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(54) **Tire-stacking device, tire-stacking kit and method for handling of tires**

(57) Tire-stacking device (2) comprising;  
- a stacking frame (6) having a base end (8) with a base (10), a top end (12) with a top (14) and a length (16) extending between the top (14) and the base (10), and provided with a tire receiving means (18) adapted for receiving at least one tire (20), wherein the device (2) further comprises an adapter (22) having adapter attachment means (24) configured for attaching the adapter (22) to a support arrangement (4), wherein the adapter (22) is provided with a first fulcrum (34) about which the stacking frame (6) is pivotable when the stacking frame (6) is in contact with the first fulcrum (34), wherein the device (2) comprises a linking means (26) having a first end (28), a second end (30) and a length (16) extending between the first and the second ends (28, 30), wherein the first end (28) is pivotably attached to the base end (8) of the stacking frame (6), and wherein the second end (30) is pivotably attached to the adapter (22), such that the stacking frame (6) is pivotable between a horizontal position and a vertical position with the base end (8) below the top end (12), a tire-stacking kit (37) and a method for handling of tires (20).

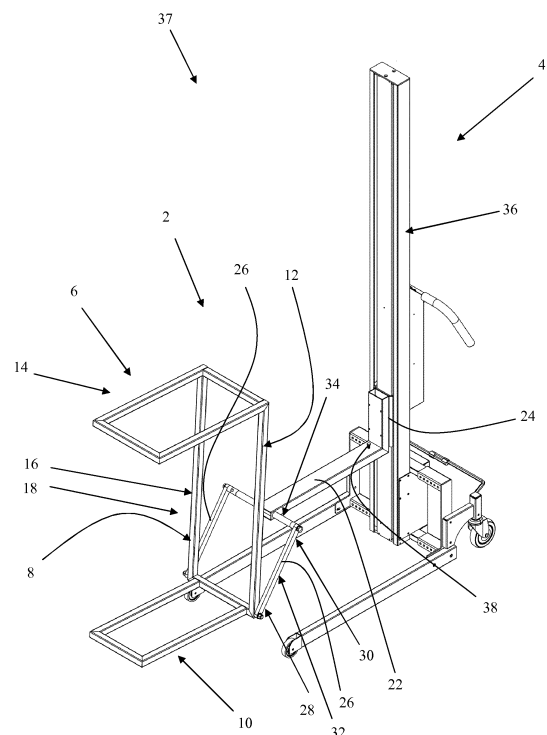


Fig. 1

**Description****Field of the Invention**

[0001] The present invention relates to a tire-stacking device, a tire-stacking kit and a method for handling of tires.

**Background of the Invention**

[0002] In the present application the term tire is used for vehicle tires with or without rim. Examples of vehicles are automobiles, motorcycles, buses, tractors and trucks.

[0003] In some countries it is recommended or even a requirement to use special tires in the winter. These tires may be optimized for snow, ice and/or cold conditions, but less optimal for dry, wet and/or warm conditions. Therefore there is a requirement for storing the tires in the season in which they are not in use. At the end of each season the tires in use needs replacing with the tires in storage. The tires may be collected from storage and moved to the vicinity of the car for replacing with the tires in use. The tires previously in use may be put into storage thereafter.

[0004] Tires may be stored on racks in a side-by-side configuration and placed in a stacked configuration when they are removed from the vehicle or vice versa. Tires may be heavy to handle manually. Therefore there exists a need for manipulating the tires from a side-by-side configuration to a stacked configuration and back in a more ergonomically efficient manner.

[0005] US 5,385,440 disclose a tire-stacking device for stacking and moving stacks of tires. The device includes an elongate platform upon which a plurality of tires may be placed in a side-by-side configuration, when the platform is in a horizontal position. The platform has a pair of wheels at its root end and a hook at its top end. The hook is engaged with the lift truck at the top end and resting on the wheels at the root end. Then, the device is raised to a vertical position by the lift truck. It is a disadvantage of US 5,385,440 that the tire-stacking device may only be lifted to a rack in a high position with the tires in a stacked configuration. A further disadvantage of US 5,385,440 is that the force needed to lift the frame from the horizontal position is high until close to the vertical position. Therefore manually raising a fully loaded platform is difficult.

