(54) Title: METHOD AND SYSTEM TO DETERMINE NEED FOR DIMENSIONAL WEIGHING

(57) Abstract: A system and method for assisting a party (e.g., a freight carrier) in determining whether dimensional weight or actual weight should be used for shipping particular freight. A DIM comparator may be associated with a forklift, along with a weighing device. The DIM comparator may have allow for the input and display of information, and may include a processing unit for processing data. The DIM comparator may allow an operator to input various data through selectable menus and tables. The DIM comparator determines a theoretical dimensional weight of the freight and compares it to the actual weight as measured by the weighing device associated with the forklift. This comparison may be displayed to an operator and a prompt is provided if a dimensional weight should be determined.

FIG-1
Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
METHOD AND SYSTEM TO DETERMINE NEED FOR DIMENSIONAL WEIGHING

TECHNICAL FIELD

Exemplary embodiments of the invention described herein relate generally to the packaging and shipping of freight. More particularly, exemplary embodiments of the invention described herein relate to increasing the efficiency of freight shipment and packaging.

BACKGROUND

All cargo space involved in transporting freight has physical limits based on the volume of the freight and its weight. Each type of shipping container (e.g., trailer, train, plane, etc.) typically also has a limit with regard to the amount of freight that can be transported thereby. In recognition of these variables, many freight carriers worldwide have adopted dimensional weight ("DIM weight") as a standard to calculate shipping charges for light density freight.

DIM weight, also known as Volumetric or Cubed weight, is a calculation of a theoretical weight of a package. This theoretical weight is the weight of the package at a minimum density chosen by the freight carrier. If the package is below this minimum density, then the actual weight is irrelevant as the freight carrier will charge for the volume of the package as if it was of the chosen density (what the package would weigh at the minimum density). Furthermore, the volume (e.g., in cubic inches, cubic feet, cubic meters, etc.) used to calculate the DIM weight may not be absolutely representative of the true package volume. Rather, the freight carrier will measure the longest dimension in each of the three axes (X, Y, and Z) and use these measurements and a dimensional factor to determine the package volume. Thus, the DIM weight is calculated as (Length x Width x Height) / (Dimensional Factor). The measurements can be made in inches or centimeters, but the
appropriate dimensional factor must also be applied. If the package is a cube, then the calculated volume will be equal to the true volume of the package. However, if the package is not a cube, then the calculated volume will be more than the true volume of the package.

The DIM weight is applied to freight when the actual density thereof is less than the minimum density represented by the chosen factor. The factor may differ based upon different shipment modes (e.g., international or domestic) or based upon the contents of the freight. The factor may also differ between different customers, depending on value, or for other business reasons.

To determine whether the DIM weight or the actual scale weight produces the most desirable shipping charge, freight is traditionally weighed as well as measured. This has generally been accomplished through a multi-step process whereby each piece of freight is weighed on a floor or forklift scale and then measured manually or by a dimensioner to obtain its volume. The volume of the freight is then used to determine the DIM weight, which is compared to the freight’s actual scale weight. If the freight’s DIM weight exceeds its actual scale weight, then the DIM weight will be used when calculating shipping charges.

While such a multi-step process functions to determine which DIM weight or actual scale weight yields the most desirable shipping charge, it can be easily understood that such a system and method is time consuming and prone to human error. That is, even if the density of a particular piece of freight is above the minimum density selected by the freight carrier and will thus be subject to shipping charges based upon its actual scale weight, the dimensions of that piece of freight are often measured nonetheless.
This adds an additional, and frequently unnecessary, step to the transportation of each piece of freight whose dimensions do not need to be measured because shipping charges for that piece of freight will be based upon the its actual scale weight. Such an inconvenience might seem insignificant in the case of a single piece of freight; however, when the multitude of freight loads that must be transported and measured in this manner are considered, it can be understood that such a method is highly inefficient and increases a freight carrier's labor and operating costs.

Therefore, it is desirable to overcome the shortcomings of the traditional methods of determining the appropriate freight weight for use in the calculation of shipping charges, as described above.

SUMMARY

Exemplary embodiments of the inventive concept are based upon the recognition that in the freight carrier industry determining whether dimensional weight or actual weight should be used for a particular piece or pieces of freight may result in increased revenue. Exemplary embodiments described herein provide a system and method for accurately determining whether time should be spent obtaining a dimensional weight for a particular piece of freight. Embodiments of the present invention minimize the potential for human error in the process and increase efficiency in the loading process.

