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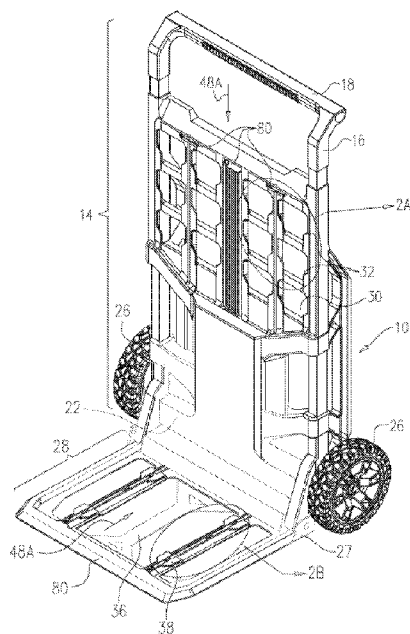


Fig. 1A

(57) Abstract: The present disclosure concerns a hand truck comprising a frame (14) having a first end, and a second end (22) configured with a wheel set (26, 26), and a ledge (28) extending at said second end (22), wherein one or both of the frame and the ledge is configured with an articulation arrangement for detachably attaching thereto a utility unit, the articulation arrangement extending parallel to a plane of the respective frame or ledge.



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HAND TRUCK

TECHNOLOGICAL FIELD

The present disclosure concerns a hand truck. More particularly it is directed to a specialty hand truck configured for articulating different utility units thereto.

BACKGROUND ART

References considered to be relevant as background to the presently disclosed subject matter are listed below:

- US 7,044,484
- US 8,454,033
- WO 2017/191628
- US 10,106,180

Acknowledgement of the above references herein is not to be inferred as meaning that these are in any way relevant to the patentability of the presently disclosed subject matter.

BACKGROUND

Hand trucks are well known in the art. These can be generally categorized into several categories, depending on the nature of load they are expected to transfer. One type of hand trucks is the so-called *L-shaped hand truck*, comprising a frame with one or more handles at one end, and wheels on the other end, and a short nose-plate (also referred to as a *toe-plate* or a *ledge*) configured for supporting a load underneath. L-shaped hand trucks are available also in several foldable versions, wherein the wheels and/or the ledge are foldable. Another type of hand trucks is the so-called *convertible hand truck*, convertible between at least an upright position and a horizontal position, with two or four wheels, suited for handling respective large/heavy loads. Other types of

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hand trucks are referred to as *specialty hand trucks*, and are typically designed with special load engaging arrangements (e.g. a barrel grip, a fork nose and the like).

Often, the terms *hand trucks* and *dollies* are interchangeably used. A load dolly is a flat, typically rectangular, wheeled platform, with a frame-shaped handle extending from the platform, the handle typically being foldable over the platform.

In spite of some differences between load-dollies and hand trucks, the term *hand truck*, as used herein, refers collectively to any type of load moving handcart.

US 7,044,484 discloses a foldable hand truck comprising a folding anchor structure, a frame, a loading board, a wheel set and a handle, the loading board and the wheel set being driven simultaneously by a gear set to be folded on two sides of the frame, the handle being extendable and retractable on the frame; wherein the folding anchor structure mounted to an end portion of the handle, the folding anchor structure includes a latch lever to latch the loading board on one side of the frame in a folded and shrunk condition when the handle is retracted and to release the loading board in response to the handle being extended, wherein the latch lever of the folding anchor structure includes latches which are located at opposed sides of the handle and which engage opposed sides of a front end of the loading board

US 8,454,033 relates to a handcart composed of a main frame, four wheels properly assembled with a frame rod of the main frame, a grip, two positioning sleeves combined movably with the grip, and two joint assemblies installed between the main frame and the grip for changeably connecting the main frame with the grip. The grip together with the positioning sleeves can be aligned flat or become 90° relative to the main frame by means of the joint assemblies. Then the handcart can be transformed into a two-wheel handcart or a four-wheel one by handling the grip through movement of the pivotal bases of the joint assemblies.

WO 2017/191628 concerns a coupling mechanism for detachably attaching two or more utility modules to one another, utility assemblies, mobile carriers and other attachable modules and articles.

US 10,106,180 describes a transportable container that includes a container portion with an opening into an interior space; a lid for closing the opening; a handle for carrying the container; and a pivotable side latch, pivotally connected to the lid, moveable between a retaining position and a storage position. The pivotable side latch is configured to engage a retaining structure of another container when the pivotable

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side latch is in the retaining position, and configured to be in a depression of the lid when the pivotable side latch is in the storage position. With the container in an upright position, the pivotable side latch moves toward the depression when the pivotable side latch is released from the retaining position.

GENERAL DESCRIPTION

According to the present disclosure there is provided a hand truck comprising a frame, having a first end and a second end configured with a wheel set, and a ledge extending at said second end, wherein one or both of the frame and the ledge is configured with an articulation arrangement for detachably attaching thereto a utility unit, the articulation arrangement extending parallel to a plane of the respective frame or ledge.

As noted above, the term *hand truck*, as used herein, refers collectively to any type of load moving hand truck.

The term *utility unit* as used herein denotes any article of utility, either stationary or mobile, having a utility and being detachably attachable to other utility units. A utility unit according to the present disclosure can be, by way of example, any type of container, drawer shed, work surface, locomotion system, mounting system, and the like.

The term *ledge* as used herein denotes any sort of load bearing member of the hand truck, including flat or shaped plates, fork-type load bearing elements, and the like.

In a particular configuration of this disclosure, attaching a utility unit to the articulation arrangement takes place along a sliding path extending parallel to the plane of the respective frame or ledge

According to a specific configuration of the disclosure, the articulation arrangement is a male-female type coupling arrangement, wherein one or both of the frame and the ledge is configured with a male coupler or a female coupler and is configured for detachably attaching thereto a utility unit configured with the other one of a male coupler or a female coupler.

The articulation arrangement of each of the frame and the ledge defines a utility unit articulation face, and according to a particular configuration, the articulation

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arrangement comprises at least one male coupler at one of the articulation face and a face of the utility unit, and a female coupler at the other one of the articulation face and a face of the utility unit, said female coupler having a depressed locking location configured with at least one locking rib extending above a depressed plain and along a sliding path, and having an open edge facing in a first sense (i.e. a first direction); said male coupler having a projecting locking location disposed in register with said depressed locking location and configured with at least one locking tongue extending along said engaging sliding path at a second sense (i.e. a second direction), opposite to said first sense, and configured for arresting engagement at a space between said locking rib and depressed plain.

The hand truck, according to a particular example of the disclosure, can be an L-shaped cart.

According to a specific example, the ledge can be pivotable between a first position at which it extends substantially normal to the frame and is configured for bearing loads, and a collapsed position at which it extends substantially against the frame at a stowed position.

The hand truck can comprise a secondary frame articulated to an opposite end of the ledge, said secondary frame can be fixed or pivotable with respect to the ledge.

Any one or more of the following features designs and configurations can be applied to a hand truck according to the present disclosures, independently or in various combinations thereof:

- The coupling arrangement can be a set of couplers or a unitary coupling;
- The coupling arrangement can be disposed on either or both of a front face and a rear face of the frame;
- The coupling arrangement can be disposed on either or both faces of the ledge;
- The coupling arrangement can be integral with the respective frame and ledge of the hand truck, or it can be integrated therewith;
- The female coupler can be configured at the top face of the articulation face, and the male coupler can be configured at the bottom face of the utility unit;
- The at least one locking rib can extend substantially parallel to the sliding path;
- The at least one locking rib can extend substantially perpendicular and intersect the sliding path;

