

PATENT SPECIFICATION

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(54) A DEVICE ADAPTED TO FACILITATE THE SIMULTANEOUS TRANSPORTATION OF A NUMBER OF STANDARDIZED LOAD UNITS

- (71) We, SALÉN & WICANDER
TERMINALSYSTEM AB, a Swedish Company,
of 400 34 Goteborg, Sweden, do hereby de-
clare the invention for which we pray that
a Patent may be granted to us and the
method by which it is to be performed, to
be particularly described in and by the fol-
lowing statement:—
This invention relates to a device ad-
apted to facilitate the simultaneous trans-
portation of a plurality of standardised
load units.
Goods which are to be transported in
ships are nowadays often brought together
into standardized load units, usually so cal-
led containers, but may also be loaded
onto flats having the same base
measurements as containers and being
provided with corner stanchions or foldable
gables having a height corresponding to
that of a container. The dimensions of a
container are standardized internationally,
and the use of such units make possible a
rapid and rational handling of the cargo.
Certain goods, for instance boards and
sawn timber may be bundled together to
form a unit having the same dimensions as
a container, and the expression, standar-
dized load units, which is used in this
specification and the pertaining claims,
shall be understood to include also such
units, which have the proper dimensions
and in which the goods forming the unit
are sufficient strong and rigid to permit the
handling in the same manner as a con-
tainer or a flat. Certain movements, for in-
stance when loading or unloading a ship,
could however be further simplified if
several load units could be transported
simultaneously.
With ships of the Ro-Ro type, fork lift
trucks are often used, which have a capac-
ity to lift one, possibly two containers, one
on top of the other, for each trip into, or
out of the ship. Further advantages could
be obtained if a number of standardized
load units could be combined into a trans-
portation compound, which by means of a
suitable trolley member could be moved
into or out of the ship, respectively. In
such a manner it would be possible at the
harbour to prepare the cargo into a re-
stricted number of transportation com-
pounds, which could be rapidly loaded as
soon as the corresponding number of com-
pounds had been unloaded.
A container is provided with a built-in
box at each of its eight corners for the
application of lifting and locking means
and furthermore along its lower longi-
tudinal sides with pockets for the fork of
the truck. A container is sufficiently rigid
to be self supporting between the lower
corner boxes. These are, however, so low
that it is impossible to use wheeled lifting
means other than fork lift trucks, and for
practical reasons it is not possible to make
the forks long enough to enable two con-
tainers, arranged side-by-side, to be lifted.
According to the invention, a device for
the simultaneous transportation of a num-
ber of standardized load units as herein
defined comprises a load support and a
trolley adapted to be introduced into the
support, the support being formed as a
frame of which at least a portion is in the
form of a rectangle with one open side, the
breadth and length of said portion of the
frame substantially corresponding to whole
multiples of the breadth or length of a
standardized load unit, said portion of the
frame having beams forming the remaining
sides of the rectangle, two opposed parallel
ones of the beams defining open-ended
channels facing inwardly of the frame, the
trolley including a platform of the same
general size as said portion of the frame
and dimensioned so that marginal portions
thereof fit into the channels, and further
including means enabling the frame to be

lifted relative to a surface upon which the device is supported.

The beam frame in its simplest form, is generally U-shaped but it may comprise a number of frame portions each being in the form of a rectangle with one open side, the portions being combined to form an H or an E-shaped frame.

A necessary function of the frame is to locate the lowermost units a sufficient distance above floor level to permit the trolley to be introduced below the containers. As these are very rigid it is possible to lift directly at the containers if these are securely locked to the frame.

The sides of the frame which are perpendicular with respect to the open side will herebelow be termed longitudinal sides. The breadth of a simple frame, or a part of a combined frame is thus substantially the same as the length or the breadth, respectively, of a standardized load unit, while the length is a whole multiple of the length or breadth, respectively, of such a unit, depending upon the units being arranged parallel to, or perpendicularly to the longitudinal sides of the frame. It is evident that the dimensions of the frame shall be sufficient to permit accessibility for lashing the units to the frame and the latter to a ship's deck, respectively.

