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(54) Title: A METHOD, A DEVICE AND A HOIST FOR HANDLING TYRES

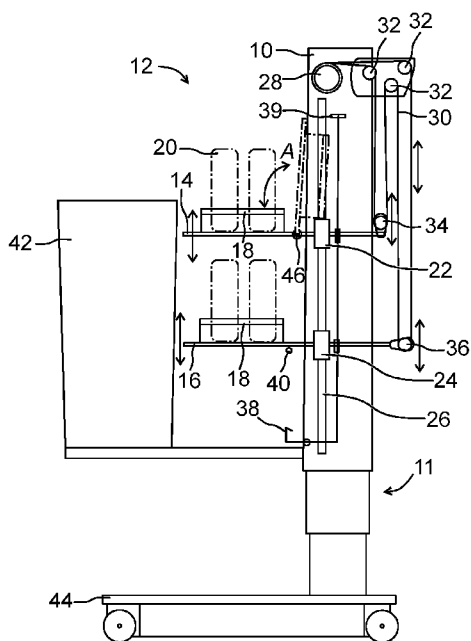


Fig. 1

(57) Abstract: A method of handling tyres or wheels, comprising loading the tyres on a vertically displaceable support and unloading tyres from the support to a storage rack, comprising loading a first set of tyres on a first shelf in an upright position, vertically displacing said first shelf at least a distance corresponding to the diameter of the tyres, loading a second set of tyres on a second shelf in an upright position, vertically displacing said first shelf to an unloading height, moving said first set of tyres to the storage rack, further displacing said first shelf so as to give space to said second shelf, and vertically displacing said second shelf to said unloading height and moving said second set of tyres to the storage rack. The device comprises a first vertically displaceable shelf (14) and a second vertically displaceable shelf (16), said shelves having support means (18) to support tyres (20) in an upright position. It further comprises a first carriage (22) supporting said first shelf and a second carriage (24) supporting said second shelf, and a drive means operating on said first carriage and said second carriage for vertically and individually displacing said first carriage and said second carriage to an unloading height.

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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A METHOD, A DEVICE AND A HOIST FOR HANDLING TYRES

TECHNICAL FIELD

5 [0001] The handling of tyres/wheels generally and storing of snow tyres in store houses in particular is attended to by garages or repair shops. During snow conditions the normally used tyres are stored and handled in a corresponding way. The tyres are stored in an upright position or in a horizontal position in storage racks.

PRIOR ART

10 [0002] When tyres are stored in the horizontal position it is possible and convenient to use pallet or magazines that are handled by lift trucks. A drawback is that lift trucks require a large space to operate between the storage racks. There are advantages of handling and storing tyres in the upright position. The tyres can be rolled to an appropriate position in the rack
15 and it is possible to optimize packaging of the tyres since they have different widths and sizes.

[0003] A problem of storing tyres in the upright position is that the tyres have to be handled manually when loading and unloading. Preferably, the tyres should be positioned close to the storage rack before they are rolled into the
20 desired position. According to a presently used method ladders are used to reach high position. Such a method is of course not recommended and definitely is not ergonomic.

[0004] It is possible also to use hoists with a lift cage. The tyres are then placed on the bottom of the lift cage and have to be lifted manually from the
25 lift cage to the storage rack and back. A more ergonomic system obviously is desired. A comparatively short distance between storage racks is used to maximise storage capacity. However, such a short distance will highly limit the size and required operating area of a hoist or truck.

SUMMARY OF THE INVENTION

30 [0005] An object of the invention is to overcome the drawbacks presented above and to provide a tyre lifting apparatus that is more ergonomic and can

be used for handling tyres and wheels in garages and store houses. In various embodiments the apparatus will facilitate a manual handling of tyres and wheels when they are placed in and removed from a storage rack. Specifically, the manual handling can be carried out without lifting the wheels
5 and without working in uncomfortable positions.

[0006] In various embodiments the apparatus in accordance with the invention comprises a lifting device operating on two fork shelves. Each fork shelf is designed to support and carry at least two wheels in an upright position and is provided with support means designed to support the wheels
10 in the upright position. Both fork shelves extend in a substantially horizontal direction. In accordance with the invention both shelves can be raised to approximately the same height to facilitate the transfer of the wheels from the shelves to the storage rack even though a first fork shelf is operated as an upper fork shelf and a second fork shelf is operated as a lower fork shelf.

