Since the frame is telescopic, the length of the stabilizer wheel arrangement **72** can be adjusted as required. When the apparatus **10** is configured as a stair chair and located on a stair as shown in FIG. **31**, the length of the stabilizer wheel arrangement **72** is reduced and the stabilizer wheel arrangement **72** is pivoted to provide support for the apparatus on the stair and while moving down the stairs.

[0162] Therefore, the stabilizer wheel arrangement **72** is adjustable to enable it to support the apparatus **10** at varying heights while in a stretcher configuration, and also at various angles, such as when in the stair chair configuration.

[0163] The telescopic leg is attached by means of a larger T-joint, which is located on the main support frame **12.1** over the second pivot member **22**. The telescopic leg is pivotable but locked in place by the castor or by the connection on the second wheel arrangement **16**, as seen in FIG. **36** or **37** respectively, depending on the movement required.

[0164] The connecting member **74** is pivotably fixed to the stair engagement frame **56**. This is best illustrated in FIG. **38**. Therefore, when needed, the connecting member **74** can be pivoted to an operative position (as shown in FIG. **36**) to connect the stabilizer wheel arrangement **72** and the second wheel arrangement **16**. When no longer required, the connecting member **74** can be pivoted away.

[0165] A locking clip **75** is also provided, to perform a similar function as the connecting member **74**, but in instances where the length of the stabilizer wheel arrangement **72** has been shortened.

[0166] In some cases, such as in the second example embodiment of the apparatus **10**, support caster wheels **96** are provided, which are not fixed relative to the main portion **12.1**. These support caster wheels **96** are also provided for facilitating loading the apparatus **10** into an ambulance (in cases where the apparatus **10** is configured in a stretcher configuration). It will be understood that, in cases where the second support frame **18.3** is pivoted upwards, such as when the apparatus is configured in the Fowler position, the support caster wheels **96** will no longer be able to facilitate the loading of the apparatus **10** into the ambulance. In such cases the stabilizer wheel arrangement **72** may be adjusted to facilitate the loading of the apparatus **10** into the ambulance.

[0167] It will be appreciated that the spacing of the wheels **26** of the apparatus **100** are not similar to that of the apparatus **10** and as mentioned above. Specifically, due to the use of the stair engagement subframe **108**, the second wheel arrangement **16** of the apparatus **100** need not be configured in an intermediate configuration when the apparatus **100** is configured in the third configuration. Therefore, no interference between the first and second wheel arrangements (**14**, **16**) of the apparatus **100** occurs. Furthermore, since the second wheel arrangement **16** of the apparatus **100** remains in position when the apparatus **100** is configured in the third configuration, the apparatus **100** does not require a stabiliser wheel arrangement **72**.

[0168] It will be appreciated that, since the first and second wheel subframes (**24**, **28**) are both pivotably fixed to the main support frame **18.1**, the apparatuses (**100**, **10**), when configured as a wheelchair, are very compact, and therefore facilitates easy manoeuvring through small corridors and around corners.

[0169] The apparatuses (**100**, **10**) may be used in a wide number of applications, due to its ability to be used as EMS apparatuses, and also due to its ability to be configured in the various configurations as discussed. The construction of the apparatus is furthermore lightweight, adding to the ease of manoeuvrability, in use.

[0170] Furthermore, since the apparatus is easily configurable between the various configurations, the apparatus **100** may be used to transport a patient in various positions and over different types of terrain, and still be used as an EMS apparatus, supporting a patient whilst being transported by ambulance. Since various wheels or casters are provided, some of which are also adjustable, the apparatus may support the patient in the Fowlers position, even when located inside an ambulance.

[0171] The first and second wheel arrangements (**14**, **16**) are splayed relative to each other when in the unfolded configuration, to improve stability of the apparatus **100**.

[0172] It will be appreciated that the inclusion of the pivotable stair engagement subframe **108** (in the case of the first example embodiment **100**) provides an ergonomic advantage over the configuration of the second example embodiment **10**, since the patient support assembly **12** is now generally supported higher relative to the stairs, which eases manoeuvring of the apparatus **100** by a paramedic or operator. That said, the configuration of the second embodiment **10** still provides a useful alternative solution.

[0173] It will be appreciated that the above description only provides example embodiments of the invention and that there may be many variations without departing from the spirit and/or the scope of the invention. It will easily be understood from the present application that the particular features of the present invention, as generally described and illustrated in the figures, can be arranged, and designed according to a wide variety of different configurations. In this way, the description of the present invention and the related figures are not provided to limit the scope of the invention but simply represent selected embodiments.