**Object of the Invention**

[0006] An object of the present invention is to provide an improved tire-stacking device, a tire stacking kit and a method for handling tires.

**Description of the Invention**

[0007] According to the present invention, this is

achieved by a tire-stacking device comprising;

- a stacking frame having a base end with a base, a top end with a top and a length extending between the top and the base, and provided with a tire receiving means adapted for receiving at least one tire, wherein the device further comprises an adapter having adapter attachment means configured for attaching the adapter to a support arrangement, wherein the adapter is provided with a first fulcrum about which the stacking frame is pivotable when the stacking frame is in contact with the first fulcrum, wherein the device comprises a linking means having a first end, a second end and a length extending between the first and the second ends, wherein the first end is pivotably attached to the base end of the stacking frame, and wherein the second end is pivotably attached to the adapter, such that the stacking frame is pivotable between a horizontal position and a vertical position with the base end below the top end.

[0008] Furthermore according to the present invention, this is achieved by a tire-stacking kit comprising;

- a tire-stacking device as described herein,
- a support arrangement, for supporting the tire-stacking device, said support arrangement comprising support attachment means configured for cooperation with the adapter attachment means of the adapter, wherein the support arrangement is configured for vertical and/or horizontal positioning of the tire-stacking device.

[0009] Moreover according to the present invention, this is achieved by a method for handling of tires, the method comprising the following steps;

- a. Using a tire-stacking device as described herein in combination with a support arrangement,
- b. positioning the combined tire-stacking device and support arrangement in a position for loading at least one tire,
- c. loading at least one tire into the tire receiving means,
- d. positioning the loaded combined tire-stacking device and support arrangement in a position for unloading at least one tire,
- f. unloading at least one tire from the tire receiving means.

[0010] The term base end and top end is used to define the extend of the respective halves of the stacking frame. The base end extends from the base and halfway along the length towards the top. The top end extends from the top and halfway along the length towards the base. The base and top ends meet at the midpoint of the stacking frame.

**[0011]** It is herewith achieved that a tire-stacking device, a tire-stacking kit and a method for handling tires is provided which is an improvement over the prior art.

**[0012]** Said at least one tire may be lifted to or collected from a low as well as a high position on for example a floor or a rack by the tire-stacking device. The orientation of the at least one tire may be in a side-by-side or stacked configuration when loaded onto the tire receiving means. The orientation of the at least one tire may be in a side-by-side or stacked configuration when unloaded from the tire receiving means.

**[0013]** The invention is especially advantageous over the prior art in relation to manual manipulation of the tire-stack between horizontal and vertical configurations. This is because of the first fulcrum providing leverage when pivoting the stacking frame between the horizontal position and vertical position.

**[0014]** By introducing the linking means and the first fulcrum the centre of gravity of the stacking frame travels a shorter distance especially in the vertical direction but also in the horizontal direction, when changing between the horizontal and vertical positions of the stacking frame, compared to the prior art. The travel of the centre of gravity may be seen as a measure of the work required to move the at least one tire in the stacking frame between the horizontal and vertical position.

**[0015]** The stacking frame is provided with a tire receiving means. The tire receiving means may be adapted to receive the tires in a side-by-side configuration or a stacked configuration.

**[0016]** In an embodiment of the invention the tire receiving means is configured for receiving a dolly together with the tires.

**[0017]** This embodiment may be combined with all other embodiments of the invention.

**[0018]** The dolly is used as a support for a stack of tires that can be moved around a workshop or storage facility to a desired location. The stack of tires may conveniently be moved into and out of the tire-stacking device for easy loading and/or unloading. The support arrangement may be a cradle or a lift.

**[0019]** The stacking frame is pivotable about a base end pivot axis through the attachment point between the first end of the linking means and the attachment point on the base end of the stacking frame. When moving from the vertical position to the horizontal position, the stacking frame pivots about the base end pivot axis until it contacts the first fulcrum. Hereafter the stacking frame pivots about a first fulcrum pivot axis through the first fulcrum until it reaches the horizontal position.