Generally, the exemplary embodiments described herein provide a weighing device associated with a forklift, and may also include a DIM comparator in association with the forklift. The DIM comparator may have an input and a display of information, and may also include a CPU unit for storing and processing data. The DIM comparator may allow an operator to input data related to maximum shipping
device (e.g., pallet) capacity, percent of maximum shipping device capacity used, shipping factors values, and a threshold percentage, through selectable menus and tables.

Based upon operator input, the DIM comparator then determines a theoretical dimensional weight of the freight and compares it to the actual weight as measured by the weighing device associated with the forklift. The DIM comparator then displays this comparison to the operator and provides a prompt as to whether a dimensional weight should be determined. If the actual weight of the freight is greater than the theoretical dimensional weight then determination of a dimensional weight is unnecessary. If the actual weight is less than the theoretical dimensional weight, then a determination of dimensional weight to determine shipping costs is advisable.

BRIEF DESCRIPTION OF THE DRAWINGS

In addition to the features mentioned above, other aspects of the inventive concept will be readily apparent from the following descriptions of the drawings and exemplary embodiments, therein like reference numerals across the several views refer to identical or equivalent features, and wherein:

Figure 1 is a diagram illustrating an exemplary embodiment of a method for using an exemplary DIM weight comparator of the present invention;

Figure 2 is a perspective view illustrating an exemplary forklift equipped for weighing and comparing actual weight to DIM weight using a DIM weight comparator;

Figure 3 is a diagram illustrating an exemplary configuration procedure of the DIM weight comparator;
Figure 4 is an illustration of an exemplary pallet capacity selection screen of the DIM weight comparator;

Figure 5 is an illustration of an exemplary shipping factor setup screen of the DIM weight comparator;

Figure 6 is an illustration of an exemplary threshold percentage setup screen of the DIM weight comparator;

Figure 7 is an illustration of an exemplary DIM comparison screen of the DIM weight comparator;

Figure 8 is an illustration of an exemplary DIM comparison screen of the DIM weight comparator indicating that a dimensional weight calculation is necessary after the comparison has been made; and

Figure 9 is an illustration of another exemplary DIM comparison screen of the DIM weight comparator indicating that a dimensional weight calculation is unnecessary after the comparison has been made.

**DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENT(S)**

The present inventive concept will now be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all possible embodiments of the invention are shown. Indeed, these inventions may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

Figure 1 diagrammatically illustrates an exemplary embodiment of a system and method for weighing and determining whether a dimensional measurement of freight is necessary. In Figure 1, freight (such as palletized freight) is lifted by a forklift 2 having a forklift scale for providing the weight of the freight on the forks. Once the freight is resting on the forks of the forklift, the DIM weight comparator is
initialized 4. The DIM weight comparator may be initialized automatically when a weight is applied to the forks of the forklift or, in other exemplary embodiments, the operator of the forklift may manually initialize the DIM weight comparator. After initialization, the DIM weight comparator screen is displayed 6 to the operator of the forklift. The display 30 (such as the display shown in Figure 2) for the DIM weight comparator may be integrated into the instrument panel of the forklift. In other exemplary embodiments, the display 30 may be located anywhere on or in the forklift that provides for good visualization and manipulation by the operator.

In use of the DIM comparator, an appropriate shipping factor may be selected 8. The system may allow the operator to select between a preprogrammed selection of shipping factors or, in other exemplary embodiments, a single shipping factor may be preprogrammed into the system during setup, thereby further limiting the potential for human error. A visual inspection of the freight may be conducted 10 to identify the percent of the pallet’s maximum capacity that is used. After the visual inspection is made, the operator selects the corresponding capacity option on the DIM weight comparator 12.

The DIM weight comparator then calculates and displays the theoretical DIM weight 14 by using the selected shipping factor and the used capacity of the pallet. Although described using palletized freight, one of ordinary skill in the art would understand that exemplary embodiments of the resent invention may be used with other shipping devices, such as boxed freight and other shipping containers. While the freight is supported by the forklift, the actual weight of the freight is determined and typically also displayed to the operator 16. The DIM weight comparator, after determining the theoretical DIM weight and the actual scale weight, compares the two weights 18. The comparison determines whether the theoretical DIM weight is
greater than the actual weight 20 of the freight. If the theoretical DIM weight is
greater than the actual scale weight of the freight, the DIM weight comparator
instructs the operator to obtain a dimensional measurement 22 of the freight. If the
theoretical DIM weight of the freight is less than actual scale weight of the freight, the
DIM comparator notifies the operator that a dimensional determination is
unnecessary 24 and the operator may proceed with loading the freight.