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- The female coupler can comprise a single locking rib extending at rear end of the depressed locking location and substantially perpendicular to the sliding path;
- The female coupler can comprise two locking ribs extending at side edges of the depressed locking location and disposed substantially parallel to the sliding path;
- The female coupler can comprise two locking ribs each extending at a respective side edge of two neighboring depressed locking locations, said locking ribs disposed substantially parallel to the sliding path;
- The coupling arrangement can be configured such that engaging the utility unit with the articulation face of the hand truck is facilitated by sliding the utility unit with respect to the utility unit articulation face along a sliding path defined by at least one of said at least one locking rib and said at least one locking tongue;
- The coupling arrangement can be configured for snap-type locking of a utility unit over the a utility unit articulation face;
- The coupling arrangement can further comprise a locking mechanism for preventing unintentional separation of the utility unit from the articulation face, while they are interlocked;
- The locking mechanism can comprise at one of a top face of the articulation face and a bottom face of the utility unit a locking latch arresting location, and the other one of said top face of the articulation face and a bottom face of the utility unit can comprise a locking member displaceable and disposed in register with said locking latch arresting location, wherein at a locked position the locking member is arrested by the corresponding locking latch arresting location, and further wherein disengaging the utility unit from the hand truck is facilitated by disengaging the at least one locking latch from the at least one locking latch arresting location;
- The locking mechanism of the coupling arrangement can further comprise a release latch for displacing the locking latch into disengagement from the locking latch arresting location;
- The locking mechanism of the coupling arrangement can be spring biased and configured for normally projecting from a face of the utility unit.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to better understand the subject matter that is disclosed herein and to exemplify how it may be carried out in practice, embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Fig. 1A illustrates an L-shaped hand truck, according to an example of the disclosure, the hand truck at an upright, deployed position;

Fig. 1B illustrates the hand truck of Fig. 1A, at a folded position;

Fig. 2A is an enlarged view of the portion marked 2A in Fig. 1A, directed to a coupling arrangement;

Fig. 2B is an enlarged view of the portion marked 2B in Fig. 1A, directed to a coupling arrangement;

Fig. 3A is a perspective bottom view of a utility unit, namely a container, configured for articulation to the hand truck according to the disclosure;

Fig. 3B is an enlarged view of the portion marked 3B in Fig. 3A, directed to an interlocking coupling arrangement of the container of Fig. 3A;

Fig. 3C is an opposite view of the coupling arrangement of Fig. 3B;

Figs. 4A and **4B** are locally sectioned views along line 4D – 4D in Fig. 6A, illustrating consecutive steps of interlocking a utility unit container to the hand truck, by a articulation arrangement according to the disclosure;

Figs. 5A and **5B** are locally sectioned views along line 5D – 5D in Fig. 6A, illustrating consecutive steps of locking a utility unit container to the hand truck, according to the disclosure;

Figs. 6A to **6D** are examples of utility units articulated to a hand truck, according to the disclosure; and

Figs 7A and **7B** are directed to a convertible hand truck according to yet an example of the present disclosure, at an L-shape configuration and at a dolly configuration, respectively.

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DETAILED DESCRIPTION OF EMBODIMENTS

Attention is first directed to Figs. 1A and 1B of the drawings, directed to a hand truck according to an example of the disclosure, generally designated **10**. The hand truck **10** is a so-called "L-shaped hand truck", generally comprising an upright frame member **14** extending between a first, free end **16** comprising a bar-handle **18**, and a second, bottom end **22**, configured with a set of wheels **26**. Pivotally articulated at **27** to the second end **22** there is a ledge **28**, displaceable between a deployed position (Fig. 1A) where it is disposed at substantially right angle with respect to the frame **14**, and a folded/collapsed/stowed position (Fig. 1B) at which the ledge **28** is disposed substantially parallel to the frame **14** and bears against it.

As for the set of wheels **26**, it is noted that other locomotion arrangements can be utilized, such as triangularly disposed stair-climbing wheel sets, locomoting belt, and the like. The ledge **28** is exemplified herein as a flat planar load bearing member, however it is appreciated that a ledge can assume different configurations of load bearing elements, such as flat or shaped plates, fork-type load bearing elements, and the like.

In the illustrated example, the frame **14** is configured at a front face **30** thereof with an array of articulation arrangements **32** seen in greater detail in Fig. 2A, and the ledge **28** is configured at a top face **36** thereof with an array of articulation arrangements **38**, seen in greater detail in Fig. 2B.

The front face **30** of the frame **14** and the top face **36** of the ledge **28** constitute, each, a utility unit articulation face. However, it is appreciated that according to other configurations (not shown), the rear face of the frame member and the bottom face of the ledge can as well be configured with articulation arrangements.

A particular example of an articulation arrangement is illustrated in the annexed drawings, though it should be appreciated that other articulation mechanisms can be used as well, however without departing from the scope of the disclosure.

With particular reference to Figs. 2A and 2B, the articulation arrangement **32** and **38** of the frame **14** and the ledge **28**, respectively, are exemplified, where the female articulation elements of the frame **14** are indexed (*) and female articulation elements of the ledge **28** are indexed (**). The female articulation elements comprise a set of female coupling/articulation couplers **40**, each comprising a depressed locking location **42** configured with at least one locking rib **44** extending above the depressed plain **46** and

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along a sliding path **48** (which is the orientation at which a utility unit is displaced during articulation, wherein **48A** is the locking direction and **48B** is the unlocking direction), and having an open edge **52** facing in a first sense along the sliding path **48**. As can be seen, the sliding path **48** is parallel to a plane defined by the frame **14** or the ledge **28**; thus, wherein attaching and detaching a utility unit to the articulation arrangement takes place along the sliding path, to the plane of the respective frame or ledge.

The container **60** of Fig. 3A exemplifies a utility unit, having a bottom face **62** facilitating a utility unit articulation face and configured with several (four in the illustrated example) male couplers **66**, seen at larger scale in Figs. 3B and 3C.

It is appreciated that the container **60** is a mere example of a utility unit, which can be any article of utility, either stationary or mobile, having a utility and being detachable attachable to other utility units. A utility unit according to the present disclosure can be, by way of example, any type of container, drawer shed, work surface, locomotion system, mounting system, and the like.

The male couplers extend in register with the female couplers **40** of the hand truck (of both the frame and the ledge), as far as shape, size and positioning, whereby the utility unit, namely container **60**, can be articulated to the hand truck at any location thereof. Each male coupler **66** comprises a projecting locking location **68** disposed in register with said depressed locking location **42** of a female coupler **40**, and is configured with at least one locking tongue **72** (two in the example, one at each side of the locking location **68**, i.e. facing away from one another), laterally extending along said engaging sliding path **48** (at a second, sense, opposite to said first sense), and configured for arresting engagement at a space between said locking rib **44** and depressed plain **46**.

Further noted, the utility unit articulation face of the hand truck (frame/and or ledge) is configured with at least one locking latch arresting location, i.e. recesses **80**, and the utility unit (container **60**) is configured with a locking member **82** spring biased (by spring **86**) to project from the bottom face **62** of the container **60**, and being manually displaceable by a manipulating grip **87** through an aperture **89**, between the normally projecting position (Figs. 3A, 4A, 4B and 5B) and a pressed position (Fig. 5A), such that when in a locked position, as described below, said locking member **82** is disposed in register with at least one of the locking latch arresting locations **80**.

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When it is required to detachably attach a utility unit to the hand truck, the former is placed over the later (Figs. 4A and 5A), placing the projecting locking portions **68** within the depressed locking location **38** with the locking tongues **72** slidably engaging below and being gradually arrested by the respective locking ribs **44** until complete arresting is obtained (Fig. 4B). At the fully engaged locked position (Fig. 4B) each locking rib **44** is disposed between the respective locking tongue **72** and the bottom face of the **62** of the utility unit (container **60**), however bearing flush against at least a portion of the top surface of the locking tongues **72**. Simultaneously, as the locking tongues **72** arrest by the locking ribs **44**, the locking latch **82** of the utility unit (container **60**) slides into the locking latch arresting location (recess **80**) and finally snaps into locking engagement therewith. It is noted the locking latch **82** is configured with a chamfered nose **91** whereby upon sliding displacement of the utility unit along the sliding path **48A** it first glides over a guiding ramp surface **93** of the hand truck, displacing it upwards against the biasing effect of spring **86** (in direction of arrow **95** in Fig. 5A), whereby when the utility unit **60** reaches the final locking position over the respective articulation face of the hand truck, the locking latch **82** plunges into arresting position within the recess **80**.

At the locked position, utility unit **60** is attached over the articulation face of the frame or ledge of the hand truck, respectively, such that they can be moved as an integrated unit. Detaching of a utility unit **60** from a hand truck **10** is easily facilitated by unlocking, obtained by displacing the locking latch **82** upwards against the biasing effect of spring **86**, whereby the utility unit **60** can be slidably displaced along path **48B**, and detached.

