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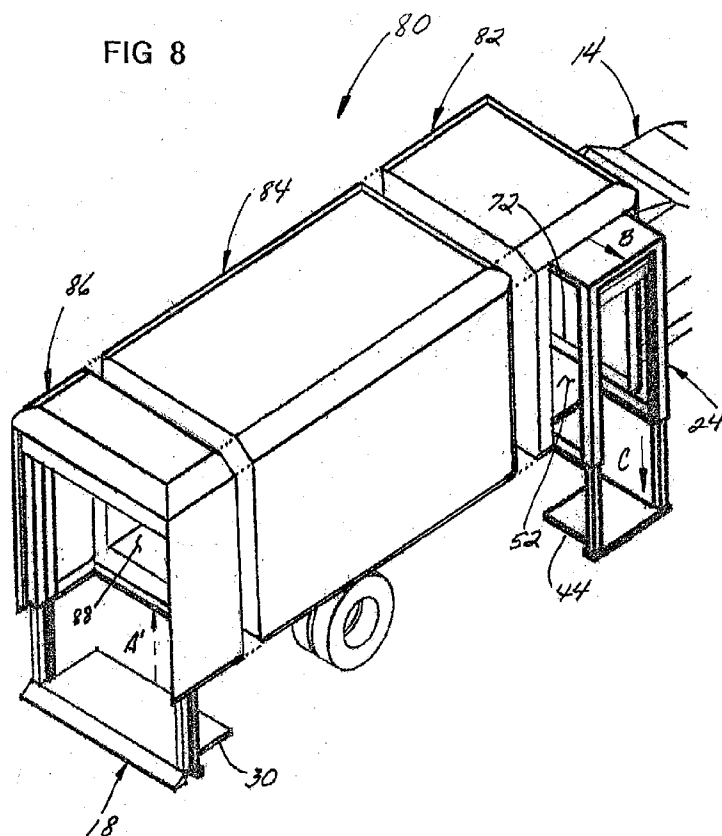
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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**Published:**  
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(54) Title: CARGO HANDLING APPARATUS



(57) Abstract: A goods handling apparatus for a cargo storage and transport vehicle includes a movable cargo platform continuous with a portion of cargo enclosure floor, when the cargo platform is in an upper position. Cargo may be slid between the trailer floor and the cargo platform. A vertical actuator raises and lowers the cargo platform between the upper position and a lower position atop the ground or other vehicle support surface whereupon cargo may be slid between the cargo platform and the ground or other positions. The cargo platform is disposed substantially within the plan perimeter of the floor of the cargo module during raising and lowering. A modular system may be integrated into the cargo enclosure or may be incorporated into a modular enclosure for appending to a cargo box of the prior art.

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## Cargo Handling Apparatus

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Appl. No. 11/981,345, filed October 31, 2007 with the United States Patent & Trademark Office, which is hereby incorporated by reference herein in its entirety. If any national office does not provide for incorporation by reference in its entirety, at least the additional subject matter not included in this application directly is incorporated by reference herein.

Field of the Invention

[0002] The field relates to delivery trucks with lifts to raise and lower cargo to and from an enclosure mounted on the chassis of a cargo truck.

Background

[0003] While lifts are known that extend off the back of a truck by folding down or by arcuately extending outward and down from the back of a truck. These lifts fail to provide for use when space behind a truck is limited, are bulky additions to the truck, and do not provide additional floor space while enclosing the lift components within the enclosure of the cargo area.

[0004] Typically, trailers and vehicles with a trailer or enclosure for hauling cargo are arranged to haul cargo within the trailer and atop a trailer floor. One such arrangement is found in a delivery truck which includes a vertically movable lift gate which swings down and extends rearwardly from the end of the trailer floor. Cargo is either loaded onto or off the rear lift gate and either elevated or lowered for pick up or delivery of the cargo. However, in inclement weather, the operator and the cargo may be exposed to rain or snow by being outside of the confines of the trailer. Moreover, extra room behind the trailer is required to accommodate the length of the lift gate and additional space to load and unload cargo therefrom.

[0005] A number of prior art systems have been developed which, in part, address this limiting aspect of the above delivery trucks. U.S. Patent 4,236,747 issued December 2, 1980 to Ratliff discloses a transport vehicle for medium-sized route delivery of goods. The versatile design allows for removability of the central partition in each cargo bay and adjustability of the position of the floor. A delivery truck body or trailer, which is convertible between being

arranged for side loading at ground level or rear loading at dock height, is disclosed in U.S. Patent 4,659,132 to Day.

[0006] Price teaches a double drop trailer with lifts therein in U.S. 5,092,721. A first lift comprises upper and lower platforms rigidly interconnected one to another, the second lift located in the rear section.

[0007] Three U.S. patents to Greenlaw, et al., U.S. 5,915,913, 6,328,525 and 6,474,446 teach delivery vehicles with multi-tier storage and elevator assemblies installed therein. Substantially continuous side access door provide total exterior access to the lowermost tier of cargo in the '525 patent, the '913 patent teaching elevator assemblies for multi-tier storage. The '446 patent teaches a framing system that reduces structural requirements of side walls and floors, permitting multiple side access ports and reduced floor thickness to permit easier access from the pavement.