Furthermore, it is necessary to take into account that the frame, while being moved over ground which is not entirely level, will be subjected to bending forces. The units should therefore not be located close by each other in the longitudinal direction of the frame, but ought to be separated by a distance of about 5 cm. If the frame sags in a central region, the adjacent top edges of the uppermost units should not touch and thereby prevent the deformation movements of the frame. If the space within the ship permits, two or more standardised load units may be arranged on top of each other.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 shows a perspective view of a frame of the device of the invention.

Figure 2 shows, likewise in perspective, a portion of a trolley of the device of the invention.

Figure 3 shows, on a somewhat larger scale, a modified embodiment of the device where the trolley is fitted within the frame.

Figure 4 shows a view corresponding to that of Figure 3, where the lifting and movement facilitating parts of the trolley are formed as air cushions.

Figure 5 shows a further modification of the trolley.

Figure 6 shows an elevation of the latter during movement thereof.

Figure 7 schematically shows the arrangement of a boggie suitable for the embodiment of Figure 5.

Figure 8 schematically shows the arrangement of a boggie suitable for the embodiment of Figure 3, and

Figures 9 and 10 show alternative embodiments of the frame of the device.

The beam frame 10 shown in Figure 1 is composed of two parallel side beams 11 and 12 and a transverse beam 13. These have, in this very schematic embodiment, spaced pairs of interconnected flanges forming channels of U-shaped cross section, the channels being turned with their open sides inwards with respect to the frame. In this manner a groove is formed between the flanges along three sides of the frame into which it is possible to slide a low flat trolley.

The frame has a breadth which, taking into account margins for lashing and deformation, corresponds to the length of a load unit i.e. is a whole multiple of one of a load unit length, and it has in the present embodiment a length corresponding to the breadth of three units i.e. a whole multiple of three of a unit breadth. It is, in this embodiment, strong enough to carry two layers of load units. Figure 1 shows in dashed lined six load units, being conventional containers.

As the fourth side of the frame is open it is possible to drive a fork lift truck into the frame and to deposit a first load unit, or a pair of such units, at the closed end of the frame. The truck will never move closer to the transverse side 13 than the breadth of a load unit, and the frame may therefore, at a distance from the transverse side corresponding to this measurement, be provided with a cross brace 14. This should, however, not be so deep as to prevent the introduction of the trolley.

One form of trolley is schematically shown in Figure 2. The trolley has the same length as the beam frame, has a sufficient breadth to enable it to fit into the beam channels, and furthermore has means for connection to a traction vehicle.

The lower containers rest with their corner boxes upon the beam frame, which means that the beams are subjected to point loads. Presupposing that the frame is lifted vertically upwards at the locations of the load points on the beams, there will be no substantial tendency for the frame to sag between the beams.

The trolley has two functions; first, to lift the complete load compound and secondly to permit a movement in the horizontal plane. The latter function may be taken care of by means of wheels or

rollers, but for moving heavy or big compounds an air cushion device is preferable. This will at the same time perform the lifting function.

5 The trolley 15 schematically shown in Figure 2 includes a central flat body, which is carried by a number of rollers 16. Along each longitudinal edge the central body is provided with a flange or ledge 17, upon which a number of pressure fluid rams 18 are mounted. A pressure fluid is, in known manner, supplied and withdrawn, respectively, through pipes 19.

10 The arrangement shown is very schematic and the intention is to show how the rams 18 are located, so that, when the trolley is slid into the frame, at least some rams, will be positioned at locations of high load. A development would include a beam, resting upon the rams and adapted to engage the lower face of the top beam flange.