The male/female articulation arrangement disclosed herein above is an example, and is understood that other coupling arrangements can be utilized, such as, for example, a bayonet coupling arrangement, however bearing in mind that the coupling arrangement should offer a fast and reliable attaching/detaching arrangement between the utility unit and the hand truck. Furthermore, the male and female couplers can be disposed over one or both of the utility unit and hand truck. It is further appreciated that the coupling arrangement can be facilitated on either or both of the respective sides of the frame and ledge of the hand truck. Even more so, the articulation arrangements **32** and **38** of the frame **14** and the ledge **28**, respectively, can be an integral part of the hand

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truck, or can be an interconnecting articulation platform fixedly or detachably attached to the frame and ledge, respectively.

With further attention being made to Figs. 6A to 6E, illustrating various articulation configurations with respect to the hand truck **10**, as discussed herein. In Fig. **6A** the hand truck is illustrated with a first utility unit (container **60**) articulated over the ledge **28**, as exemplified hereinabove, with a second utility unit (container **100**) articulated over the first utility unit **60**, utilizing the same male/female coupling arrangement (i.e. the second utility unit **100** could just as well be articulated directly to the hand truck). A third utility unit **102**, in the form of an open crate, is likewise articulated over the second utility unit **100**, where articulation is facilitated through a side wall of the utility unit (crate **102**). When transferring the hand truck **10** the three utility units are securely attached thereover as a unit, however readily detachable from one another.

In Fig. 6B a free load (three cement bags **106**) is placed over the ledge **28** (these can be secured by a bungee cord or the like, not shown), with the open crate **102** articulated to the frame **14**.

In Fig. 6C a first utility unit (container **60A**) is articulated over the ledge **28** of the hand truck **10**, with two similar containers **60B** and **60C** stacked and articulated on top of one another. Yet another container **100** is articulated over the container **60C** and an open crate **102** is articulated to the frame **14**.

The arrangement illustrated in Fig. 6D presents the hand truck **10** fitted with a first container **60A** articulated over the ledge **28**, and a second container **100** articulated in turn over the first container **60A**. A small container **108** is articulated at its base to the frame **14**, and two boxes **110A** and **110B** are also articulated to the frame **14** through their respective bases. Thus, it is noted that the coupling arrangement offers readily articulation also of utility units having a smaller or larger footprint than the respective articulation portion of the hand truck.

Turning now to Figs. 7A and 7B there is illustrated a hand truck according to a different design, being a modular hand truck, convertible between several configurations. For example, the hand truck **120** has a frame configured with base portion **122** and top portion **124**, articulated to one another by a joint coupler **126** facilitating converting the hand truck between an L-shaped cart (Fig. 7A), and a four-wheeled dolly like hand truck (Fig. 7B). At the L-shaped configuration only one pair of

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wheels **130** is required, whilst at the dolly like configuration an additional set of wheels **132** is added (or deployed from a stowed position). The ledge **136** pivotally extends at the bottom, wheeled end **138** of the base portion **122** of the frame.

It is seen that each of the of the ledge **136** and the two frame portions **122** and **124** is configured with a coupling arrangement **140A**, **140B** and **140C**, respectively, each similar to the coupling arrangement disclosed hereinabove in connection with the previous example. The arrangement being such that one or more utility units can be detachably attached at any one or more articulation locations of the convertible hand truck **120**, at any of its configurations.

CLAIMS:

1. A hand truck comprising a frame having a first end, and a second end configured with a wheel set, and a ledge extending at said second end, wherein one or both of the frame and the ledge is configured with an articulation arrangement for detachably attaching thereto a utility unit, the articulation arrangement extending parallel to a plane of the respective frame or ledge.
2. The hand truck of claim 1, wherein attaching a utility unit to the articulation arrangement takes place along a sliding path extending parallel to the plane of the respective frame or ledge.
3. The hand truck of claim 1 or 2, wherein the articulation arrangement is a male-female type coupling arrangement, and wherein one or both of the frame and the ledge is configured with a male coupler or a female coupler and is configured for detachably attaching thereto a utility unit configured with the other one of a male coupler or a female coupler.
4. The hand truck of claim 2 or 3, wherein a utility unit articulation face of the hand truck comprises at least one male coupler at one of the articulation face and a face of the utility unit, and a female coupler at the other one of the articulation face and a face of the utility unit, said female coupler having a depressed locking location configured with at least one locking rib extending above a depressed plain and along a sliding path, and having an open edge facing in a first sense; said male coupler having a projecting locking location disposed in register with said depressed locking location and configured with at least one locking tongue extending along an engaging sliding path at a second sense, opposite to said first sense, and configured for arresting engagement at a space between said locking rib and depressed plain.
5. The hand truck of claim 4, wherein the at least one locking rib extends substantially parallel to the sliding path.
6. The hand truck of claim 4, wherein the at least one locking rib extends substantially perpendicular and intersect the sliding path.
7. The hand truck of claim 4, wherein the female coupler comprises a single locking rib extending at rear end of the depressed locking location and substantially perpendicular to the sliding path.

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8. The hand truck of claim 4, wherein the female coupler comprises two locking ribs extending at side edges of the depressed locking location and disposed substantially parallel to the sliding path.
9. The hand truck of claim 4, wherein the female coupler comprises two locking ribs each extending at a respective side edge of two neighboring depressed locking locations, said locking ribs disposed substantially parallel to the sliding path.
10. The hand truck of claim 4, wherein the coupling arrangement is configured as a snap-type locking of a utility unit over the articulation face.
11. The hand truck of claim 1, being an L-shaped cart.
12. The hand truck of claim 11, wherein the ledge is pivotable between a first position at which it extends substantially normal to the frame and is configured for bearing loads, and a collapsed position at which it extends substantially against the frame at a stowed position.
13. The hand truck of claim 1, wherein the articulation arrangement is disposed on either or both of a front face and a rear face of the frame coupling arrangement is a set of couplers or a unitary coupling system.
14. The hand truck of claim 1, wherein the articulation arrangement is disposed on either or both of a front face and a rear face of the ledge.
15. The hand truck of claim 1, wherein the female coupler is configured at the top face of the articulation face.
16. The hand truck of claim 1, wherein the articulation arrangement further comprises a locking mechanism for preventing unintentional separation of the utility unit from the articulation face, while they are interlocked.
17. The hand truck of claim 16, wherein the locking mechanism comprises at one of a top face of the articulation face and a bottom face of the utility unit a locking latch arresting location, and the other one of said top face of the articulation face and a bottom face of the utility unit can comprise a locking member displaceable and disposed in register with said locking latch arresting location, wherein at a locked position the locking member is arrested by the corresponding locking latch arresting location, and further wherein disengaging the utility unit from the hand truck is facilitated by disengaging the locking latch from the locking latch arresting location.