[0008] Recently issued Patent 7,114,905 to Dibdin teaches methods and an apparatus for optimizing use of storage space in a trailer. The apparatus provides a loading apparatus for the trailer having a platform movable relative to the floor of the trailer to facilitate loading of goods.

[0009] Published application 2003/0147734 to Adams discloses a goods handling system for a vehicle or railway trailer which allows the level of access to all areas of the trailer to be improved.

[00010] None of the known lifts provide vertically movable cargo within the confines of a trailer enclosure. Additional space is required rearwardly of the trailer for most of the known systems. Additionally, movable side cargo-receiving lifts are capable of being used for floor space for hauling cargo.

#### BRIEF SUMMARY OF THE INVENTION

[00011] A goods handling apparatus for a cargo storage and transport trailer includes a movable cargo platform module forming a separate part of the trailer floor that may be continuous with the trailer floor when the cargo platform is in an upper position, and cargo may be slid between the trailer floor and the cargo platform or may remain on the platform during hauling of the cargo to a destination. A vertical actuator attached to the cargo platform raises and lowers the cargo platform between the upper position and a lower position atop the ground or other vehicle support surface or loading dock. Cargo may be slid or rolled off the platform

without lifting between the cargo platform and the ground or other surface. The cargo platform is positioned substantially within the plan perimeter of the floor of the trailer during lifting and lowering, allowing cargo to be loaded or off-loaded in tight confines not possible with known lifts.

[00012] A cargo handling apparatus may be incorporated into a conventional delivery trailer of a truck, which will lift and lower cargo within the confines of the trailer. In one example, the platform is confined to the perimeter of a module that may be modularly coupled with the truck. In one example, a modular lift extends from side of the truck allowing the lift to clear the chassis of the truck.

[00013] In one example, rear impact protection is provided by an integrated cross member that is capable of lowering and rising with the lift mechanism integrated into the rear of enclosure. In one advantage, goods handling apparatus may eliminate the need for additional working space behind or to the rear of the trailer of the vehicle by deploying and lifting a vertically movable cargo platform which is positioned within a rearward opening formed into the floor of the trailer floor and within the plan profile of the trailer (e.g. the perimeter of the enclosed area).

[00014] In one example, a goods handling apparatus which extends laterally from the side of a trailer only a distance sufficient for a cargo platform to move vertically just outboard of the frame of the trailer provides for raising and lowering within the perimeter of the goods handling apparatus module.

[00015] In one example, a lift module has the features recited in claim 1. In additional examples, a lift module and a cargo truck of the present invention may have the features recited in claims 2-16 appended hereto.

#### BRIEF DESCRIPTION OF THE FIGURES

[00016] Figure 1 is a perspective view of a vehicle showing two embodiments of the invention incorporated into the trailer assembly of the vehicle.

[00017] Figure 2 is a side elevation broken view of Figure 1.

[00018] Figure 3 is a top plan view of Figure 1.

[00019] Figure 4 is another view of Figure 1 showing both embodiments of the invention deployed.

[00020] Figure 5 is a broken side elevation view of Figure 4.

[00021] Figure 6 is a broken top plan view of Figure 4.

[00022] Figure 7 is a perspective exploded view of Figure 1.

[00023] Figure 8 is a perspective partially exploded view of two additional embodiments of the invention.

[00024] Figure 9 is a detailed view of an example of an actuator and underride protection.

[00025] Examples are illustrated in the drawings and are described herein. . It is intended that the embodiments and figures disclosed herein are to be considered to be illustrative rather than limiting.

### DETAILED DESCRIPTION OF THE INVENTION

[00026] Referring now to the drawings, an otherwise conventional delivery 10 vehicle is shown and includes a trailer assembly 12 and a truck 14. A trailer assembly 12 includes a trailer body 16 defining an enclosure above a trailer floor 28 and having a longitudinally extending frame 26 which may be formed as an integral part of the truck 14.

[00027] Two examples of integrated lift platforms 18, 24 are illustrated. The examples may be combined in one trailer 12 or may be used separately. In one example, a vertically movable cargo platform 30 is rectangular, but may be of any convenient shape or size and may have a tapered lip or ramp 32 along the rearwardly distal edge, for example. This example includes upright frame members 36 and 38 rigidly connected at each rearwardly corner of the platform 30 or at least within the enclosure when the platform is raised. Each are upwardly engaged into one of two elongated upright channels 40a and 42a of vertical actuators 40 and 42, respectively. These actuators 40 and 42 may be rigidly attached or affixed to an inner surface of the trailer 16 or an intermediate support in an upright orientation within the enclosure of the trailer 16.

[00028] The trailer floor 28 includes an opening 34 which may be formed in the distal rearward portion of the trailer floor 28. The opening substantially mates with and receives the platform 30 so that, when the platform 30 is in the upper position, top-most surface of the platform 30 is substantially continuous with and uninterrupted of the trailer floor 28 so that cargo within the trailer 16 may be slid onto or from the platform 30 without the need for lifting or use of a wheeled cart or hand truck, for example.

[00029] An overhead-type door 22, shown in the open position in Figures 4 and 7 and in

the closed position in Figure 1, may completely enclose the trailer 16, including all of the components of the cargo handling apparatus 18. During inclement weather, a movable door 22 may be left closed while the apparatus 18 is loaded with cargo and then moved downwardly by actuators 40 and 42 to the lowered position resting atop the ground or other vehicle support surface, that movement being in the direction of arrow A as illustrated in Figures 4 and 5. The door 22 may be opened a distance sufficient for removal of the cargo from the platform 30. Note importantly that, as best seen in the top plan view of Figures 3 and 6, the amount of rearwardly space required for loading and offloading of cargo from the trailer 16 is reduced compared to known lifts.