**[0020]** When moving from the horizontal position to the vertical position the stacking frame first pivot about the first fulcrum pivot axis until the base end or the linking means contacts the floor or a stopper. Hereafter the stacking frame pivots about the base end pivot axis until it reaches the vertical position.

**[0021]** The stacking frame and the adapter may be configured such that they maintain the horizontal position

and/or the vertical position without external support.

**[0022]** The support arrangement may be configured with wheels or other means of facilitating horizontal movement around a workshop, storage facility or other location. Furthermore, the support arrangement may be configured with a means of vertical movement of the tire-stacking device, for example a lift.

**[0023]** According to a further embodiment, the tire-stacking device according to the invention is peculiar in that, the length of the linking means is configured such that the centre of gravity of a loaded stacking frame in the horizontal position is located in a position between the first fulcrum and the top of the stacking frame.

**[0024]** It is herewith achieved that the stacking frame is biased towards the horizontal position as soon as the centre of gravity of the stacking frame passes a vertical plane through the first fulcrum pivot axis.

**[0025]** The adapter is equipped with a structure that prevents the stacking frame from pivoting beyond the horizontal position.

**[0026]** According to a further embodiment, the tire-stacking device according to the invention is peculiar in that, the length of the linking means is between 0 to 0.5 the length of the stacking frame and preferably greater than 0 and less than 0.5.

**[0027]** It is herewith achieved that the contact point of the first fulcrum will be such that the stacking frame will be biased towards the horizontal position as soon as the centre of gravity of the stacking frame passes a vertical plane through the first fulcrum pivot axis.

**[0028]** According to a further embodiment, the tire-stacking device according to the invention is peculiar in that, the tire receiving means is configured for receiving one to ten tires, preferably eight tires, more preferably five tires, most preferably four tires.

**[0029]** In the case of four wheeled vehicles it is achieved that the tire receiving means may have the capacity for one to two vehicles with or without a spare tire.

**[0030]** In the case of a two wheeled vehicles it is achieved that the tire receiving means may have a capacity for one to five vehicles.

**[0031]** According to an alternative embodiment, the tire stacking device according to the invention is peculiar in that, the tire receiving means comprises adjustable tire supports, such that the position of the centre of gravity of the at least one tire may be controlled.

**[0032]** It is herewith achieved that the tire receiving means cater for a varying amount of tires while maintaining the centre of gravity in the same position.

**[0033]** According to a further embodiment, the tire-stacking device according to the invention is peculiar in that, the tire-stacking device comprises a releasable locking means for securing the stacking frame in the horizontal position and/or vertical position.

**[0034]** It is herewith achieved that the stacking frame may be secured in the horizontal and/or vertical positions, such that it does not pivot unintentionally.

**[0035]** According to a further embodiment, the

tire-stacking kit according to the invention is peculiar in that, the tire-stacking kit comprises a raking means, configured for pushing/pulling a tire from/to the tire receiving means.

**[0036]** It is herewith achieved that the ergonomics for a user is improved. The reach of the user is increased. Therefore it is possible to reach for a tire on a shelf on the opposite side of the stacking device and pull the tire onto the tire receiving means. The raking means may also be used to push the tire from the tire receiving means to a shelf.

**[0037]** According to a further embodiment, the method for handling of tires according to the invention is peculiar in that, in step b, the stacking frame is pivoted to a horizontal position.

**[0038]** It is herewith achieved that the stacking frame may be loaded with at least one tire in a vertical orientation, which is suitable for a side-by-side arrangement of a plurality of tires.

**[0039]** According to a further embodiment, the method for handling of tires according to the invention is peculiar in that, in step d, the stacking frame is pivoted to a vertical position.

**[0040]** It is herewith achieved that the at least one tire may be unloaded from the stacking frame in a horizontal orientation, which is suitable for a stacked arrangement of a plurality of tires.

**[0041]** According to a further embodiment, the method for handling of tires according to the invention is peculiar in that, in step b, the stacking frame is pivoted to a vertical position.

**[0042]** It is herewith achieved that the stacking frame may be loaded with at least one tire in a horizontal orientation, which is suitable for a stacked arrangement of a plurality of tires.