[0174] The skilled person will understand that the technical characteristics of a given embodiment can in fact be combined with characteristics of another embodiment, unless otherwise expressed or it is evident that these characteristics are incompatible. Also, the technical characteristics described in a given embodiment can be isolated from the other characteristics of this embodiment unless otherwise expressed.

1) A patient transport apparatus comprising:

a patient support assembly, having a main portion, and a first and second portion extending from opposite sides of the main portion, which first and second portions are independently adjustable relative to the main portion; and

at least a first and second wheel arrangement which are adjustable relative to the patient support assembly,

wherein the patient transport apparatus is configurable in at least a first configuration, a second configuration and a third configuration, by adjustment of at least some of the first portion, the second portion, the first wheel arrangement and the second wheel arrangement, and wherein the patient transport apparatus is configured: i) as a stretcher when configured in the first configuration; ii) as a chair when configured in the second configuration; and iii) as a stair chair when configured in the third configuration.

2) The patient transport apparatus according to claim **1**, wherein the main portion and first and second portions of the patient support assembly are substantially aligned and supported by the first and second wheel arrangements in a substantially horizontal orientation when the patient transport apparatus is configured in the first configuration.

3) The patient transport apparatus according to claim **1** or claim **2**, wherein the first portion is pivoted downward, and

the second portion is pivoted upward relative to the main portion, when the patient transport apparatus is configured in the second configuration.

4) The patient transport apparatus according to any one of the preceding claims, further including at least a first stair engagement device which is operatively configured in a position to engage a stair, when the patient transport apparatus is configured in the third configuration.

5) The patient transport apparatus according to claim **4**, wherein the first stair engagement device is fitted to a stair engagement subframe, which in turn, is fitted to the second wheel arrangement.

6) The patient transport apparatus according to claim **5**, wherein the second wheel arrangement includes a second wheel subframe, wherein the stair engagement subframe is pivotably fixed to a bottom portion of the second wheel subframe, and wherein the stair engagement subframe is pivotably displaceable between a folded configuration and an operative configuration.

7) The patient transport apparatus according to claim **6**, wherein the stair engagement subframe is disposed at an angle of about 35 degrees from vertical, when in the operative configuration.

8) The patient transport apparatus according to claim **6** or **7**, further comprising a brace extending between the second wheel subframe and the stair engagement subframe when the stair engagement subframe is configured in the operative configuration, for supporting the stair engagement subframe in the operative configuration.

9) The patient transport apparatus according to claim **8**, wherein a part of the brace is received within a slot formed on the stair engagement subframe, and wherein the brace biases the stair engagement subframe towards the operative configuration.

10) The patient transport apparatus according to claim **9**, comprising a torsion spring located between the brace and the second wheel subframe, which torsion spring causes the brace to bias the stair engagement subframe towards the operative configuration.

11) The patient transport apparatus according to any one of claims **8** to **10**, including a retaining mechanism for releasably retaining the brace when the stair engagement subframe is in the folded configuration.

12) The patient transport apparatus according to claim **5**, wherein the second wheel arrangement is displaceable to an intermediate configuration which is between a folded and unfolded configuration, when the patient transport apparatus is configured in the third configuration.

13) The patient transport apparatus according to claim **12**, wherein, when the patient transport apparatus is configured in the third configuration, the first wheel arrangement is configured in an unfolded configuration, such that the second wheel arrangement is inhibited from being displaced beyond the intermediate configuration by interference between the first and second wheel arrangements.

14) The patient transport apparatus according to claim **13**, wherein, when the second wheel arrangement is inhibited from being displaced beyond the intermediate configuration, the second wheel arrangement is retained at a predetermined angle, facilitating the main portion of the patient support assembly to be supported in a substantially horizontal configuration when the patient support apparatus is located on stairs.

15) The patient transport apparatus according to claim **13** or **14**, further comprising a stabiliser wheel arrangement extending in a direction of the second portion of the patient support assembly.

16) The patient transport apparatus according to claim **15**, wherein a connecting member extends between the second wheel arrangement and the stabiliser wheel arrangement for releasably locking the second wheel arrangement and the stabiliser wheel arrangement together.

17) The patient transport apparatus according to claim **16**, wherein the connecting member is pivotably fixed to the second wheel subframe.