[00030] In one example, an underride mechanism 64 includes spaced upright frame members 66 and 68 which are coupled movably by elongated channels 40b and 42b, for example. The height and position rearwardly of the trailer 16 prevent other vehicles from sliding beneath the truck during an unintended rear-end collision with the vehicle 10. In one example, actuators 40 and 42 may be downwardly deploy the underride member 64 upon engagement with the platform 30, when the platform 30 is lowered, as disclosed in more detail in reference to Figure 9.

[00031] An example of a side loading lift 24 includes an additional feature of a movable cargo receiving module 24 having a module floor 52, an upright back panel 62, two vertical actuators 54 and 56 and an upper protective panel 60. The module 24 also includes a module floor 44 which, in the upper position, just closely fits within a modular floor cutout 50 so that the module platform 44 is continuous with and uninteruptive of the module floor 52.

[00032] To deploy this cargo module 24, a power track 70 connected within the trailer 16, in one example, is laterally oriented at approximately the trailer floor level. The power truck 70 will move the module 24 outwardly in the direction of arrow B, as best seen in Figure 6. When the module platform 44 clear the frame 26, the module platform 44 may be lowered in the direction of arrow C by actuators 54, 56 until the modular platform 44 comes to rest atop the ground or otherwise. Cargo loading and unloading onto or from the interior of the trailer 16 is facilitated as the module 24 may be installed anywhere along the length of the trailer and on either side for convenience or special delivery needs.

[00033] Referring now to Figure 8, a cargo truck 80 and includes one or more modular lifts 18, 24. A modular lift 18, 24 may be installed within a self-contained handling add-on

module 86, 82. Operation of each of the lifts 18 and 24 is as previously described. The modularity may be used for any cargo truck. Refrigerated cargo spaces may benefit from an interlock or curtain that reduces the amount of cooled air that escapes from the cargo enclosure during loading and off-loading.

[00034] While a number of exemplary aspects and embodiments have been discussed above, those of ordinary skill in the art will recognize certain modifications, permutations and additions and sub combinations thereof which are included within the scope of the present inventions, as claimed.

[00035] In one example, such as illustrated in Figures 7-9, rear impact protection is integrated with the lift mechanism. For example, a cross member 64 is coupled to a platform 30, which may be raised or lowered, by retractable members 66, 68. Both the retractable members 66, 68 and the platform 30 may be mounted to the cargo enclosure 12, 84 of the truck 10 by support members 40, 42. Each of the support members 40, 42 may include enclosed channels 40a, 40b, 42a, 42b. The enclosed channels are schematically illustrated in the exploded view of Figure 7, for example, and are illustrated with additional detail in Figure 9. A detailed view of two of the enclosed channels 40a, 40b for one of the support members 40 shows a spring biased coupling member 67 coupling the retractable member 66 to cross member 64. One or more limiting devices 69 may be provided to limit the maximum extent of the movement of the retractable member 66 in the upward and/or downward directions. As the platform 30 moves downward, the cross member 64 may remain stationary until the platform reaches the cross member 64. Then, the platform 30 and the cross member 64 may continue to move downward together. As the platform 30 is raised upwardly, the cross member 64 may be raised, also, until the retractable member 66 reaches the limit device 69, for example, which limit device 69 positions the cross member 64 at a height to provide for rear impact protection.

## Listing of Components

10. Cargo storing & transport vehicle
12. Trailer assembly
14. Truck
16. Trailer body
18. Cargo (goods) handling apparatus/lift
20. Trailer wheel
22. Rear door
24. Cargo handling apparatus/lift/receiving module
26. Longitudinal trailer frame
28. Trailer floor
30. Movable cargo platform
32. Ramp
34. Floor cutout
36. Upright frame member
38. Upright frame member
40. Vertical actuator
- 40a, b. Upright Channel
42. Vertical actuator
- 42a, b. Upright Channel
44. Module movable cargo platform
46. Upright frame
48. Upright frame
50. Module floor cutout
52. Module floor
54. Vertical actuator
56. Vertical actuator
58. Side door
60. Module top panel
62. Module back panel
64. Under ride member
66. Upright frame
68. Upright frame
70. Track
72. Track
80. Cargo storage and transport vehicle
82. Front cargo handling add-on module
84. Intermediate trailer section
86. Rear cargo handling add-on module
88. Trailer floor
- 90/92. Linear Actuator

WHAT IS CLAIMED IS

1. A lift module for use with a cargo truck having a cargo floor, the lift module comprising:

An enclosure module;

A movable cargo platform coupled to the enclosure module and restricted to movement upward and downward only within the perimeter of the enclosure module;

A linear actuator coupling the enclosure module to the movable cargo platform and contained entirely within the enclosure module when the movable cargo platform is raised to a position level with the cargo floor of the cargo truck.