**[0043]** According to a further embodiment, the method for handling of tires according to the invention is peculiar in that, in step d, the stacking frame is pivoted to a horizontal position.

**[0044]** It is herewith achieved that the at least one tire may be unloaded from the stacking frame in a vertical orientation, which is suitable for a side-by-side arrangement of a plurality of tires.

**[0045]** According to a further embodiment, the method for handling of tires according to the invention is peculiar in that, step c and/or f is performed using a raking means for pushing/pulling a tire from/to the tire receiving means.

**[0046]** It is herewith achieved that the ergonomics for a user is improved. The reach of the user is increased. Therefore it is possible to reach for a tire on a shelf on the opposite side of the stacking device and pull the tire onto the tire receiving means. The raking means may also be used to push the tire from the tire receiving means to a shelf. Furthermore, according to the present invention, an objective of the present invention is achieved by a method for handling of tires, the method comprising the following steps;

a. Using a tire-stacking device according to any of the claims 1-5 in combination with a support arrangement,

b. positioning the combined tire-stacking device and support arrangement in a position for loading at least one tire including ensuring that the stacking frame is in a horizontal position,

c. loading at least one tire into the tire receiving means,

d. positioning the loaded combined tire-stacking device and support arrangement in a position for unloading at least one tire, including pivoting the stacking frame to a vertical position,

f. unloading at least one tire from the tire receiving means.

**[0047]** It is herewith achieved that tires stored on a shelf in a side-by-side arrangement may be collected by the tire-stacking device and moved to a desired location and unloaded in a stacked configuration.

**[0048]** Even further according to the present invention, an objective of the present invention is achieved by a method for handling of tires, the method comprising the following steps;

a. Using a tire-stacking device described herein in combination with a support arrangement,

b. positioning the combined tire-stacking device and support arrangement in a position for loading at least one tire including ensuring that the stacking frame is in a vertical position,

c. loading at least one tire into the tire receiving means,

d. positioning the loaded combined tire-stacking device and support arrangement in a position for unloading at least one tire, including pivoting the stacking frame to a horizontal position,

f. unloading at least one tire from the tire receiving means.

**[0049]** It is herewith achieved that tires in a stacked configuration may be collected by the tire-stacking device and moved to a desired location and unloaded in a side-by-side arrangement, for example onto a shelf.

## Description of the Drawing

**[0050]** The invention will be explained in more detail below with reference to the accompanying drawing, where:

- Fig. 1 illustrates the tire-stacking device installed on a support arrangement, wherein the tire-stacking device is shown in a vertical position,
- fig. 2 illustrates the tire-stacking device of fig. 1 in an intermediate position,
- fig. 3 illustrates the tire-stacking device of fig. 1

- in a horizontal position,  
 fig. 4 is an isometric illustration of the tire-stacking device,  
 figs. 5a-b show side views of the tire-stacking device in different positions, and  
 figs. 6-13 illustrate the steps of the method according to the invention.

### Detailed Description of the Invention

**[0051]** In the explanation of the figures, identical or corresponding elements will be provided with the same designations in different figures. Therefore, no explanation of all details will be given in connection with each single figure/embodiment.

**[0052]** Figs. 1-3 illustrate the tire-stacking device 2 installed on a support arrangement 4. On fig. 1 the stacking device 2 is shown in a vertical position, on fig. 2 the stacking device 2 is shown in an intermediate position and on fig. 3 the stacking device 2 is shown in a horizontal position.

**[0053]** The tire-stacking device 2 comprises a stacking frame 6 having a base end 8 with a base 10, a top end 12 with a top 14 and a length 16 extending between the top 14 and base 10. The base end 8 and the top end 12 each extends over half of the length 16 of the stacking frame 6. The stacking frame 6 is provided with a tire receiving means 18 adapted for receiving at least one tire 20 (see fig 6-13).