Figure 2 illustrates an exemplary manner in which a forklift 26 may be
equipped to implement a system and method described herein. In this embodiment,
the CPU 28 of the DIM weight comparator may be integral to forklift 26. The CPU 28
may be located in the dash of the forklift 26 as illustrated in Figure 2. In other
exemplary embodiments, the CPU 28 may be located anywhere on the forklift
allowing existing forklifts to be modified to accommodate the system and method
described herein, or the CPU may be located in a DIM comparator housing. The
CPU unit 28 may include a data storage unit for storing data related to maximum
shipping device capacity, percent of maximum shipping device capacity used,
shipping factors values, and a threshold percentage, and a processing unit for
comparison of DIM weight versus actual weight. The CPU 28 may also be equipped
with a display device 30, such as a LCD display, which may be conveniently located
for displaying information to the operator of the forklift 26.

In the embodiment shown in Figure 2, the display 30 is integral with the dash
of the forklift 26 in view of the forklift operator. In other exemplary embodiments, the
display 30 may be located at any other position in or on the forklift 26 that allows
viewing by the forklift operator. Thus, in some embodiments, the DIM comparator
may be a housed device that is attachable to the forklift. The display 30 may also
function as an input device for receiving commands from the forklift operator. For
example, the display 30 may incorporate touch screen technology, or it can be equipped with keys or buttons that allow the forklift operator to setup and operate the DIM weight comparator.

The DIM weight comparator may also be in communication with the scale mechanism (e.g., load cell) of the forklift 26. In this manner, as the scale of the forklift 26 weighs the freight, the actual scale weight of the freight may be transmitted to the DIM weight comparator. It should be understood that this illustration represents only one way that the system and method described herein can be implemented. For example, in one alternative embodiment, the CPU 28 and display 30 may be integral to a crane or other lifting device used in the shipment of freight. Communications between the CPU 28, display 30, and load cell may occur, via a wired or wireless connection. In still other exemplary embodiments, the DIM weight comparator may be integrated and communicate with existing systems such as invoicing, tracking, and other systems associated with freight shipping to increase overall efficiency. Furthermore, although described in relation to a forklift, other devices that may be associated with weighing operations, such as static weighing platforms and conveyor belts, are contemplated for use in conjunction with a DIM weight comparator described herein.

Figure 3 diagrammatically illustrates an exemplary configuration procedure of the DIM weight comparator. To initialize the setup of the DIM weight comparator a setup button is selected 32 on the display 30. The DIM weight comparator may then provide visual prompts on the display 30 to guide the operator through configuration of the pallet capacity 34, shipping factor 36, and threshold 38. The pallet capacity 34 is used to determine the freight's volume as it relates to the pallet's maximum capacity at various stages (e.g., full capacity, three-quarters capacity, half capacity,
etc.). In the exemplary embodiment of the pallet capacity selection screen 40 illustrated in Figure 4, the operator is presented with two options for pallet capacity; five 42 and ten 44. “Five” provides 5 pallet capacity possibilities and “Ten” provides 10 pallet capacity possibilities. For example, a pallet’s maximum capacity is determined to be 91,125 cu. in., and five pallet capacities are used to identify the freight’s volume at various stages identified in 25% increments. In this scenario, the values set for five capacity options would be as follows:

- Capacity 1 = 9112.50 (10% or less)
- Capacity 2 = 22781.25 (25%)
- Capacity 3 = 45562.50 (50%)
- Capacity 4 = 68343.75 (75%)
- Capacity 5 = 91125 (100%)

Using this same pallet capacity example, ten pallet capacities could be identified in 10% increments; whereas Capacity 10 would equal 91125 (100%), Capacity 9 would equal 82012.50 (90%), Capacity 8 would equal 72900 (80%), and so on. The pallet capacity selection screen 40 also provides a visual indication to the operator of the currently selected pallet capacity setting 46. The pallet selection screen 40 provides a means for the operator to change the values assigned to the pallet capacity for each capacity setting for a pallet having a maximum either greater or less than 91125 cu. in. Other pallets may have other volume capacities. Additionally, the volume of this exemplary pallet, as well as other pallets, may be expressed in alternate units such as cubic feet, cubic meters, etc.