2. The lift module of claim 1, wherein the linear actuator comprises a screw.

3. The lift module of claim 1, wherein the linear actuator comprises a rack and pinion.

4. The lift module of claim 1, wherein the linear actuator is an hydraulic actuator.

5. The lift module of claim 1, wherein the linear actuator is an electromechanical device.

6. The lift module of claim 1, further comprising: an underride member movably coupled to the movable cargo platform such that when the movable cargo platform is lowered, the underride member moves downward when engaged by the movable cargo platform.

7. The lift module of claim 6, further comprising a biasing mechanism coupled to the underride member such that when the cargo platform is raised, the underride member is raised by the biasing mechanism.

8. The lift module of claim 1, wherein the enclosure module has a portion that is extendable from a side of the truck such that the cargo platform is raised and lowered within the perimeter of the enclosure module when the portion of the enclosure module is extended from the side of the truck.

9. The lift module of claim 1, wherein the enclosure module is not extendable from the side of the truck.

10. The lift module of claim 9, wherein the movable cargo platform is substantially the same shape as a bottom opening of the enclosure module.

11. The lift module of claim 1, wherein the enclosure module includes a curtain dividing the enclosure module and a cargo box of the cargo truck.

12. The lift module of claim 11, wherein the curtain is comprised of polymer strips supported at one end by a top portion of the cargo box of the cargo truck or a top portion of the enclosure module.

13. A cargo truck comprising the lift module according to any of claims 1 to 12 coupled with a cargo box supported by the chassis of the cargo truck.