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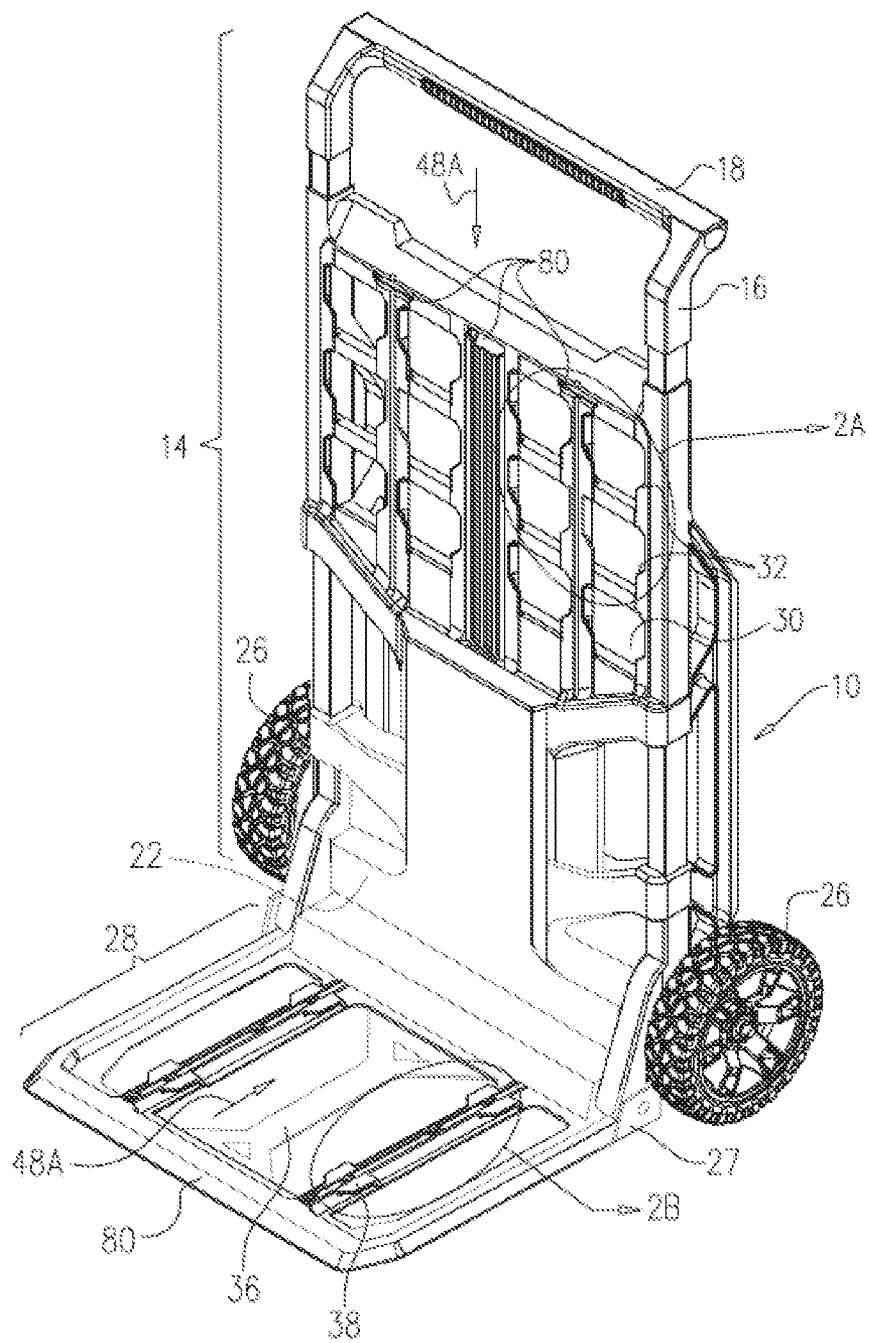


Fig. 1A

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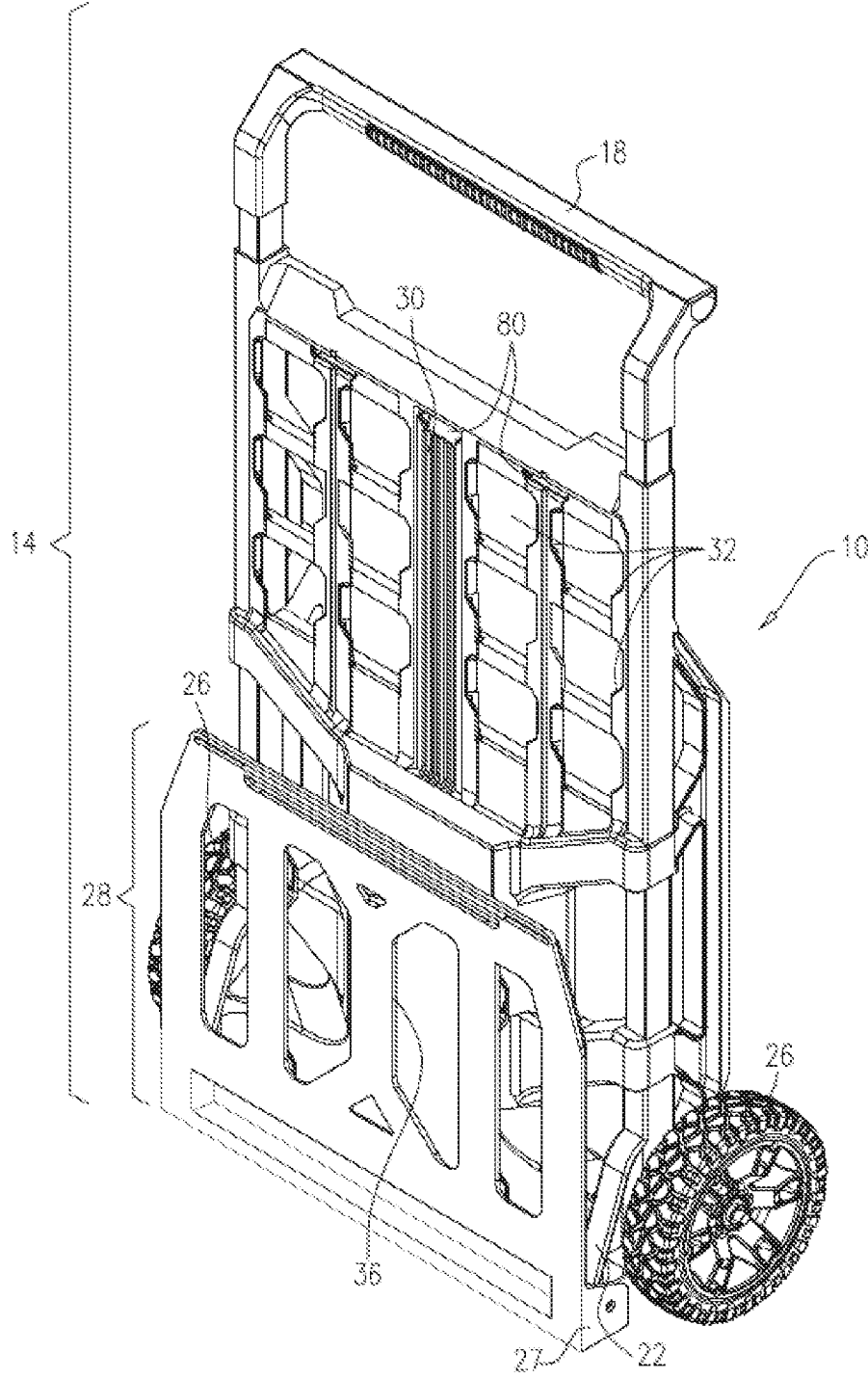
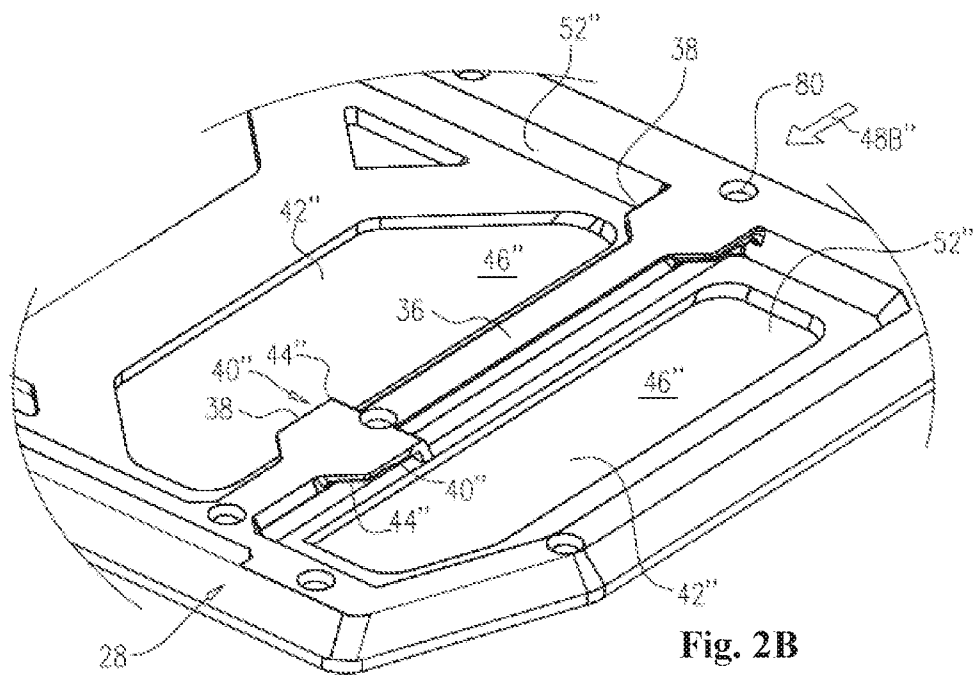
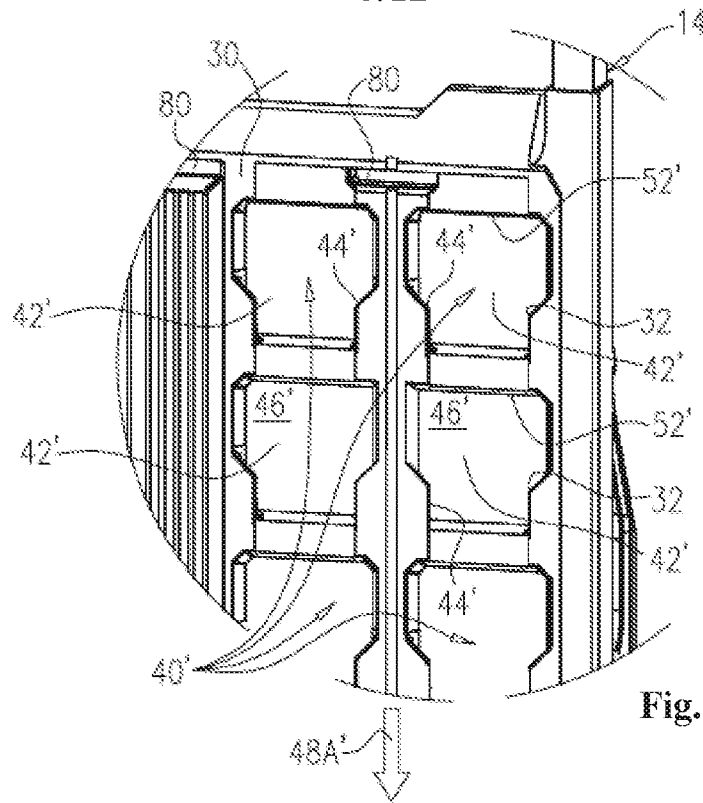