15 Figure 3 shows a modified embodiment. The beam frame is composed of I-beams 20, which outwardly are strengthened by flat bars 21 welded between the flanges of the beam. A compound consisting of six load units has a considerable weight, and it is necessary to select the beams in such a manner that their lower flanges provide a satisfactory area, so that the ground support is not damaged. The top faces of the longitudinal side beams 20 are provided with extending spigots 22, which fit into the corner boxes and will lock the same with respect to the beams.

20 The trolley is, as in Figure 2, supported by rollers 16 and a number of rams 18 are mounted on shelves 19 along the longitudinal sides of the central body. The rams are here interconnected by a beam 23, which engages the top beam flange.

25 With the embodiment shown in Figure 4 the trolley includes a platform 25, which is carried by a number of air cushions 26 supplied with working fluid through conduits 27.

30 Air cushion devices are well known in the art in a number of designs and shapes, and form, by themselves, no basic part of the invention. In order to obtain a satisfactory stability and the necessary carrying capacity, if some of the cushions should be deficient, it is advantageous to arrange the cushions in two or more rows. By making the mounting of the individual cushions to the platform flexible it is possible to move frames from a flat quay to a flat deck across an inclined ramp.

35 The cushions are shown as defined by resilient membranes 28, but it is evident that instead separately, inflatable, open or closed annular elements of elastic material may be used. These elements will then take care of the lifting function, while air

introduced within the annular elements will make horizontal movement possible simultaneously with the lifting, if desired.

40 The side beams 20 are provided with guides 29 in the form of rollers for facilitating the introduction of the trolley. Instead of spigots 22 the beams are here provided with brackets 30, between which the corner boxes may be fitted.

45 The air cushions will here perform the lifting of the beam frame with its load and will also permit the movement along the ground. The air is supplied through hoses from an existing air distribution system, or from a compressor mounted upon an extension of the trolley, or upon the traction vehicle, respectively.

50 On occasions, for instance when moving empty or lightly loaded containers, it is possible to use a frame of the type shown in Figures 5 and 6.

55 The trolley here consists of a frame 31, the dimensions of which permit the introduction thereof into the channels formed by the beams. The trolley frame is at one end provided with a goose neck traction member 32 of known type; which may be lifted up and hitched to a traction vehicle. In the end of the trolley frame remote from the traction means a roller 33, or a series of wheels, are mounted upon a pair of arms 34, which are pivotable about an axis 35 about midway in the trolley frame. The roller will carry the trolley frame when this is introduced into the beam frame.

60 With the aid of further rams, not shown, the end of the trolley frame remote from the goose neck may be lifted with respect to the roller 33 and thereby with respect to ground level.

65 During a first moment of the operation the compound is brought into the position shown in Figure 6. Thereafter the goose neck 32 is lifted from the ground and hitched to the traction vehicle, whereupon the compound is ready for transportation.

70 Figure 7 shows in detail, but still in a schematic way only, a boggie device adapted to replace the roller 33 in Figures 5 and 6. The intention is that movement of the boggie over irregularities in the ground shall be facilitated.

75 The design includes two boggies each provided with four wheels 40, which are mounted in pairs upon axles 41. The axles 41 are pivotally mounted on carrying beams 42 which are, in turn pivotally mounted on a transverse beam 43 interconnecting arms 34. Between transverse beam 43 and a further cross beam 44, forming part of trolley frame 31, a suitable number of pressure fluid rams 45 are mounted.

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A similar boggie construction may also be used instead of roller 16 in Figure 3. Such boggie is schematically shown in Figure 8. Each boggie here includes four pairs of wheels 50, which in the same manner as described in connection with the preceding figure, are pivotably connected to a transverse beam 51. This is here formed as part of a disc, which may be turned about a centre pivot 52 being journaled in the main body of trolley 15. The beam engages the latter by way of a number of balls, which run in grooves and facilitate a turning of the boggie. In order to make possible a rational stowing of the big transportation compounds it may be necessary, as a last movement of a loading operation, to perform a sideward movement. By turning beam 51 it is possible to bring the boggie into various angular positions with respect to the longitudinal axis of the frame and thus to steer the compound. The beam 51 is for this purpose provided with a laterally extending arm 53, which may be connected to any suitable steering device.