**[0054]** In the embodiment shown in figs. 1-5 the tire receiving means 18 is a platform comprising two long-erons 602 (see fig. 4). A base frame 604 (see fig. 4) extends laterally from the platform at the base 10 and a top frame 606 (see fig. 4) extends laterally from the platform at the top 14. The at least one tire will be in a side-by-side configuration on the platform. The base frame 604 and the top frame 606 will prevent the at least one tire 20 (see figs. 6-13) from toppling over.

**[0055]** In an alternative embodiment (not shown) the positions of the base frame 604 (see fig. 4) and the top frame 606 (see fig. 4) in relation to the platform may be adjusted, such that a varying number of tires may be loaded onto the tire receiving means 18 with little or no variation of the centre of gravity of the loaded stacking frame 6.

**[0056]** In a further alternative embodiment (not shown) the stacking frame 6 comprises additional frames that may be inserted along the platform. The additional frames provide the same function as book ends on a shelf to prevent the tires from toppling over while keeping the centre of gravity of the loaded stacking frame 6 in a position with little or no variation independently of the number of tires loaded onto the stacking frame 6.

**[0057]** When the stacking frame 6 is in its horizontal position the at least one tire 20 (see figs. 6-13) is loaded/unloaded by rolling the tire 20 onto the platform in a crosswise direction.

**[0058]** When the stacking frame is in its vertical posi-

tion the at least one tire 20 (see figs. 6-13) is loaded/unloaded by placing the at least one tire in a horizontal orientation onto the base frame 604.

**[0059]** The tire-stacking device 2 further comprises an adapter 22 having adapter attachment means 24. The adapter attachment means 24 is configured for attaching the adapter 22 to the support arrangement 4. Said adapter 22 is connected to the stacking frame 6 through a linking means 26. The linking means 26 is having a first end 28, a second end 30 and a length 32 extending between the first and the second ends 28, 30. The first end 28 is pivotably attached to the base end 8 of the stacking frame 6 and the second end 30 is pivotably attached to the adapter 22. The adapter 22 is provided with a first fulcrum 34 about which the stacking frame 6 is pivotable when the stacking frame 6 is in contact with the first fulcrum 26. The stacking frame 6 is therefore pivotable between a horizontal position and a vertical position with the base end 8 below the top end 12.

**[0060]** The support arrangement 4 in the embodiment shown in figs. 1-3 is a lift. The adapter 22 is attached via the adapter attachment means 24 to a mast 36. The mast 36 comprises means for vertical positioning of the tire-stacking device 2 by lifting it to a desired vertical position.

**[0061]** The combined tire-stacking device 2 and support arrangement 4 make up a tire-stacking kit 37.

**[0062]** Fig. 4 is an isometric illustration of the tire-stacking device 2 according to the invention and 5a-c show side views of the tire-stacking device 2 in different positions.

**[0063]** The length of the linking means 26 is less than 0.5 the length of the stacking frame 6. The centre of gravity of a loaded stacking frame 6 in the horizontal position is located in a position between the first fulcrum 34 and the top 14 of the stacking frame 6.

**[0064]** The tire-stacking device 2 comprises a releasable locking means 38 for securing the stacking frame 6 in the horizontal position. The locking means 38 may be a spring biased latch that is released manually.

**[0065]** At the base end 8 on the embodiment shown in figs. 2-5 a support plate 40 is attached to the stacking frame 6, such that the support plate 40 will contact the floor, when the stacking frame 6 is pivoted from the horizontal position to the vertical position.

**[0066]** The support plate 40 provides a second fulcrum 42 about which the stacking frame 6 is pivotable when the second fulcrum 42 is in contact with the floor or other support surface.

**[0067]** The steps of pivoting of the stacking frame 6 from a horizontal position to a vertical position will be explained by reference to figs. 5a-c. On figs. 5a-c the stacking frame 6 is viewed from a side where it pivots in a counter clockwise direction.

**[0068]** Initially the stacking frame 6 is in a horizontal position as shown on fig. 5a. The base end 8 is supported on the fulcrum 34 and the top end 12 is supported by the adapter 22. The locking means 38 may be engaged, in

which instance the pivoting of the stacking frame 6 is initiated by releasing the locking means 38.