[0007] In use an operator or a driver sets the first as well as the second fork shelf to a lowest position and mounts two wheels on the upper fork shelf in a transport position. The driver then actuates the lifting device to raise the upper fork shelf while the lower fork shelf is maintained in the lowest position. When the upper fork shelf is in the higher position a distance is created to the
20 lower fork shelf. The distance is sufficient to allow two more wheels to be mounted on the lower fork shelf also in the upright position.

[0008] When both fork shelves are loaded with wheels at least the upper fork shelf is raised until it reaches an appropriate height in relation to a storage rack where the wheels arranged on the first fork shelf can be
25 unloaded. After unloading the wheels from the upper fork shelf the lower fork shelf is raised to approximately the height at which the upper fork shelf was unloaded. In various embodiments the upper fork shelf is pivoted at least 90° from the horizontal position to a raised resting position after being unloaded. As a result the lower fork shelf can be raised to a position substantially
30 corresponding to the height at which the upper fork shelf was unloaded.

[0009] Then the wheels from the lower fork shelf are unloaded accordingly. During all movements and transfer of the wheels both during loading and

unloading the wheels rolled and no lifting of the wheels is required. A suitable working position for the operator is also maintained during the complete process.

5 [0010] The unloading of wheels from the storage rack is performed in the same way in the reverse order. Wheels are rolled from the storage rack to the lower fork shelf positioned in line with the storage rack while the upper fork shelf is in the raised position. The lower fork shelf then is lowered to a position where an upper section of the wheels is below the upper fork shelf when again positioned in the horizontal position. In this position wheels can
10 be rolled over from the storage rack to the upper fork shelf. Then both fork shelves are lowered to an unloading position.

[0011] In the unloading position the lower fork shelf normally is in the lowermost position where the wheels are rolled of the fork shelf. The upper fork shelf then also is lowered to the lowermost position and wheels
15 supported thereon can be rolled of accordingly.

[0012] In various embodiments the lifting device comprises a winch powered by an electric motor. A wire or a belt is attached to a cylinder or roll and runs over a plurality of pulley wheels or cylinders. One cylinder is connected to the upper fork shelf and a further cylinder is connected to the lower fork shelf.
20 Each of the shelves is mounted on a carriage that is moved in a sliding movement on a vertically extending guide when the winch is operated.

[0013] In various embodiments the lifting device in accordance with the invention is arranged on a telescopic beam of a hoist. The hoist also comprises a lift cage arranged on an upper section of a periscopic beam
25 together with said lifting device.

[0014] When both fork shelves are loaded with wheels the lift cage supporting the operator is also raised so as to achieve a suitable working height for the operator when unloading the wheels from the upper fork shelf. The lift cage is kept at an unloading position. Both fork shelves will
30 accompany the lift cage during this process.

[0015] In various embodiments a loop is formed by the belt or wire and a

section of the belt or wire is attached to a rotating wheel of the winch. The belt runs over a plurality of pulley wheels and when the wheel of the winch is rotated the belt is wound up thereon and the section of the belt running over the cylinders is shortened. As a result the cylinders connected to the fork shelves will be moved. The movement will be restricted to a vertical movement along the telescopic beam. A linear controlling device such as a guide or similar device arranged on the beam will control the movement.

[0016] It is possible to lock both fork shelves in horizontal positions along the beam. When one fork shelf is locked and the winch is operated the winding of the belt will result in a movement of the non-locked fork shelf at a higher speed. By locking the lower fork shelf in a lower position until the upper fork shelf is pivoted to the resting a safety arrangement can be implemented. It would then not be possible to raise the lower fork shelf to an interfering position close to the upper fork shelf while the upper fork shelf still is supporting wheels. In the interfering position tyres on the lower fork shelf could hit tyres on the upper fork shelf and move them from the safe transport position in an unpredictable way.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In order that the manner in which the above recited and other advantages and objects of the invention are obtained will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings.

[0018] Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Fig. 1 is a schematic side elevation view of one embodiment of a device in accordance with the invention,

Fig. 2 is a schematic top section of a further embodiment of a device in accordance with the invention,

- Fig. 3 is a schematic perspective view of the top section of Fig. 2 showing also fork shelves,
- Fig. 4 is a schematic perspective view of the top section of Fig. 3 showing also a lift cage,
- 5 Fig. 5 is a schematic perspective view of a hoist with a handling device in an upper unloading position, and
- Fig. 6 shows the hoist of Fig. 5 when an upper fork shelf has been unloaded and raised to a resting position.