On occasion, it may be necessary to move the transport compound transversely to its longitudinal axis and it will then be necessary to form beam 51 as a full disc and to arrange the steering means, for instance in connection to pivot 52, in such a manner that the pivot may be made to turn through substantially 90°.

Figures 9 and 10 show some embodiments of composite frames. The one shown in Figure 9 includes two channel formed side beams 55 and 56, which about midway are interconnected by a cross beam 57. This is, as in the cross beam 14 in the embodiment according to Figure 1 not so deep as to prevent the introduction of a trolley member having the same length as the side beams.

This frame is adapted to receive four times two containers, and the frame may be served from two sides by means of fork lift trucks, as two sides of the frame are open.

The embodiment according to Figure 10 may be regarded as two frames according to Figure 1 arranged side by side. The intermediate beam 60 must here have an I-shaped cross section, while the outer beams 61 and 62 may be a U-or I-beams. On this occasion the distance between the beams correspond to the breadth of a load unit, and the length of the side beams corresponds to the length of two load units i.e. a whole multiple of unit lengths. For the transportation two trolleys are required.

The devices above described and shown in the appended drawings are examples of the invention only, the details of which may vary in many ways within the scope

of the appended claims depending upon the size of the transport compound to be made up and upon the condition of the ground across which it has to be moved, i.e. the capacity of the ground locally to take care of heavy loads. The handling of the load units in relation to the frame has been described as performed by fork lift trucks, but it is evident that the handling may also be done by other known means. A container may for instance be handled by means of lifting tackle attached to its upper corner boxes.

WHAT WE CLAIM IS:—

1. A device for the simultaneous transportation of a number of standardized load units as herein defined comprising a load support and a trolley adapted to be introduced into the support, the support being formed as a frame of which at least a portion is in the form of a rectangle with one open side, the breadth and length of said portion of the frame substantially corresponding to whole multiples of the breadth or length of a standardized load unit, said portion of the frame having beams forming the remaining sides of the rectangle, two opposed parallel ones of the beams defining open-ended channels facing inwardly of the frame, the trolley including a platform of the same general size as said portion of the frame and dimensioned so that marginal portions thereof fit into the channels, and further including means enabling the frame to be lifted relative to a surface upon which the device is supported.

2. A device according to Claim 1, wherein the trolley is provided with a plurality of wheels or rollers and a plurality of fluid pressure rams along its sides which fit into the channels.

3. A device according to Claim 1 or Claim 2, wherein the frame is provided at one end with traction means which is adapted for attachment to a vehicle upon raising the adjacent end portion of the frame, the frame having towards its other end a group of wheels which are vertically displaceable relative to the frame.

4. A device according to Claim 1, wherein the trolley platform is carried by one or more air cushion devices adapted simultaneously to lift the frame and to make possible a horizontal movement of the frame.

5. A device according to any one of the preceding Claims, wherein the frame is provided towards its side remote from the open side, with a cross brace extending between said opposed parallel beams.

6. A device according to any one of the preceding Claims, wherein the frame at its top side is provided with means adapted to co-operate with the load units in order to



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5 pairs of wheels 50, which in the same manner as described in connection with the preceding figure, are pivotably connected to a transverse beam 51. This is here formed as part of a disc, which may be
10 turned about a centre pivot 52 being journalled in the main body of trolley 15. The beam engages the latter by way of a number of balls, which run in grooves and facilitate a turning of the boggie. In order
15 to make possible a rational stowing of the big transportation compounds it may be necessary, as a last movement of a loading operation, to perform a sideward movement. By turning beam 51 it is possible
20 to bring the boggie into various angular positions with respect to the longitudinal axis of the frame and thus to steer the compound. The beam 51 is for this purpose provided with a laterally extending
25 arm 53, which may be connected to any suitable steering device.