The shipping factor represents the conversion from volume to weight. The pallet capacity divided by the shipping factor determines the DIM weight. The shipping factor setup is accomplished through the shipping factor setup screen 50 on
the display 30, as illustrated in Figure 5. The shipping factor setup screen 50 allows
the operator to select from preprogrammed shipping factors 52 for both domestic 54
and international 56 shipping. If different shipping factors are selected for domestic
54 and international 56 shipping the operator may need to manually select which
shipping factor to use on the DIM weight comparison screen 70 (shown in Figure 7).
In other exemplary embodiments, multiple shipping factors may be selected for each
domestic 54 and international 56 shipment, depending on the freight, the customer,
or other factors.

The threshold is a percentage (%) value that indicates when freight should be
taken to the pallet measuring system. A value of zero percent (0%) indicates that
the DIM weight must be greater than or equal to the actual weight. A value greater
than zero percent (0%) indicates that if the DIM weight plus the threshold value is
greater than or equal to the actual weight, then the pallet should be taken to the
pallet measuring system. This allows the operator to program in a buffer to ensure
that no time is wasted taking freight to the pallet measuring system unnecessarily.
The threshold value may be entered by the operator on the threshold setup screen
60, illustrated in Figure 6, or may be pre-programmed and/or fixed.

Although the setup screens 40, 50, and 60 are shown in node tree from, other
visualizations may be utilized, such as tiled displays or drop down boxes. In still
other exemplary embodiments the configuration and manual selection by the
operator may be eliminated. In these alternative embodiments the pallets of freight
may have bar codes or RFID chips. For embodiments where a bar code is utilized
the forklift 26 may have a bar code scanner, in communication with the CPU 28, the
scanner positioned so as to read the bar code on the pallet of freight or a hand-held
unit that may be so positioned. The bar code may provide the DIM weight

10
comparator with values for the maximum pallet capacity, shipping factor, and threshold information, eliminating the need to manually configure the DIM weight comparator.

In exemplary embodiments utilizing RFID chips, the forklift 26 may be equipped with a RFID reader (which may be a hand-held reader) in communication with the CPU 28. Like the bar code, the RFID chip may provide the DIM weight comparator with the values for the maximum pallet capacity, shipping factor, and threshold information, again eliminating the need to manually configure the DIM weight comparator. These embodiments would also eliminate potential human error associated with manual entry related to the shipping factor during operation.

As discussed above, during use of the DIM weight comparator the operator may be required to visually identify the pallet capacity 10, and select the corresponding pallet capacity option on the DIM weight comparator 12. The DIM weight comparator display 30 provides a DIM weight comparison screen 70 to the operator. The DIM weight comparison screen 70 preferably displays the actual scale weight 72 of the freight as measured by the forklift 26. A prompt 74 may also be provided to guide the operator to the next step in the DIM weight comparison, such as selecting the correct pallet capacity based on a visual inspection.

Pallet capacity buttons 76 are preferably provided to allow the operator to select the correct pallet capacity based on a visual inspection. Each of the pallet capacity buttons 76 may represent a different value selected on the pallet capacity setup screen 40, during initial configuration. In this particular example, the pallet capacities are identified by pie graphs indicating the percent of the pallet filled with freight. Other pallet capacity indicators (graphics, etc.) may be employed in other embodiments. During this step in the process, the system may also allow the
operator to select between different shipping factors, such as those configured for domestic and those configured for international, such as by using a shipping factor selection button 78. A “Close”, “OK”, etc. button 79 may also be provided to allow the operator to turn off or reset the DIM weight comparator. Other screen configurations are also possible, as would be understood by one of skill in the art.

Once the operator has selected the proper pallet capacity, the proper shipping factor, and the DIM weight comparator has compared the DIM weight to the actual scale weight, the DIM weight comparator may display the theoretical DIM weight 80, as illustrated in Figure 8. Again, a prompt 74 may be provided to instruct the operator on the proper course of action. Since the DIM weight 80 is greater than the actual scale weight 72 in this case, the prompt 74 instructs the operator to continue to the dimensional measuring system. The prompt could also instruct the operator to measure the freight by hand. If the DIM weight 80 was less than actual scale weight 72, the prompt 74 would instruct the operator to proceed with loading the freight.