14. The cargo truck of claim 13, wherein the lift module is integrated with the cargo box.

15. The cargo truck according to claims 13 or 14, comprising a plurality of the lift modules.

16. The cargo truck according to claim 13, wherein the lift module is modularly attachable to the cargo box.

FIG 1

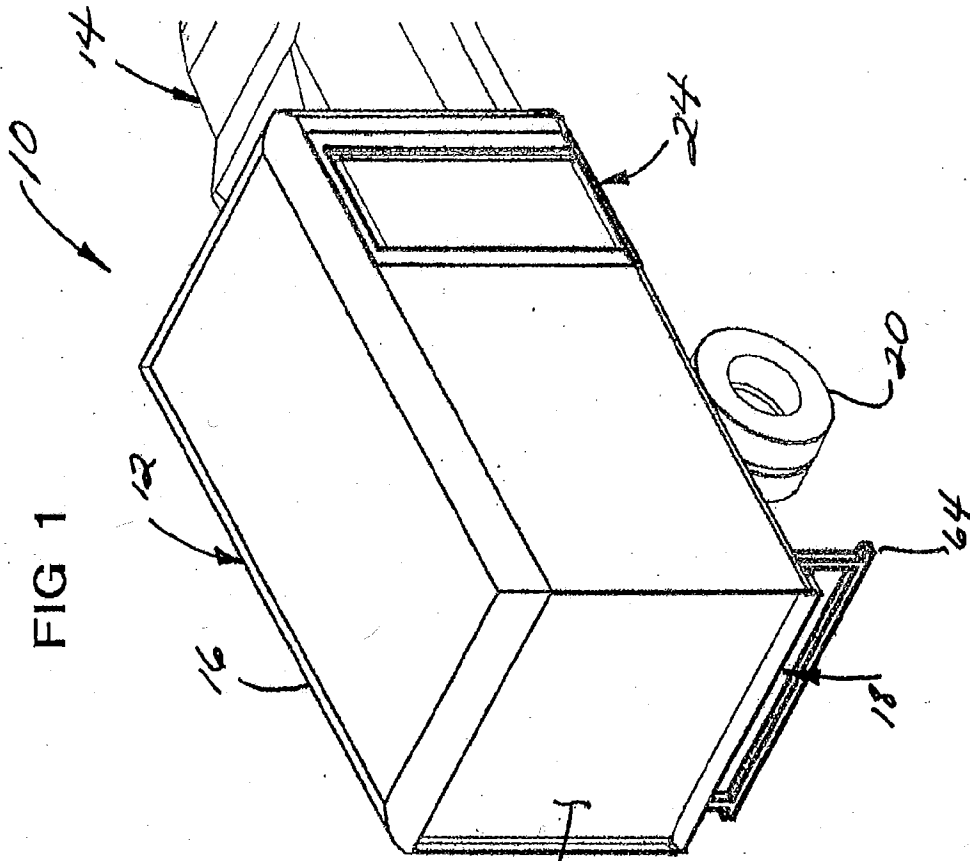


FIG 3

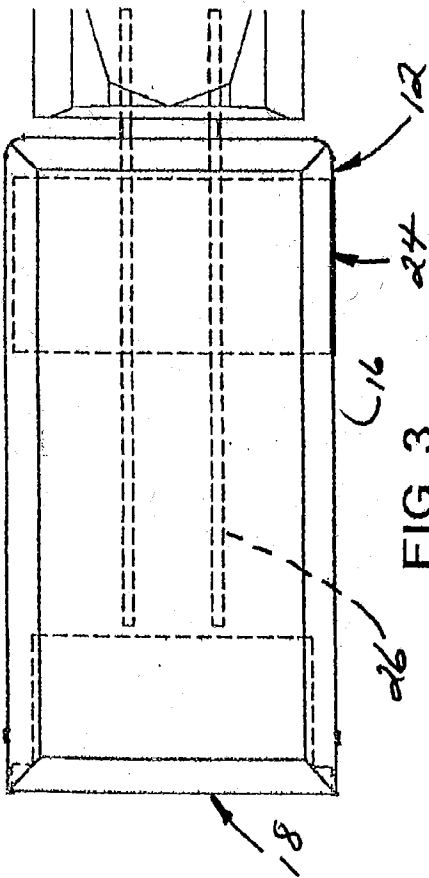
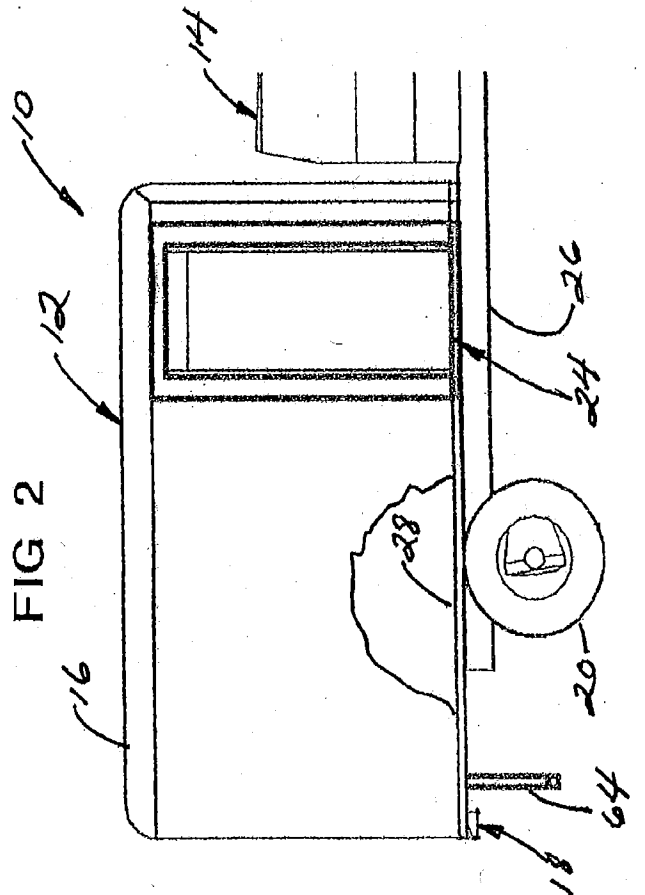