10

DETAILED DESCRIPTION

[0019] In Fig. 1 a device for handling tyres 20 in accordance with the invention is arranged on an upper section 10 of a telescopic beam 11 of a hoist 12. A first vertically displaceable fork shelf 14 and a second vertically displaceable fork shelf 16 form together a vertically displaceable support for
15 tyres. In an operating position said first vertically displaceable fork shelf 14 and said second vertically displaceable fork shelf 16 extend in a substantially horizontal direction and comprises support means 18 for supporting tyres or wheels in an upright position.

[0020] Said first vertically displaceable fork shelf 14 is connected to and supported by a first carriage 22 and said second vertically displaceable fork shelf 16 is connected to and supported by a second carriage 24. Said first carriage 22 and said second carriage 24 are displaceable in a vertical direction along a guide 26. A winch comprising a motor and a first wheel 28 is arranged in the upper section 10. An endless wire or belt 30 is attached to
25 said first wheel 28 and will be winded up on and winded off from, respectively, the first wheel when the motor is operated.

[0021] The endless belt 30 extends over a plurality of directing pulley wheels 32 and over a first end pulley wheel 34 and over a second end pulley wheel 36 and back to the first wheel 28. Said first end pulley wheel 34 is
30 attached to said first vertically displaceable fork shelf 14 and said second end pulley wheel 36 is attached to said second vertically displaceable fork shelf 16. As a result when the motor rotates said first wheel 28 and the endless

belt 30 is wound up thereon the endless belt 30 is shortened and said first end pulley wheel 34 and said second end pulley wheel 36 will be pulled upwards while rotating. As a result also the corresponding fork shelves will be displaced in the vertical direction.

5 [0022] Said second vertically displaceable fork shelf 16 is provided with a locking means for locking it in a lower loading position. In the embodiment shown in Fig. 1 the locking means comprises a hook 38 and a yoke 40. When the locking means is engaged in the lower loading position a winding operation of the first wheel 28 will pull only the first end pulley wheel 34
10 upwards while only rotating said second end pulley wheel 36. Correspondingly, when the first vertically displaceable fork shelf 14 has come to a top end position and cannot be further moved upwardly only the second end pulley wheel 36 will be pulled upwards while only rotating the first end pulley wheel 34. When one of the end pulley wheels is locked the free end
15 pulley wheel will move with a higher speed.

[0023] When the first vertically displaceable fork shelf 14 has reached a top position it can be pivoted around a hinge 46 from a tyre supporting position to a raised resting position as shown by a dash and dot line in Fig. 1. The direction of rotation is indicated by arrow A. An abutment and a release
20 element 39 are arranged at the top position. When the first vertically displaceable fork shelf 14 has reached the top position the release element 39 is touched. As a result the locking mechanism comprising the hook 38 and the yoke 40 can automatically released.

[0024] In the embodiment shown in Fig. 1 a lift cage 42 is also attached to
25 the upper section 10 of a telescopic beam 11. The hoist 12 also comprises a support and drive device 44. Batteries or other power supply units can be provided in said support and drive device 44.

[0025] In various embodiments the invention relates to a method using two fork shelves for wheels/tyres. Said fork shelves can be moved simultaneously
30 and individually by means of a motor winch. An upper fork shelf can be pivoted so as to allow a lower fork shelf to reach the same position as said lower fork shelf. The motor winch raises both fork shelves until said upper

fork shelf reaches an end position against an abutment and thereafter said lower fork shelf can continue to a height that is in level with said upper fork shelf on the condition that said upper fork shelf has been pivoted to a raised position (after having been unloaded).

5 [0026] In the embodiment shown in Fig. 2 only an upper section 10 of the telescopic beam 11 is shown. The first wheel 28 is driven by a motor 48 and a gear box (not shown). The endless belt 30 extends from the first wheel 28 over a plurality of directing pulley wheels 32 down to said first end pulley wheel 34. Then the endless belt 30 runs up over another directing pulley
10 wheel and down to said second end pulley wheel 36. As previously set out said first end pulley wheel 34 is connected to said first vertically displaceable fork shelf 14 and said second end pulley wheel 36 is connected to said second vertically displaceable fork shelf 16.

[0027] In the embodiment shown in Fig. 3 said first vertically displaceable
15 fork shelf 14 and said second vertically displaceable fork shelf 16 have reached an upper position. After pivoting the first vertically displaceable fork shelf 14 it is possible for the second vertically displaceable fork shelf 16 to reach the same vertical position.

[0028] Fig. 3 shows the lift cage 42. The first vertically displaceable fork
20 shelf 14 is in an upper position while the second vertically displaceable fork shelf 16 is positioned in a lower loading position. No wheels are supported on the fork shelves. The guide 26 is arranged on the upper section 10 of the telescopic beam.