On occasion, it may be necessary to move the transport compound transversely to its longitudinal axis and it will then be
30 necessary to form beam 51 as a full disc and to arrange the steering means, for instance in connection to pivot 52, in such a manner that the pivot may be made to turn through substantially 90°.

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40 beam 57. This is, as in the cross beam 14 in the embodiment according to Figure 1 not so deep as to prevent the introduction of a trolley member having the same length as the side beams.

45 This frame is adapted to receive four times two containers, and the frame may be served from two sides by means of fork lift trucks, as two sides of the frame are open.

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55 beams 61 and 62 may be a U-or I-beams. On this occasion the distance between the beams correspond to the breadth of a load unit, and the length of the side beams corresponds to the length of two load units
60 i.e. a whole multiple of unit lengths. For the transportation two trolleys are required.

The devices above described and shown in the appended drawings are examples of the invention only, the details of which
65 may vary in many ways within the scope

of the appended claims depending upon the size of the transport compound to be made up and upon the condition of the ground across which it has to be moved, i.e. the capacity of the ground locally to
70 take care of heavy loads. The handling of the load units in relation to the frame has been described as performed by fork lift trucks, but it is evident that the handling may also be done by other known means.
75 A container may for instance be handled by means of lifting tackle attached to its upper corner boxes.

WHAT WE CLAIM IS:—

80 1. A device for the simultaneous transportation of a number of standardized load units as herein defined comprising a load support and a trolley adapted to be introduced into the support, the support being
85 formed as a frame of which at least a portion is in the form of a rectangle with one open side, the breadth and length of said portion of the frame substantially corresponding to whole multiples of the breadth
90 or length of a standardized load unit, said portion of the frame having beams forming the remaining sides of the rectangle, two opposed parallel ones of the beams defining open-ended channels facing inwardly
95 of the frame, the trolley including a platform of the same general size as said portion of the frame and dimensioned so that marginal portions thereof fit into the channels, and further including means enabling
100 the frame to be lifted relative to a surface upon which the device is supported.

2. A device according to Claim 1, wherein the trolley is provided with a plurality of wheels or rollers and a plurality of fluid pressure rams along its sides
105 which fit into the channels.

3. A device according to Claim 1 or Claim 2, wherein the frame is provided at one end with traction means which is adapted for attachment to a vehicle upon
110 raising the adjacent end portion of the frame, the frame having towards its other end a group of wheels which are vertically displaceable relative to the frame.

4. A device according to Claim 1, wherein the trolley platform is carried by one or more air cushion devices adapted simultaneously to lift the frame and to make possible a horizontal movement of
115 the frame.

5. A device according to any one of the preceding Claims, wherein the frame is provided towards its side remote from the open side, with a cross brace extending between said opposed parallel beams.
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6. A device according to any one of the preceding Claims, wherein the frame at its top side is provided with means adapted to co-operate with the load units in order to
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prevent the latter from sliding off the frame.

- 5 7. A device according to Claim 2, wherein the trolley is carried by wheels grouped into at least two bogies, which are mounted so as to be dirigible with respect to the longitudinal axis of the frame.

- 10 8. A device according to any one of the preceding Claims, wherein the frame has two portions of generally rectangular configuration, each with one side open, said portions being interconnected to form a unit having basically the shape of an E.

- 15 9. A device according to any one of Claims 1-7, wherein two of said frame portions are interconnected with their open sides facing in opposite directions, to form a unit having basically the shape of a H.

10. A device according to Claim 7, wherein the wheels in each bogie are 20 arranged in pairs upon pivotable axles, said axles being mounted in pairs upon pivotable beams.

11. A device for the simultaneous transportation of a number of standardized 25 load units and including a beam frame and a trolley substantially as shown in and described in connection with the accompanying drawings.

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