FIG 2



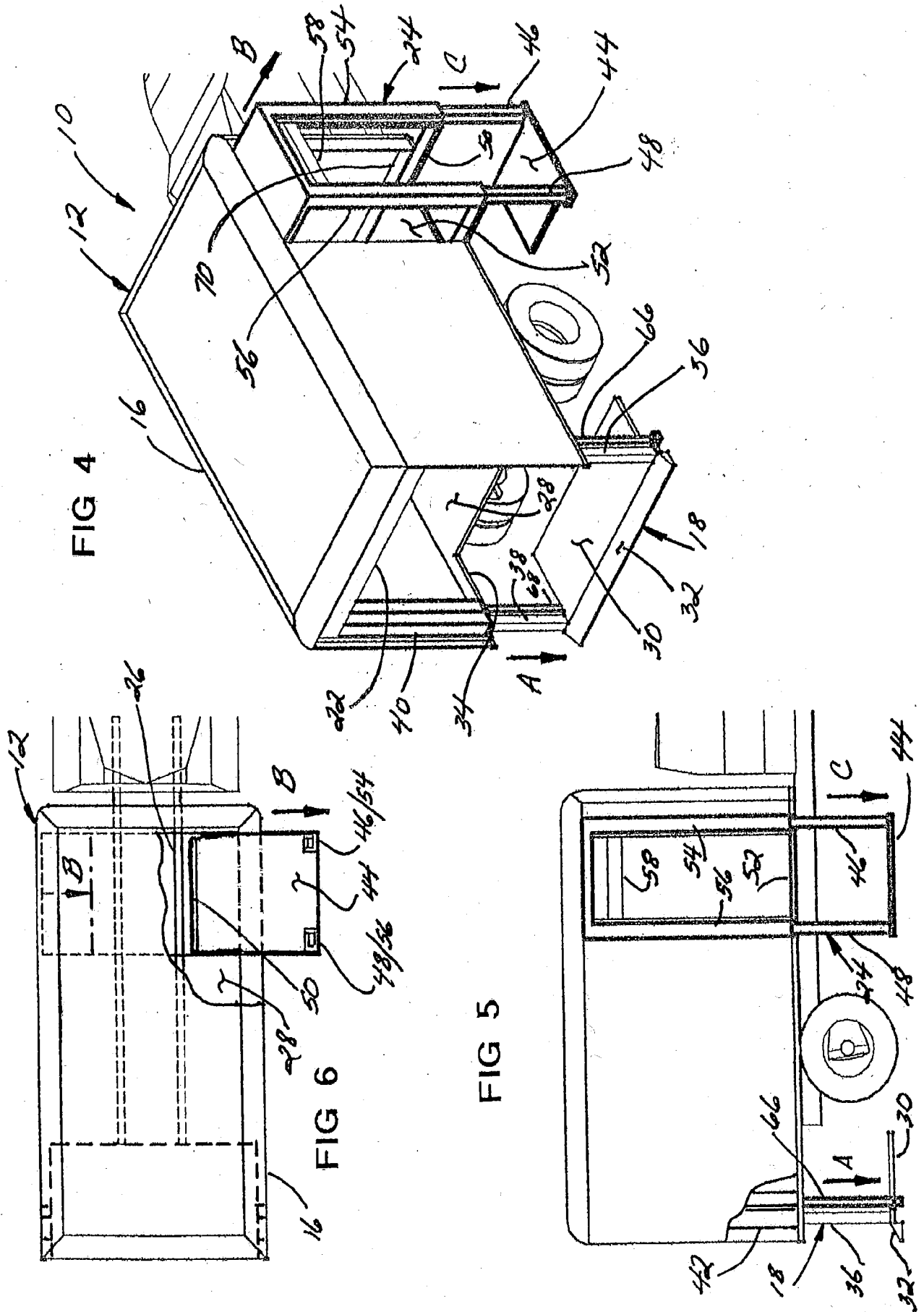


FIG 7