Fig. 1B

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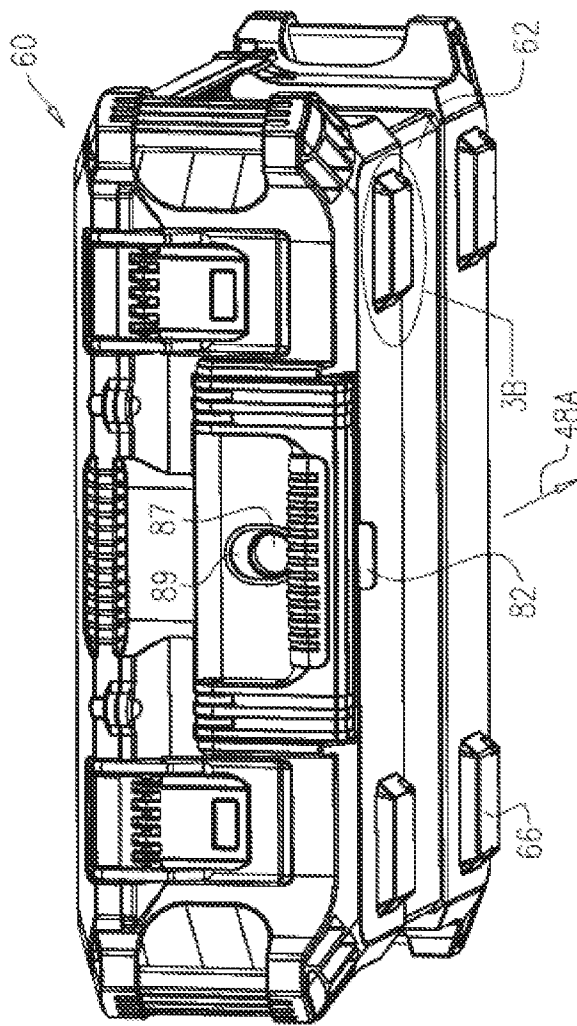


Fig. 3A

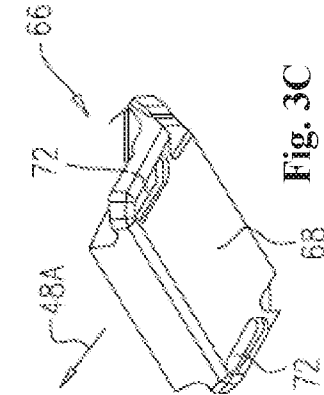


Fig. 3C

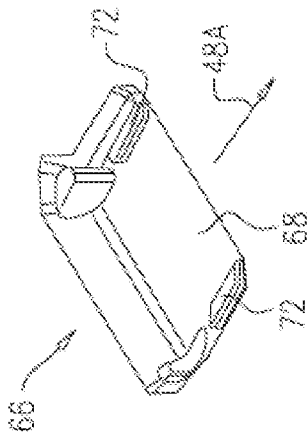


Fig. 3B

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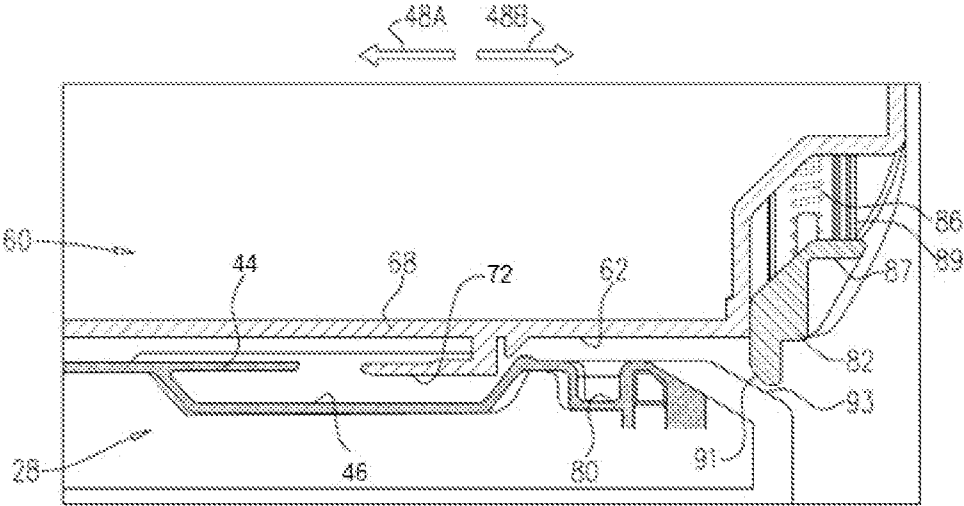