Figure 9 illustrates another exemplary embodiment of a DIM weight comparison screen 70. In this exemplary embodiment, the pallet capacity buttons 76 are represented by depictions of pallets having freight thereon. Additionally, in this depiction the DIM weight 80 is less than the actual scale weight 72, thus the prompt 74 instructs the operator to continue loading the freight without the need to measure the dimensions of the freight. Thus, one of ordinary skill in the art would understand that information displayed on the DIM weight comparison screen 70 may be represented in a variety ways, and the exemplary embodiments do not serve to limit these variations.

While certain embodiments of the invention are described in detail above, the scope of the invention is not considered limited by such disclosure, and modifications
are possible without departing from the spirit of the invention as evidenced by the following claims:
WHAT IS CLAIMED IS:

1. A system for determining the need for dimensional weighing, comprising:
   a forklift equipped for lifting freight;
   a weighing device associated with the forklift for obtaining the weight of freight
   lifted by said forklift; and
   a dimensional (DIM) weight comparator in association with said forklift and in
   communication with said weighing device, said DIM weight comparator comprising:
      a data storage unit, the data storage unit adapted to store values
      associated with pallet capacity, shipping factors, and thresholds,
      a processing unit, the processing unit programmed to compare an
      actual weight of a piece of freight to a theoretical DIM weight,
      an input/output device in association with said data storage unit,
      processing unit and said forklift, said input/output device configured to allow
      an operator to select data stored on the data storage unit and to output a
      comparison between said theoretical DIM weight and the actual weight of
      a piece of freight based on operator selected data, and
      an output in the form of a prompt indicating whether a dimensional
      weight measurement is necessary.

2. The system of claim 1, wherein said weighing device includes a load cell
   mounted to said forklift for outputting a signal indicative of the weight of a piece of
   freight.

3. The system of claim 1, wherein said input/output device is a touch screen
   display.
4. The system of claim 1, wherein said prompt is a visual indication on said input/output device.

5. A method for determining the need for dimensional weighing, comprising:
   providing a dimensional (DIM) weight comparator, said DIM weight comparator including an input/output device and a processing unit in communication with said input/output device;
   weighing freight to determine the actual scale weight of said freight, wherein said freight resides on a shipping device;
   inputting a shipping factor into said DIM weight comparator;
   determining the maximum capacity of said shipping device in volume per weight;
   determining a percentage of shipping device maximum capacity occupied by said freight and inputting said occupied percentage of shipping device maximum capacity into said DIM weight comparator;
   using said DIM weight comparator to project a theoretical dimensional weight based on the selected shipping factor and the determined percentage of shipping device maximum capacity occupied by said freight;
   using said DIM weight comparator to compare the theoretical dimensional weight of said freight to the actual scale weight of said freight; and
   displaying a prompt indicating whether a dimensional weighing operation is advised based on the comparison of the theoretical dimensional weight of said freight to the actual scale weight of said freight;
   wherein, when the theoretical dimensional weight is greater than the actual scale weight, a dimensional weighing operation is advised.
6. The method of claim 5, wherein said DIM weight comparator input/output device is a touch screen display.

7. The method of claim 5, wherein said DIM weight comparator is installed to a forklift, along with a weighing device and a display, the display operating as the input/output device for said DIM weight comparator.

8. The method of claim 7, wherein the actual scale weight of said freight is determined by lifting said freight with said forklift and using said weighing device to determine the actual weight of said freight.

9. The method of any of claims 5-7, further comprising inputting the maximum capacity of said shipping device into said DIM weight comparator.

10. The method of claims 5 or 7, wherein said shipping factor is selected from optional shipping factors displayed by said DIM weight comparator.

11. The method of claims 5 or 7, wherein said percent of shipping device maximum capacity occupied by said freight is determined by visual inspection.

12. The method of claim 11, wherein said percentage of shipping device maximum capacity is selected from a selection of possible capacity percentages presented on said input/output device.

13. The method of claims 5 or 7, further comprising displaying said theoretical DIM weight.
14. The method of claims 5 or 7, further comprising displaying said comparison of the theoretical dimensional weight of said freight to the actual scale weight of said freight.