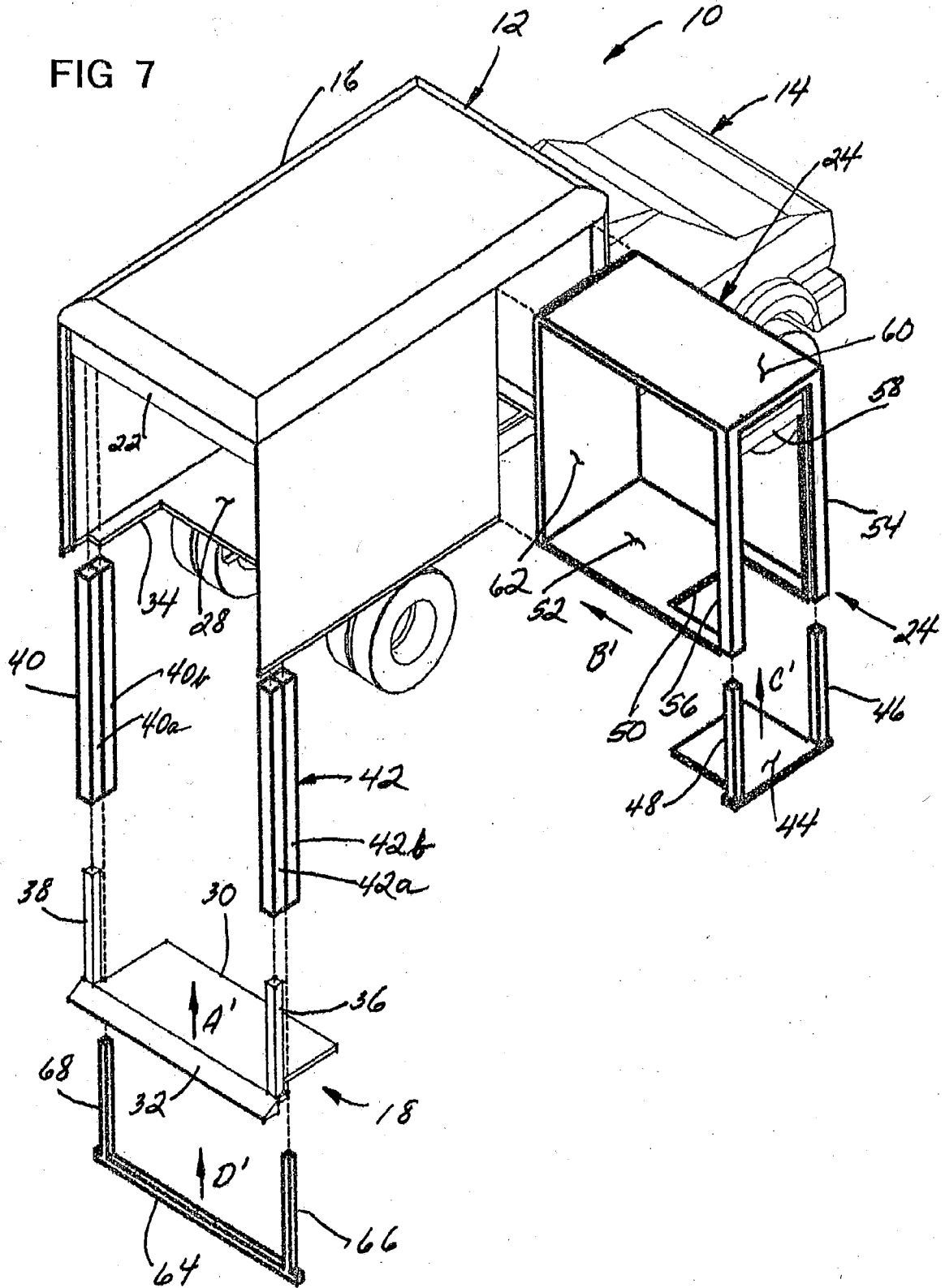
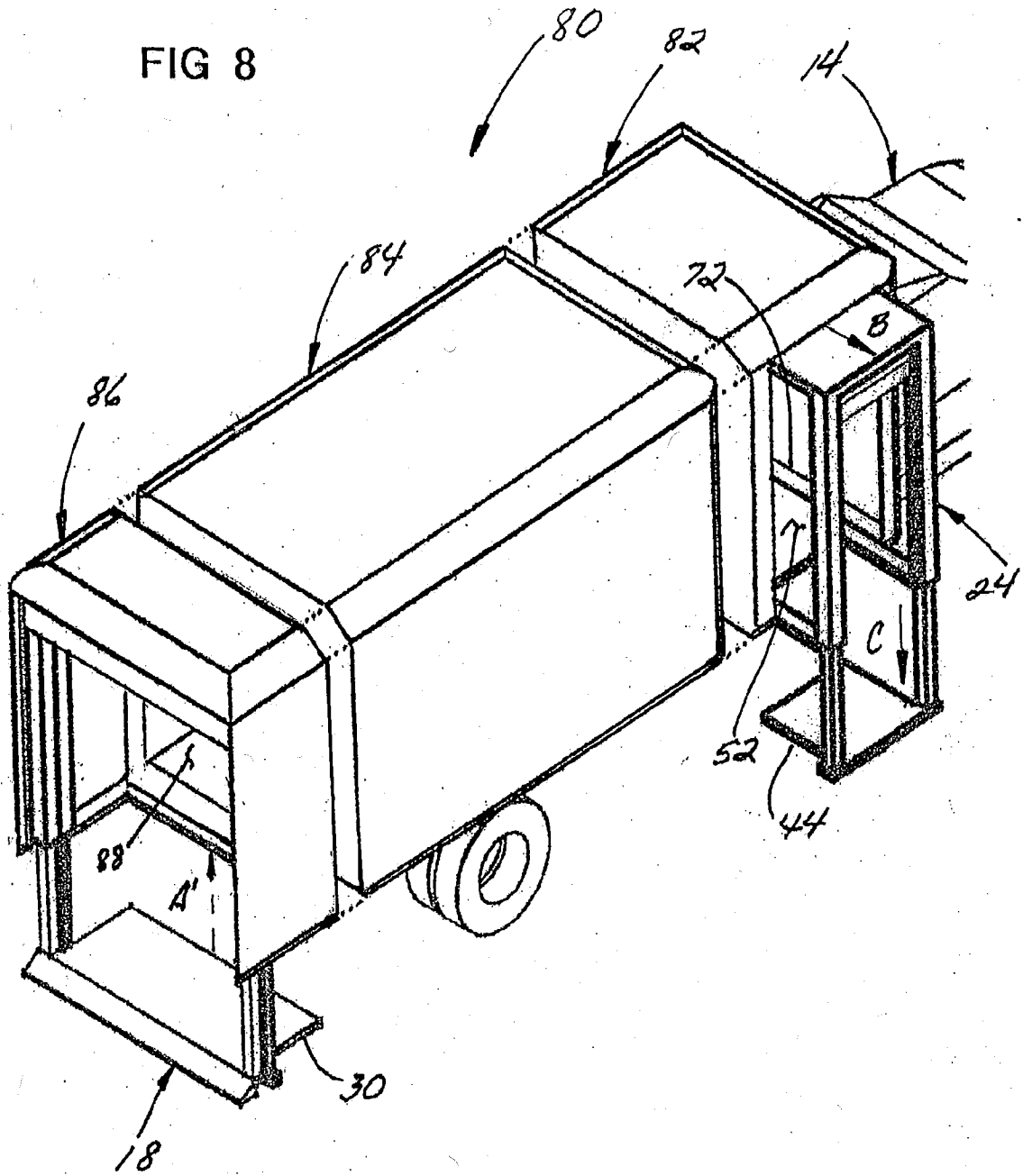