[0069] With the locking means 38 disengaged the user 39 (see figs. 6-13) may commence pivoting the stacking frame 6 about the fulcrum 34 towards the intermediate position shown in fig. 5b. The linking means 26 maintain the connection between the stacking frame 6 and the adapter 22. The linking means 26 prevents the stacking frame 6 from sliding off the first fulcrum 34.

[0070] In the intermediate position in fig. 5b the support plate 40 is in contact with the floor and the stacking frame 6 pivots about the second fulcrum 42. The stacking frame 6 is no longer in contact with the first fulcrum 34. Pivoting continues towards the vertical position in fig. 5c.

[0071] Before reaching the vertical position the base 10 come into contact with the floor and the second fulcrum 42 loose contact with floor. From then on the stacking frame 6 pivots about a pivot axis through the connection between the linking means 26 and the base end 8 until the vertical position of fig. 5c is reached.

[0072] Figs. 6-13 illustrate the steps of the method according to the invention. The method is exemplified by moving a stack of tires 20 to a storage location on a shelf 44. In this example a tire stacking kit 37 comprising a tire-stacking device 2, a support arrangement 4 and a raking means 46. The raking means 46 is optional equipment for improved ergonomics.

[0073] In other embodiments the method may be performed using a tire-stacking device 2 as described herein in combination with a support arrangement 4.

[0074] On fig. 6 a stack of tires 20 is ready to be loaded onto the tire-stacking device 2. The stack of tires 20 is supported by a roller cart 48.

[0075] The tire receiving means 18 in the example shown is configured for receiving a stack of four (4) tires 20 supported on a roller cart 48.

[0076] Alternatively the tire receiving means 18 may be configured for receiving any number of tires 20 from one (1) to ten (10) tires 20 with or without the roller cart 48 in position under the stack of tires 20.

[0077] Initially the stacking frame 6 may be in a horizontal position.

[0078] In fig. 7 the step of positioning the combined tire-stacking device 2 and support arrangement 4 in a position for loading the stack of tires 20 by moving the tire-stacking device 2 close to the stack of tires 20 and pivoting the stacking frame 6 to a vertical position. Furthermore the step of loading the stack of tires 20 into the tire receiving means 18 has been performed.

[0079] Fig. 8 shows a sub-step of the step of positioning the loaded combined tire-stacking device 2 and support arrangement 4 in a position for unloading the stack of tires 20. In sub-step on fig. 8 the user 39 is pivoting the stacking frame 6 from the vertical position to the horizontal position.

[0080] On fig. 9 the stacking frame 6 with the stack of tires 20 is in the horizontal position and the final step of positioning the loaded combined tire-stacking device 2

and support arrangement 4 in a position for unloading the stack of tires 20 may be performed.

[0081] Fig. 10 shows the loaded combined tire-stacking device 2 and support arrangement 4 positioned for unloading the stack of tires 20 on to the shelf 44. The tire-stacking device 2 has been lifted and positioned next to the second tier of the shelf 44. The loaded combined tire-stacking device 2 and support arrangement 4 is ready for commencement of the step unloading the stack of tires 20 from the tire receiving means 18.

[0082] Fig. 11 shows the step of unloading the stack of tires 20 from the tire receiving means 18 being carried out. The user 39 applies a raking means 46 to push the tires 20 onto the shelf 44.

[0083] Fig. 12 shows the final tire 20 being unloaded from the tire receiving means 18. In this view the user 39 does not apply the raking means 46.

[0084] Fig. 13 shows the method having been completed. The tires 20 that were in a stacked condition prior to commencing the method has been pivoted to a side-by-side configuration and moved to a shelf 44 for storage in the side-by-side configuration.

[0085] The method may also be performed by applying the steps in the reverse order for moving the tires 20 in the side-by-side configuration from the shelf 44 to a desired position, for example close to a vehicle that is about having its tires 20 changed. The tires 20 may be unloaded from the tire receiving means 18 in a stacked configuration by pivoting the stacking frame 6 to a vertical position. Alternatively the tires 20 may be unloaded from the tire receiving means 18 in a side-by-side configuration by maintaining the stacking frame 6 in the horizontal position.