[0029] In Fig. 5 the first vertically displaceable fork shelf 14 is in an upper
25 unloading position where an operator (not shown) easily can roll the two upper tyres 20 over to a storage rack (not shown) at the same vertical position. The second vertically displaceable fork shelf 16 is positioned in a lower position supporting two further tyres.

[0030] In Fig. 6 the two upper tyres have been rolled over to the storage
30 rack and the first vertically displaceable fork shelf 14 has been pivoted to an upright position. In this position the locking means of the second vertically displaceable fork shelf 16 can be automatically released so as to allow the

second vertically displaceable fork shelf 16 supporting two tyres to be vertically displaced to the unloading position.

[0031] In various embodiments the invention relates to two fork shelves mounted on carriages. Said carriages are connected to a winch extending
5 with a belt/wire from a motor winch to an upper carriage, around a first pulley wheel, further up to a second pulley wheel at an upper section of a beam and further down to a lower carriage. A locking means is provided to prevent an unintentional movement of a lower fork shelf.

[0032] While certain illustrative embodiments of the invention have been
10 described in particularity, it will be understood that various other modifications will be readily apparent to those skilled in the art without departing from the scope and spirit of the invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the description set forth herein but rather that the claims be construed as
15 encompassing all equivalents of the present invention which are apparent to those skilled in the art to which the invention pertains.

CLAIMS

1. A method of handling tyres or wheels, comprising loading the tyres on a vertically displaceable support and unloading tyres from the support to a storage rack, *characterised* by the steps
- 5 loading a first set of tyres on a first shelf in an upright position, vertically displacing said first shelf at least a distance corresponding to the diameter of the tyres,
- 10 loading a second set of tyres on a second shelf in an upright position, vertically displacing said first shelf to an unloading height, moving said first set of tyres to the storage rack, further displacing said first shelf so as to give space to said second shelf,
- 15 vertically displacing said second shelf to said unloading height and moving said second set of tyres to the storage rack.
2. A method as claimed in claim 1, further comprising pivoting said first shelf at least to an upright position when leaving space to said second shelf.
- 20
3. A method as claimed in claim 1, further comprising preventing said second shelf from vertical displacement to said unloading height until said first shelf has been displaced to give space to said second shelf.
- 25
4. A method as claimed in claim 3, further comprising preventing said second shelf from vertical displacement to said unloading height until said first shelf has been rotated at least to an upright position when giving space to said second shelf.
- 30
5. A method as claimed in anyone of claims 1-4, further comprising locking said second shelf from vertical displacement while said first shelf is vertically displaced to said unloading height.

6. A method as claimed in anyone of claims 1-4, further comprising locking said first shelf from vertical displacement while said second shelf is vertically displaced to said unloading height.

5

7. A device for handling tyres, comprising a vertically displaceable support, *characterised* by

a first vertically displaceable shelf (14) and a second vertically displaceable shelf (16), said first vertically displaceable shelf (14) and said second vertically displaceable shelf (16) having support means (18) to support tyres (20) in an upright position,

a first carriage (22) supporting said first shelf and a second carriage (24) supporting said second shelf,

a drive means operating on said first carriage and said second carriage for vertically and individually displacing said first carriage and said second carriage to an unloading height,

said first vertically displaceable shelf having a first supporting position and a second rest position, said rest position leaving space for the second shelf to reach said unloading height.

20

8. A device as claimed in claim 7, also comprising

a first releasable locking means for preventing said first shelf from vertical displacement,

a second releasable locking means for preventing said second shelf from vertical displacement.

25

9. A device as claimed in claim 7, wherein

said first vertically displaceable shelf comprises a hinge for pivoting said first shelf at least to an upright position when leaving space to said second shelf.

30

10. A device as claimed in claim 7, wherein said drive means comprises a motor driving a first wheel, said device further comprising

an endless belt or wire attached to said first wheel to be wound up thereon when said first wheel is rotated, said endless belt extending over a plurality of pulley wheels, a first pulley wheel being connected to said first carriage and a second pulley wheel being connected to said second carriage,
5 said first carriage and said second carriage being vertically displaced when said endless belt is wound up on said first wheel.

11. A device as claimed in claim 9, also comprising a plurality of directing pulley wheels arranged to direct said endless belt to extend in a substantially
10 vertical direction to said first pulley wheel and to said second pulley wheel.

12. A device as claimed in claim 7, also comprising guide means (26) guiding said first carriage and said second carriage to move in a substantially vertical direction.