15. The method of claims 13 or 14, wherein said display appears on said input/output device.

16. The method of claims 5 or 7, wherein said shipping device is a pallet.
Lift freight with forklift

Initialize DIM Weight Comparator

Display DIM Weight Comparator Screen

Select the Appropriate Shipping Factor from Options on DIM Weight Comparator

Visually Identify Capacity

Select Corresponding Pallet Capacity Option on DIM Weight Comparator

DIM Weight Calculated and Displayed on screen

Actual Scale Weight Measured and Displayed on Screen

DIM Weight Compared to Actual Scale Weight?

Is DIM Weight Greater Than Actual Scale Weight?

Yes

Necessary to obtain dimensions

No

Not necessary to obtain dimensions

FIG-1
Select Setup from screen of the Weight Measurement Device

- Pallet Capacity Configuration (34)
- Shipping Factors Configuration (36)
- Threshold Configuration (38)

**FIG-3**

**DIM Weight Comparison**
- Pallet Capacity
  - Five Capacities
    - Capacity 1: 911.250
    - Capacity 2: 22781.25
    - Capacity 3: 45562.50
    - Capacity 4: 68343.75
    - Capacity 5: 91125
  - Ten Capacities
  - Pallet Capacities Used: Five

**FIG-4**
Shipping factors

- Domestic: 194 cu in/lb = 8.9lb/cu ft
- 166 cu in/lb = 10.4lb/cu ft
- 216 cu in/lb = 8.0lb/cu ft
- 225 cu in/lb = 7.7lb/cu ft
- 250 cu in/lb = 6.9lb/cu ft
- 5000 cu cm/kg = 200kg/cu m
- 6000 cu cm/kg = 166.667kg/cu m
- 7000 cu cm/kg = 142.857kg/cu m

- International: 166 cu in/lb = 10.4lb

Shipping Factors Setup

FIG-5

Threshold: 0%

Threshold Setup

FIG-6
FIG-7

FIG-8
INTERNATIONAL SEARCH REPORT

PCT/US2011/038761

A. CLASSIFICATION OF SUBJECT MATTER

INV. G01G19/08 G01G19/415
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)
G01G G01B B66F

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 5 805 807 A (HANSON GEORGE E [US] ET AL) 8 September 1998 (1998-09-08) column 1, line 30 - column 2, line 55 column 10, line 63 - column 11, line 12 column 12, line 63 - column 15, line 30 figures 4, 6, 8, 9-13</td>
<td>-/--</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C. See patent family annex.

* 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 document 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.
  "S" document member of the same patent family

Date of the actual completion of the international search

14 October 2011

Date of mailing of the international search report

21/10/2011

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (31-70) 340-2040,
Fax (31-70) 340-3016

Authorized officer

Koch, Florian

Form PCT/ISA210 (second sheet) (April 2005)
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>WO 2010/024834 A1 (UNITED PARCEL SERVICE INC [US]) 4 March 2010 (2010-03-04)</td>
<td>1-10,</td>
</tr>
<tr>
<td></td>
<td>page 7, line 16 - page 8, line 5</td>
<td>13-16</td>
</tr>
<tr>
<td></td>
<td>page 26, line 4 - page 32, line 10</td>
<td>11,12</td>
</tr>
<tr>
<td></td>
<td>page 2, line 3 - page 3, line 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>figures 1, 5-10</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>WO 2010/045391 A2 (FREIGHTSCAN LLC [US]; SEKOWSKI MAREK [US]; MEAGHER DON [US])</td>
<td>1-10,</td>
</tr>
<tr>
<td></td>
<td>22 April 2010 (2010-04-22)</td>
<td>13-16</td>
</tr>
<tr>
<td>A</td>
<td>paragraph [0003] - paragraph [0006]</td>
<td>11,12</td>
</tr>
<tr>
<td></td>
<td>paragraphs [0025], [0028], [0032]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>paragraph [0050]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>figures 1-13</td>
<td></td>
</tr>
</tbody>
</table>

Form PCT/ISA/210 (continuation of second sheet) (April 2005)
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 5805807 A</td>
<td>08-09-1998</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>WO 2010024834 A1</td>
<td>04-03-2010</td>
<td>CA 2733063 A1</td>
<td>04-03-2010</td>
</tr>
<tr>
<td>EP 2326927 A1</td>
<td></td>
<td></td>
<td>01-06-2011</td>
</tr>
<tr>
<td>US 2010057593 A1</td>
<td></td>
<td></td>
<td>04-03-2010</td>
</tr>
</tbody>
</table>