Fig. 4A

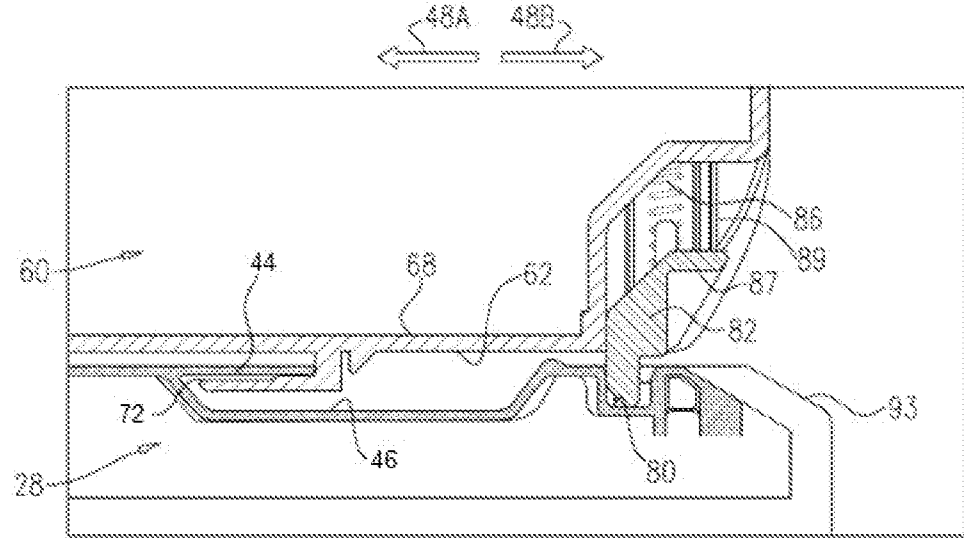


Fig. 4B

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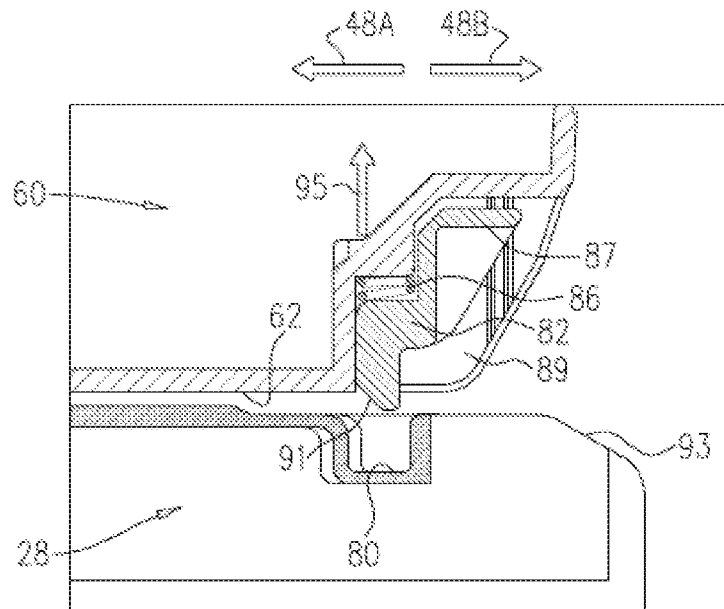


Fig. 5A

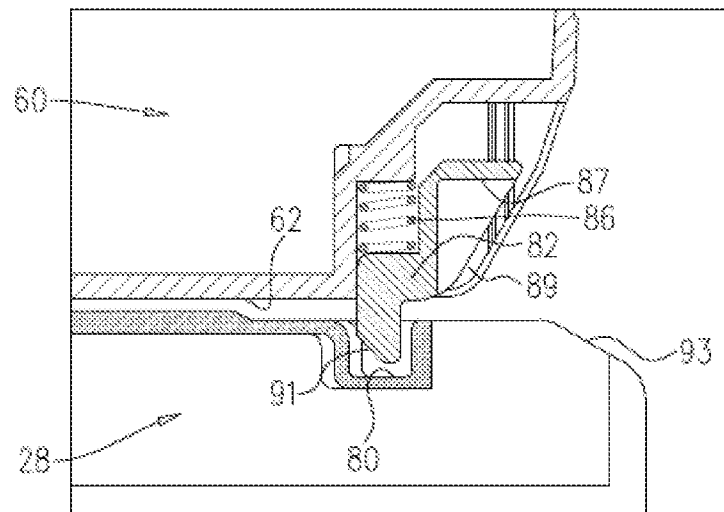


Fig. 5B

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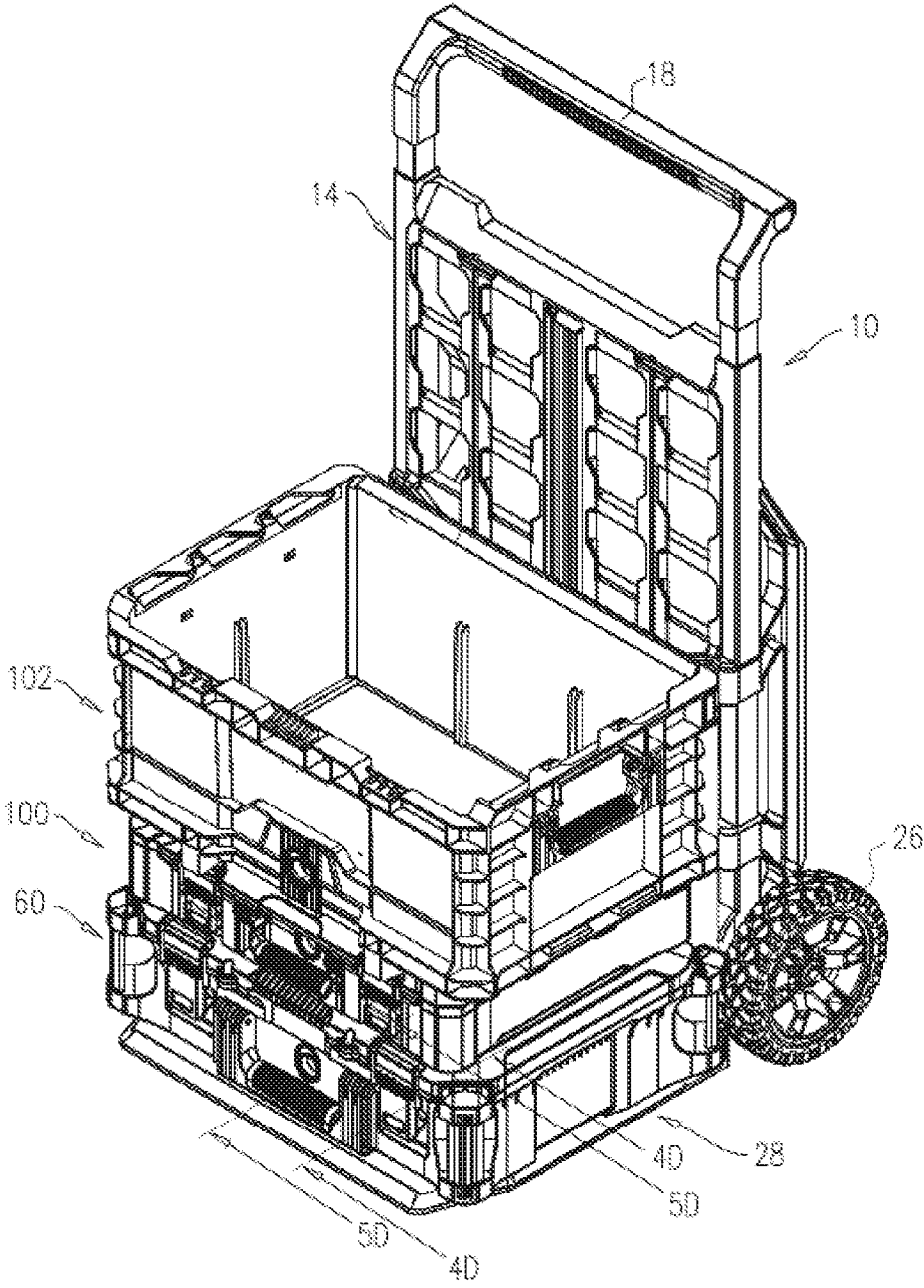


Fig. 6A

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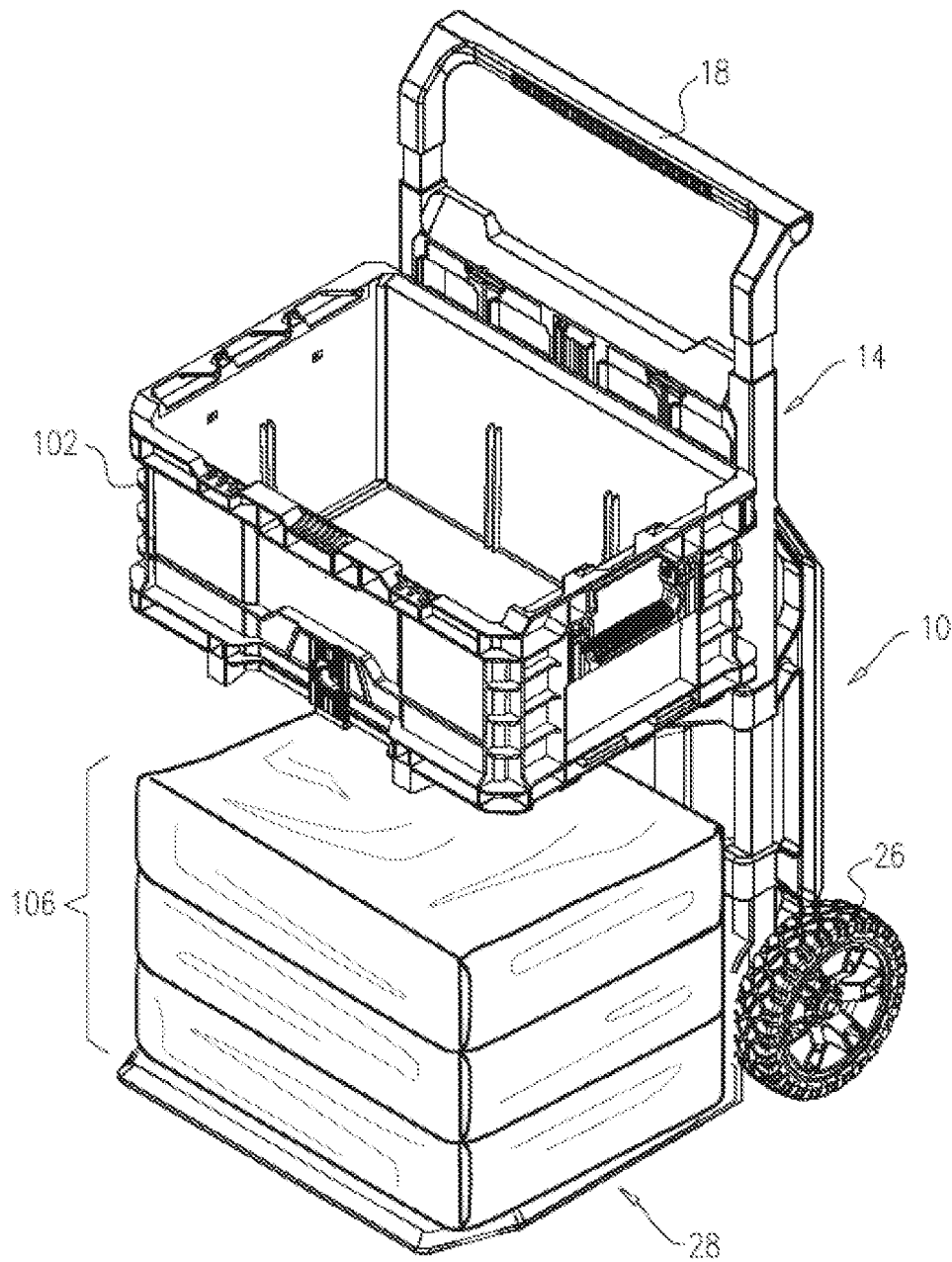