18) The patient transport apparatus according to any one of claims **4** to **17**, wherein the first stair engagement device comprises a first contact surface for operatively engaging an edge of a stair, the first contact surface formed by one of an endless belt, and an endless track, extending around first and second pulleys.

19) The patient transport apparatus according to any one of claims **4** to **18**, further comprising a second stair engagement device.

20) The patient transport apparatus according to any one of the preceding claims, being configurable in a fourth configuration, in which the second portion of the patient support assembly is pivoted upward relative to the main portion of the patient support assembly, while the first portion of the patient support assembly is provided substantially aligned with the main portion of the patient support assembly or pivoted slightly upward relative to the main portion of the patient support assembly, operatively to support a patient in a Fowler's position.

21) The patient transport apparatus according to any one of the preceding claims, wherein each of the first and second wheel arrangements are independently displaceable relative to the patient support assembly, between a folded configuration and an unfolded configuration.

22) The patient transport apparatus according to any one of the preceding claims, wherein each of the first and second wheel arrangements are pivotably fixed to the main portion of the patient support assembly.

23) The patient transport apparatus according to any one of the preceding claims, wherein the first wheel arrangement comprises a locking arrangement for locking a position of the first wheel arrangement relative to the main portion of the patient support assembly.

24) The patient transport apparatus according to any one of the preceding claims, wherein each of the first and second portions of the patient support assembly comprises a respective locking arrangement for locking a position of the first and second portions relative to the main portion of the patient support assembly.

25) The patient transport apparatus according to any one of the preceding claims, wherein the first portion of the patient support assembly is pivotably displaceable from about 80 degrees below a level of the main portion of the patient support assembly, to about 15 degrees above the level of the patient support assembly.

26) The patient transport apparatus according to any one of the preceding claims, wherein the second portion of the patient support assembly is pivotably displaceable from a level of the main portion of the patient support assembly, to about 90 degrees above the level of the patient support assembly.

27) The patient transport apparatus according to any one of the preceding claims, wherein the second portion of the patient support assembly is locked at about 65 degrees above a level of the main portion of the patient support assembly and wherein the first portion is pivoted downward between 65 and 80 degrees relative to the main portion when the patient transport apparatus is configured in the third configuration.

28) The patient transport apparatus according to any one of the preceding claims, wherein the first portion is pivoted downward by between 65 and 80 degrees relative to a level of the main portion of the patient support assembly, and the second portion is pivoted upward by between 65 degrees and 90 degrees relative to the level of the main portion of the patient support assembly, when the patient transport apparatus is configured in the second configuration.

29) The patient transport apparatus according to claim **23**, wherein the first wheel arrangement, when locked in position by the respective locking arrangement, is locked at an angle of between 60 and 80 degrees relative to a surface on which the apparatus is supported, and wherein the second wheel arrangement, is locked at an angle of between 60 and 80 degrees relative the surface on which the apparatus is supported.

30) The patient transport apparatus according to any one of the preceding claims, wherein the patient transport apparatus is configured as an emergency medical services (EMS) transport apparatus.

31) The patient transport apparatus according to claim **30**, further comprising at least a first patient securing device, for securing the patient relative to the patient support assembly.

32) The transport apparatus according to claim **31**, wherein the first patient securing device comprises a first belt, in use, extending over a mid-section of a body of the patient, thereby securing the patient to the main portion of the patient support assembly and wherein a position of the first belt is adjustable relative to the patient support assembly.

33) The transport apparatus according to any one of claims **30** to **32**, further comprising a second and third patient securing device, in the form of a second and third belt, in use extending over a lower portion of the body of the patient to secure the patient relative to the first portion of the patient support assembly, and a torso of the patient to secure the patient relative to the second portion of the patient support assembly, respectively.

34) The transport apparatus according to any one of claims **30** to **33**, further comprising a first and second adjustable arm rest, which are lockable in an upright position relative to the main portion of the patient support assembly.

35) The transport apparatus according to any one of claims **30** to **34**, further comprising an oxygen tank storage mechanism, and an intravenous hook.

36) The transport apparatus according to any one of the preceding claims, further comprising a footrest formed as part of the first portion of the patient support assembly, having an integral handle for manoeuvring the patient transport apparatus in use, and a push handle formed as part of the second portion of the patient support assembly.

37) The transport apparatus according to any one of the preceding claims, wherein the main portion and first and second portions of the patient support assembly comprise a main support subframe, first support subframe and second subframe respectively, each subframe including a covering of one of high-density foam with a metal support plate and/or a moulded plastic portion.

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