FIG 8



5/5

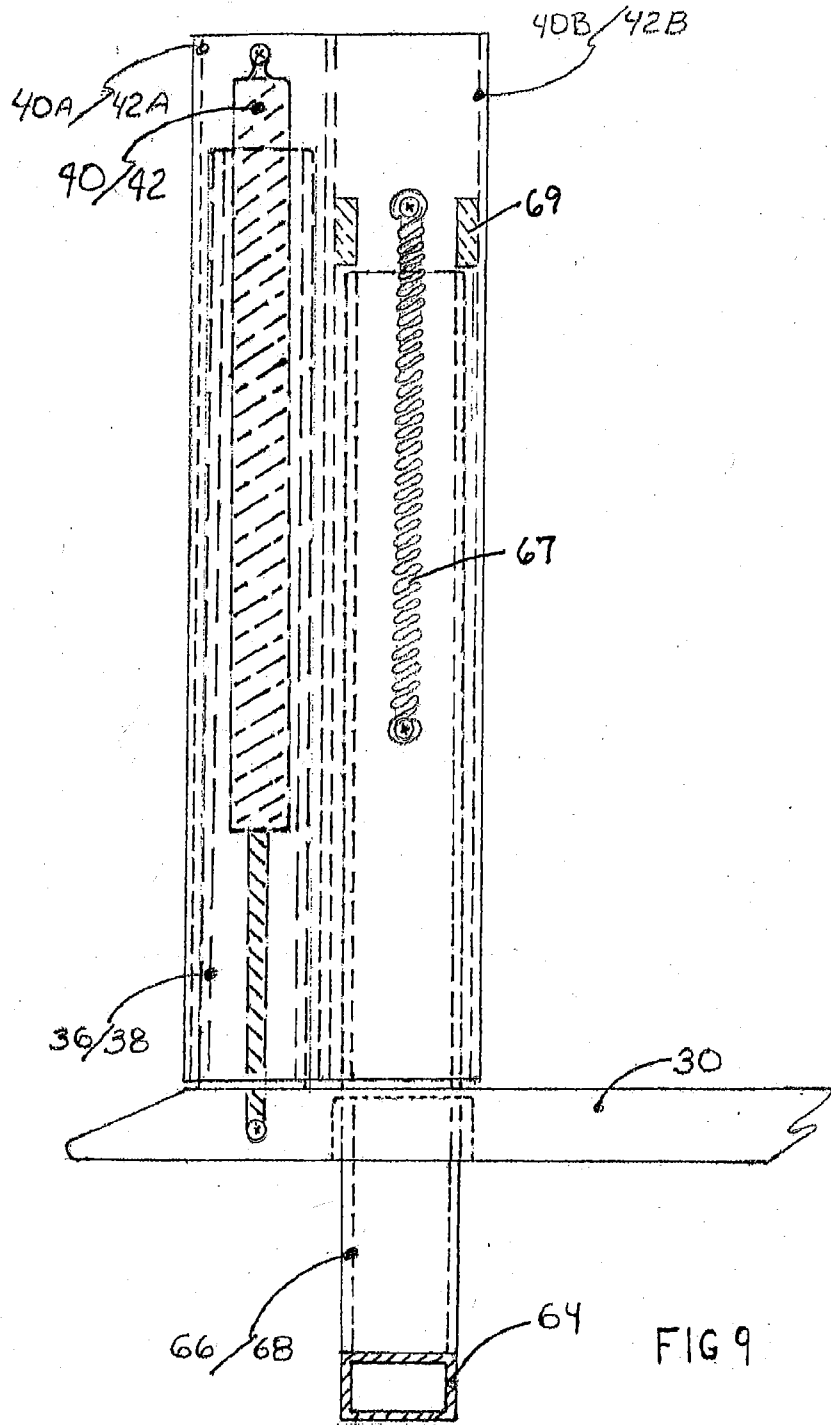


FIG 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/78345

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B60P 1/02 (2008.04)

USPC - 414/495

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)

USPC: 414/495

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
414/467, 592; 296/24.3, 181.1, 1.01 (text search - see terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
DialogClassic (US Patents (1971-present), Chinese Patent Abstracts in English, Patent Abstracts of Japan, European Patents, WIPO/PCT Patents, French Patents, INPADOC, and Derwent WPI; Google Patents, Google.  
Search Terms: vehicle, truck, van, cargo, load, goods, wheelchair, lift, raise, elevate, platform, floor, within

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7,114,905 B2 (DIBDIN) 03 October 2006 (03.10.2006), FIG. 13, 14, 15a, 15b, 19a, 19b, 19e, 19f, and col 9, ln 61-67; col 10, ln 1-28; col 11, ln 36-39, 52-58; and col 12, ln 11-16	1, 4, 9, 10, 13/(1,4,9,10), 14/13/(1,4,9,10)
Y		2, 3, 5-8, 11, 12, 13/(2, 3, 5-8, 11, 12), 14/13/(2, 3, 5-8, 11, 12), 16/13/(2, 3, 5-8, 11, 12)
Y	US 6,761,387 B2 (SLOSS) 13 July 2004 (13.07.2004), FIG. 3, 18b, col 6, ln 25-37, and col 7, ln 5-8	2, 13/(2), 14/13/(2), 16/13/(2)
Y	US 2003/0147734 A1 (ADAMS) 07 August 2003 (07.08.2003), FIG. 1A, 1B, 2, 3, and para [0016], [0053-0057]	3, 6, 7, 13/(3, 6, 7), 14/13/(3, 6, 7), 16/13/(3, 6, 7)
Y	US 3,831,788 (ERLINDER) 27 August 1974 (27.08.1974), Fig. 1, 2, and col 2, ln 49-62	5, 13/(5), 14/13/(5), 16/13/(5)
Y	US 4,071,152 to (KINKEAD et al.) 31 January 1978 (31.01.1978), FIG. 1-4, 6, and col 3, ln 35-43, 55-66; col 4, ln 41-56; and col 6, ln 11-28	8, 13/(8), 14/13/(8), 16/13/(8)
Y	US 4,384,606 to (JOHNSTON et al.) 24 May 1983 (24.05.1983), FIG. 1, 2, 5, and col 3, ln 61-65, and col 4, ln 5-15, 39-44	11, 12, 13/(11, 12), 14/13/(11, 12), 16/13/(11, 12)

Further documents are listed in the continuation of Box C.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

21 November 2008 (21.11.2008)

Date of mailing of the international search report

08 DEC 2008

Name and mailing address of the ISA/US

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PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/78345

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
- 2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
- 3.  Claims Nos.: 15  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

- 1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
- 2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
- 3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
- 4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/78345

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,814,378 B1 (MARMUR) 09 November 2004 (09.11.2004), FIG. 1, 2 4, and col 5, ln 51-55; col 6, ln 21-26, 42-43, 65-67; col 7, ln 1-3, 20-25	6, 7, 13/(6, 7), 14/13/(6, 7), 16/13/(6, 7)
A	US 6,071,064 (HACKETT) 06 June 2000 (06.06.2000), entire document, especially FIG.1	1, 2, 5, 8
A	WO 9519158 A1 (FLYGT) 20 July 1995 (20.07.1995), entire document, especially FIG.1	1, 2, 4, 5, 9, 10