Fig. 6B

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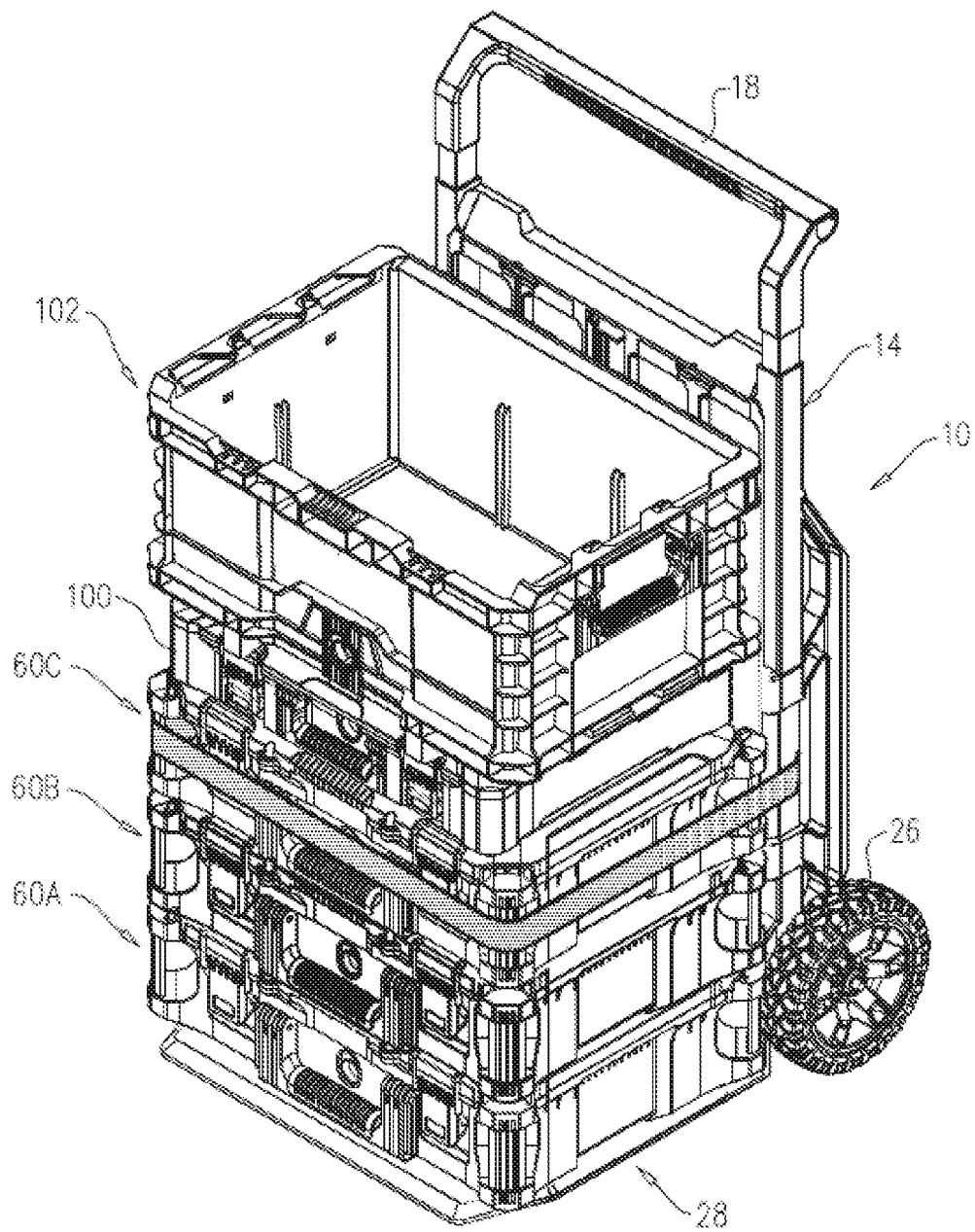


Fig. 6C

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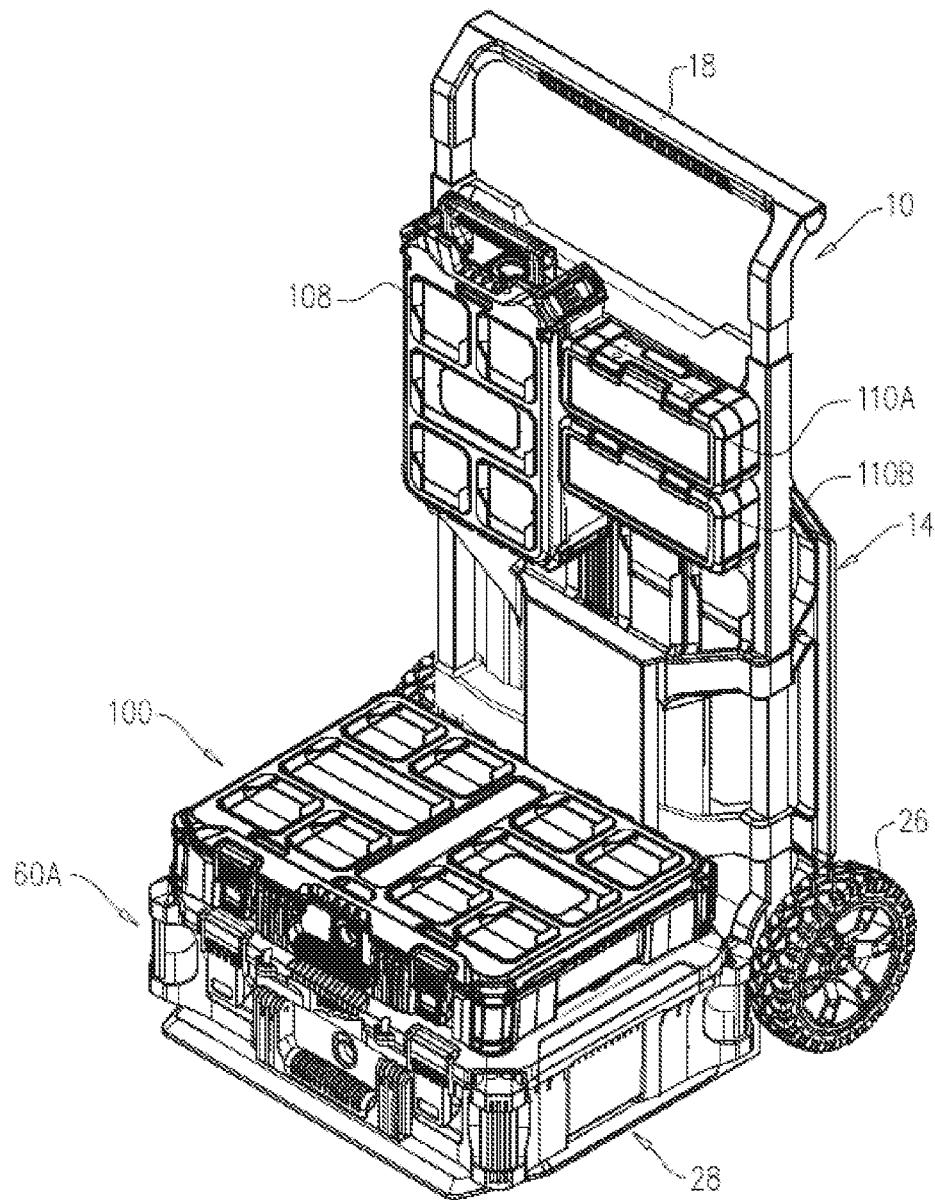