15 13. A hoist comprising a telescopic beam having a top section supporting a lift cage, and further supporting
a first vertically displaceable shelf and a second vertically displaceable shelf, said first vertically displaceable shelf and said second
20 vertically displaceable shelf having support means to support tyres in an upright position,

a first carriage supporting said first shelf and a second carriage supporting said second shelf,

25 a drive means operating on said first carriage and said second carriage for vertically and individually displacing said first carriage and said second carriage to an unloading height,

said first vertically displaceable shelf having a first supporting position and a second rest position, said rest position leaving space for the second shelf to reach said unloading height,

30 said drive means comprising a motor driving a first wheel, said hoist further comprising an endless belt attached to said first wheel to be wound up thereon when said first wheel is rotated, said endless belt extending over a plurality of pulley wheels, a first pulley wheel being connected to said first

carriage and a second pulley wheel being connected to said second carriage, said first carriage and said second carriage being vertically displaced when said endless belt is winded up on said first wheel.

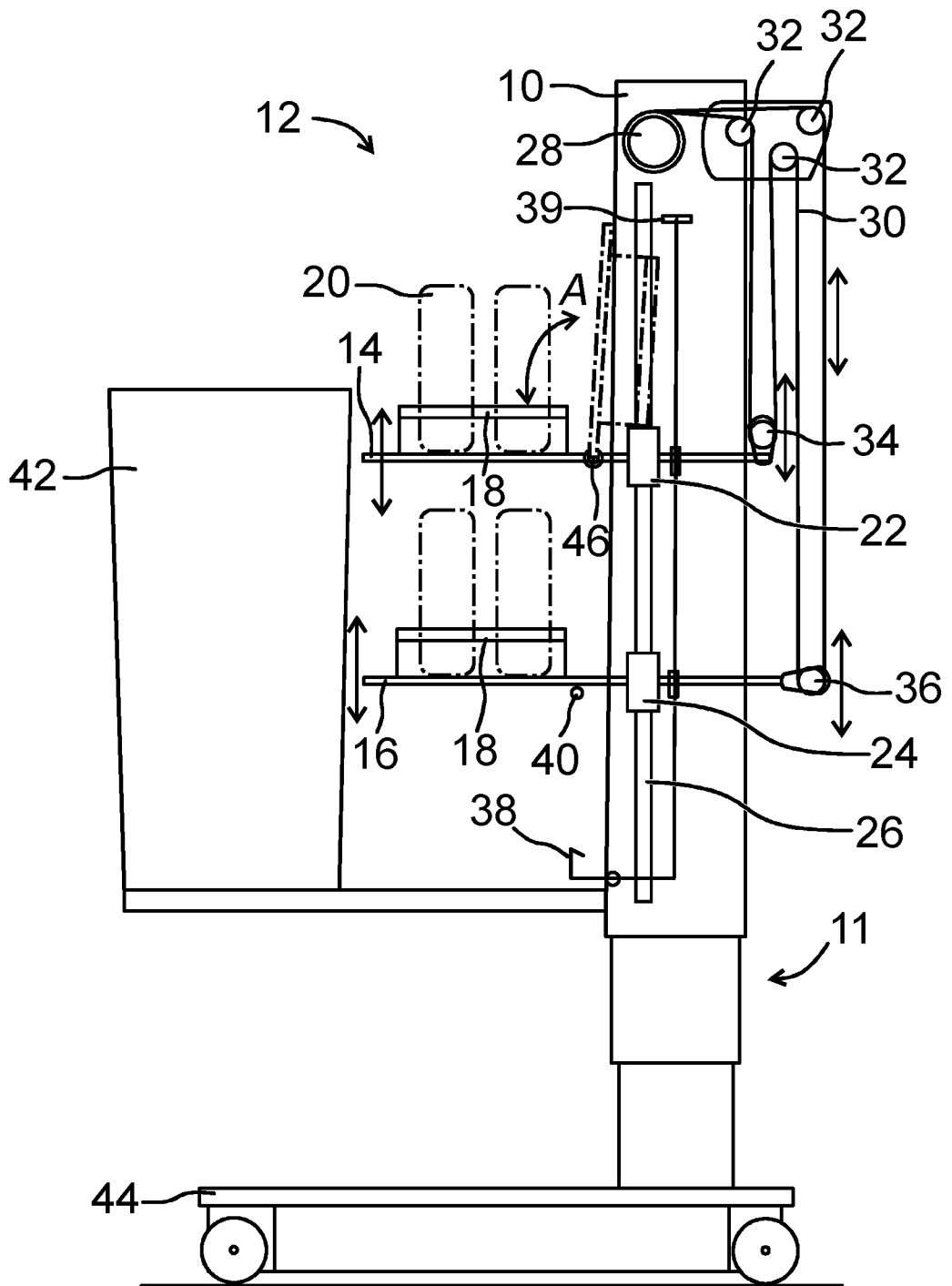


Fig. 1

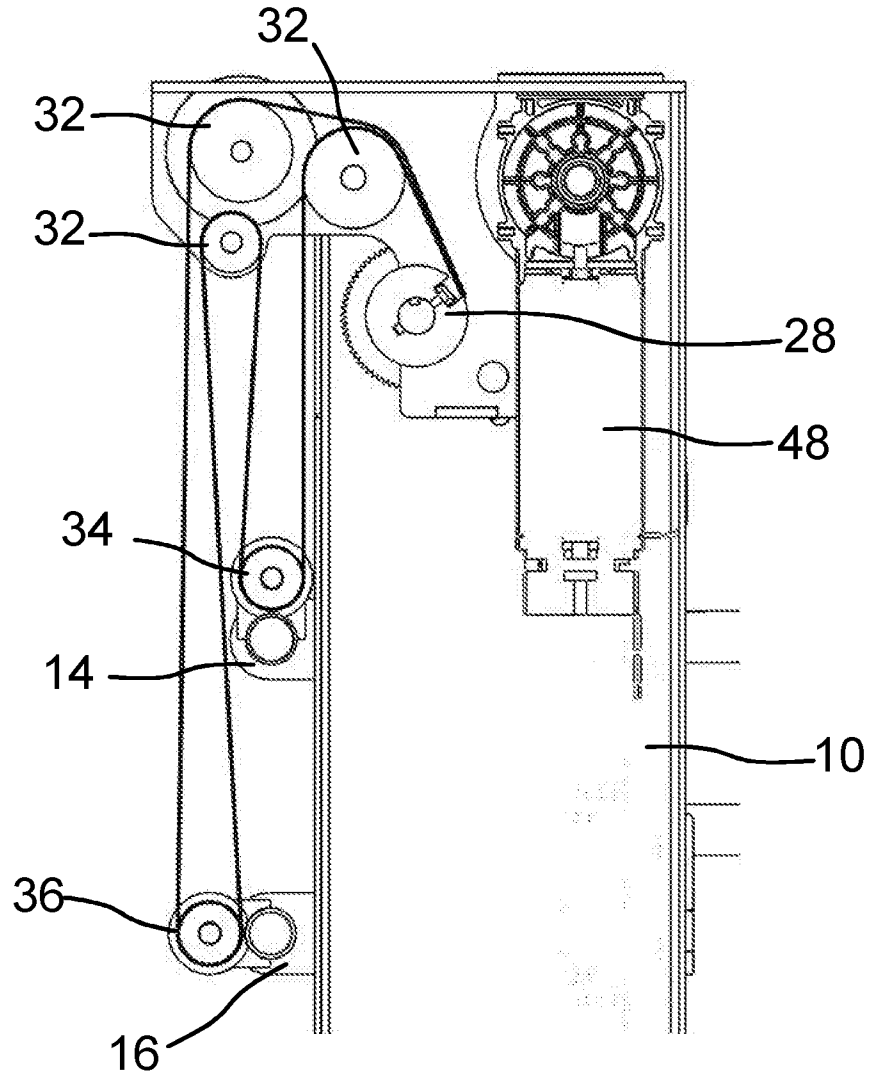


Fig. 2

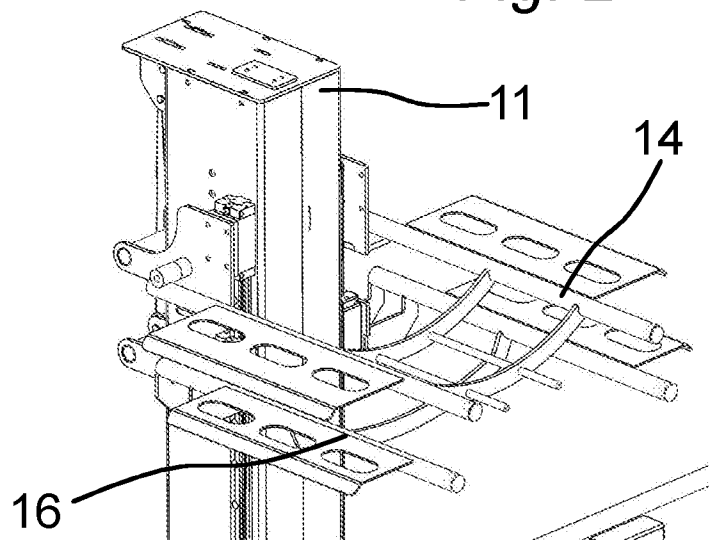


Fig. 3

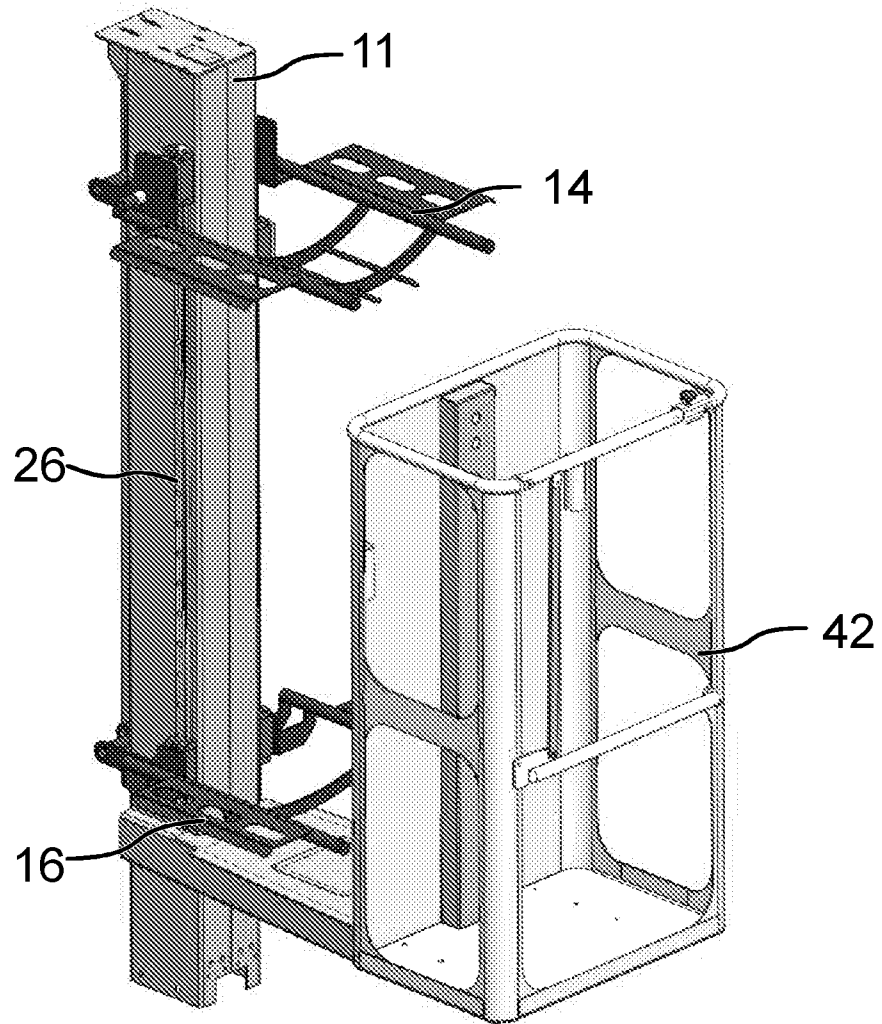


Fig. 4

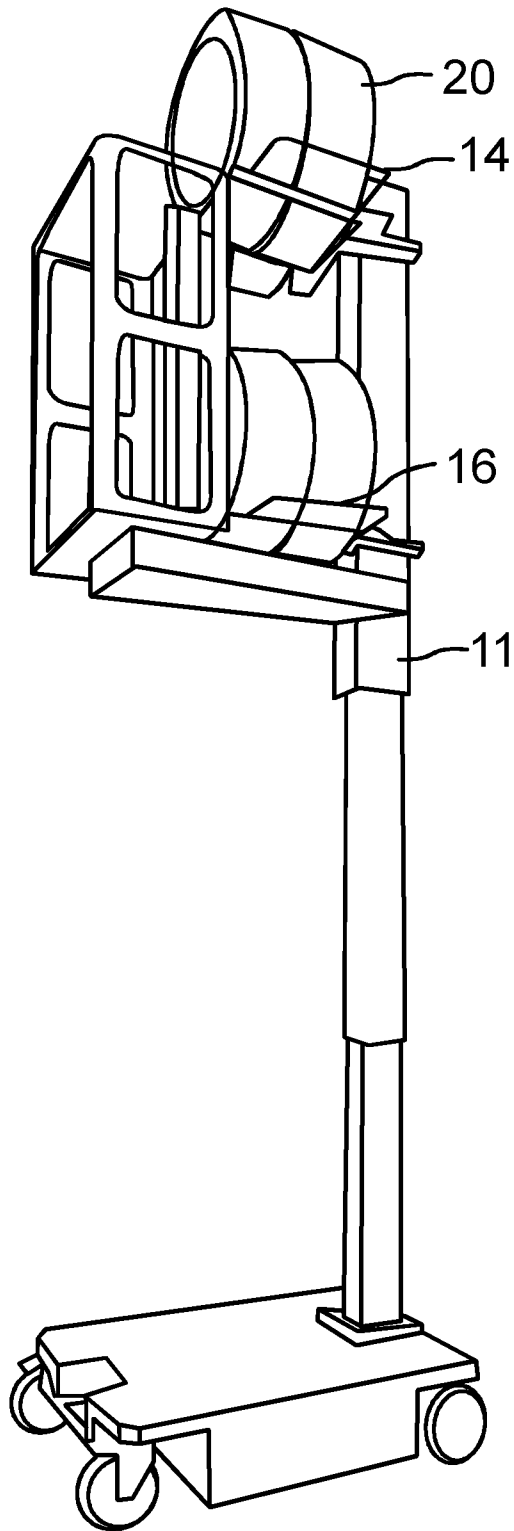


Fig. 5

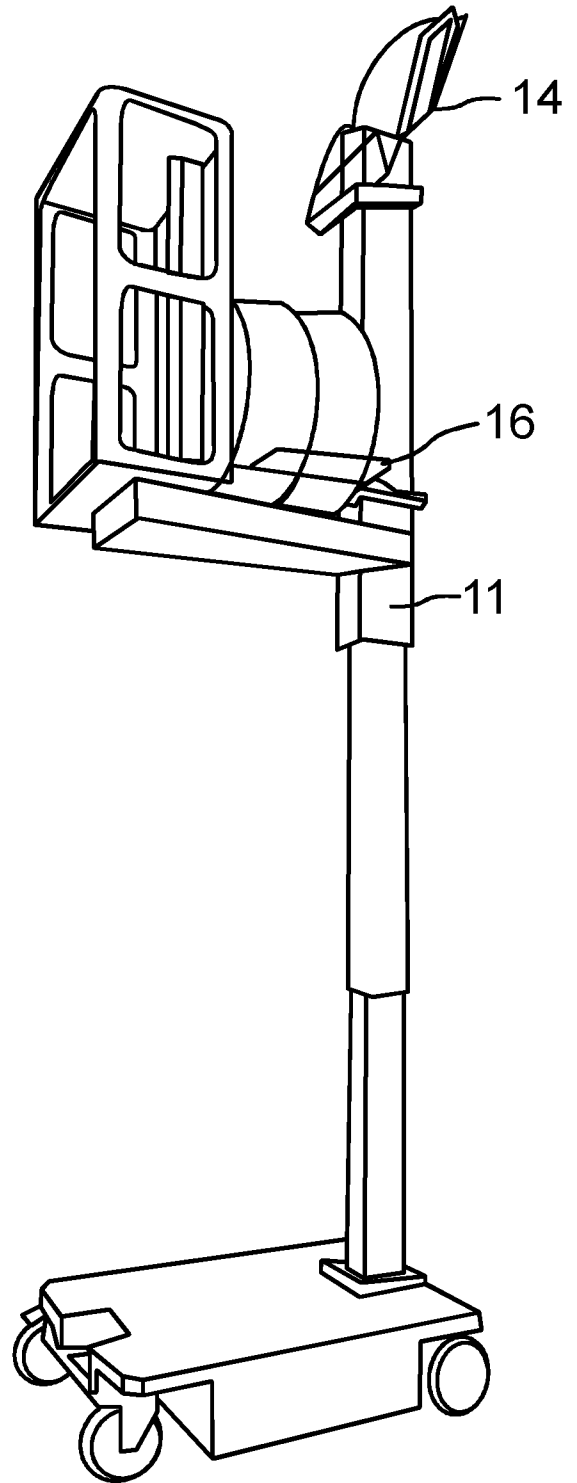


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER		
IPC: see extra sheet		
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)		
IPC: B60B, B62B, B65G, B66D, B66F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE, DK, FI, NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-Internal, PAJ, WPI data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 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		Date of mailing of the international search report
14-05-2013		15-05-2013
Name and mailing address of the ISA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86		Authorized officer Mariana Eddin Telephone No. + 46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
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- B66F 9/16*** (2006.01)
- B66F 11/04*** (2006.01)

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Information on patent family members

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