Fig. 6D

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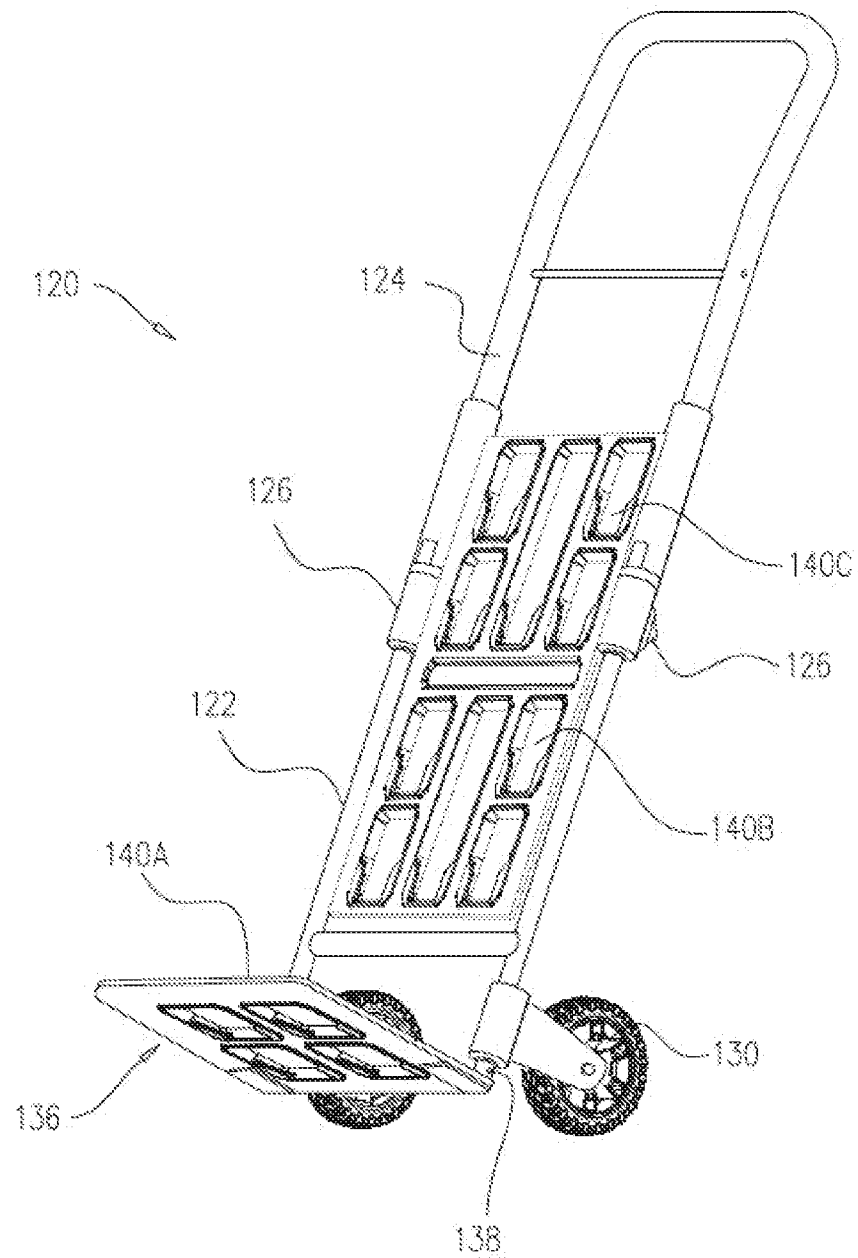


Fig. 7A

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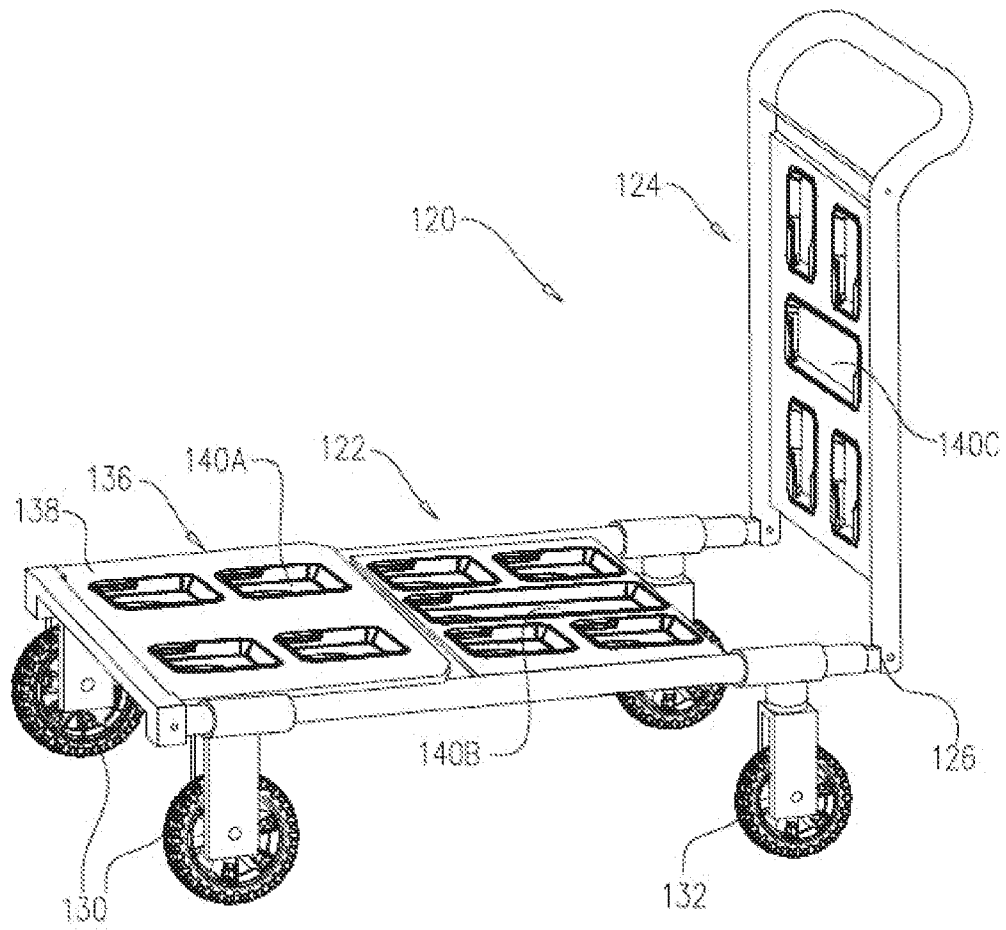


Fig. 7B

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2019/050689

A. CLASSIFICATION OF SUBJECT MATTER
INV. B62B1/14 B62B3/04
ADD.

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)
B62B

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

2 August 2019

Date of mailing of the international search report

23/08/2019

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Authorized officer

Jung, Wolfgang

INTERNATIONAL SEARCH REPORT

International application No

PCT/IL2019/050689

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	column 2, line 13 - column 5, line 10;	4,7,9
A	figures 1-11	5,8

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A	paragraph [0023] - paragraph [0029]; figures 1,2,4,5	4-10,14, 16,17

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A	paragraph [0027] - paragraph [0037]; figures 1-4,8	4-10,14, 16,17

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