## Claims

### 1. Tire-stacking device comprising;

- a stacking frame having a base end with a base, a top end with a top and a length extending between the top and the base, and provided with a tire receiving means adapted for receiving at least one tire, **characterised in that** the device further comprises an adapter having adapter attachment means configured for attaching the adapter to a support arrangement, wherein the adapter is provided with a first fulcrum about which the stacking frame is pivotable when the stacking frame is in contact with the first fulcrum, wherein the device comprises a linking means having a first end, a second end and a length extending between the first and the second ends, wherein the first end is pivotably attached to the base end of the stacking frame, and wherein the second end is pivotably attached to the adapter, such that the stacking frame is pivotable between a horizontal position and a ver-

- tical position with the base end below the top end.
2. Tire-stacking device according to claim 1, **characterised in that** the length of the linking means is configured such that the centre of gravity of a loaded stacking frame in the horizontal position is located in a position between the first fulcrum and the top of the stacking frame. 5
  3. Tire-stacking device according to claim 1 or 2, **characterised in that** the length of the linking means is between 0 to 0.5 the length of the stacking frame and preferably greater than 0 and less than 0.5.
  4. Tire-stacking device according to any of claim 1 to 3, **characterised in that** the tire receiving means is configured for receiving one to ten tires, preferably eight tires, more preferably five tires, most preferably four tires. 20
  5. Tire-stacking device according to any of the previous claims, **characterised in that** the tire-stacking device comprises a releasable locking means for securing the stacking frame in the horizontal position and/or vertical position. 25
  6. Tire-stacking kit comprising;
    - a tire-stacking device according to any of the claims 1-5, 30
    - a support arrangement, for supporting the tire-stacking device, said support arrangement comprising support attachment means configured for cooperation with the adapter attachment means of the adapter, wherein the support arrangement is configured for vertical and/or horizontal positioning of the tire-stacking device. 35
  7. Tire-stacking kit according to claim 6, **characterised in that** the tire-stacking kit comprises a raking means, configured for pushing/pulling a tire from/to the tire receiving means. 40
  8. Method for handling of tires, the method comprising the following steps; 45
    - a. Using a tire-stacking device according to any of the claims 1-5 in combination with a support arrangement, 50
    - b. positioning the combined tire-stacking device and support arrangement in a position for loading at least one tire,
    - c. loading at least one tire into the tire receiving means, 55
    - d. positioning the loaded combined tire-stacking device and support arrangement in a position for unloading at least one tire,
  - f. unloading at least one tire from the tire receiving means.
  9. Method according to claim 8, wherein in step b, the stacking frame is pivoted to a horizontal position.
  10. Method according to claim 9, wherein in step d, the stacking frame is pivoted to a vertical position.
  11. Method according to claim 8, wherein in step b, the stacking frame is pivoted to a vertical position.
  12. Method according to any of the claims 8, 9, or 11, wherein in step d, the stacking frame is pivoted to a horizontal position.
  13. Method according to any of claims 8-12, wherein step c and/or f is performed using a raking means for pushing/pulling a tire from/to the tire receiving means.
  14. Method for handling of tires, the method comprising the following steps;
    - a. Using a tire-stacking device according to any of the claims 1-5 in combination with a support arrangement,
    - b. positioning the combined tire-stacking device and support arrangement in a position for loading at least one tire including ensuring that the stacking frame is in a horizontal position,
    - c. loading at least one tire into the tire receiving means,
    - d. positioning the loaded combined tire-stacking device and support arrangement in a position for unloading at least one tire, including pivoting the stacking frame to a vertical position,
    - f. unloading at least one tire from the tire receiving means.
  15. Method for handling of tires, the method comprising the following steps;
    - a. Using a tire-stacking device according to any of the claims 1-5 in combination with a support arrangement,
    - b. positioning the combined tire-stacking device and support arrangement in a position for loading at least one tire including ensuring that the stacking frame is in a vertical position,
    - c. loading at least one tire into the tire receiving means,
    - d. positioning the loaded combined tire-stacking device and support arrangement in a position for unloading at least one tire, including pivoting the stacking frame to a horizontal position,
    - f. unloading at least one tire from the tire receiving means.

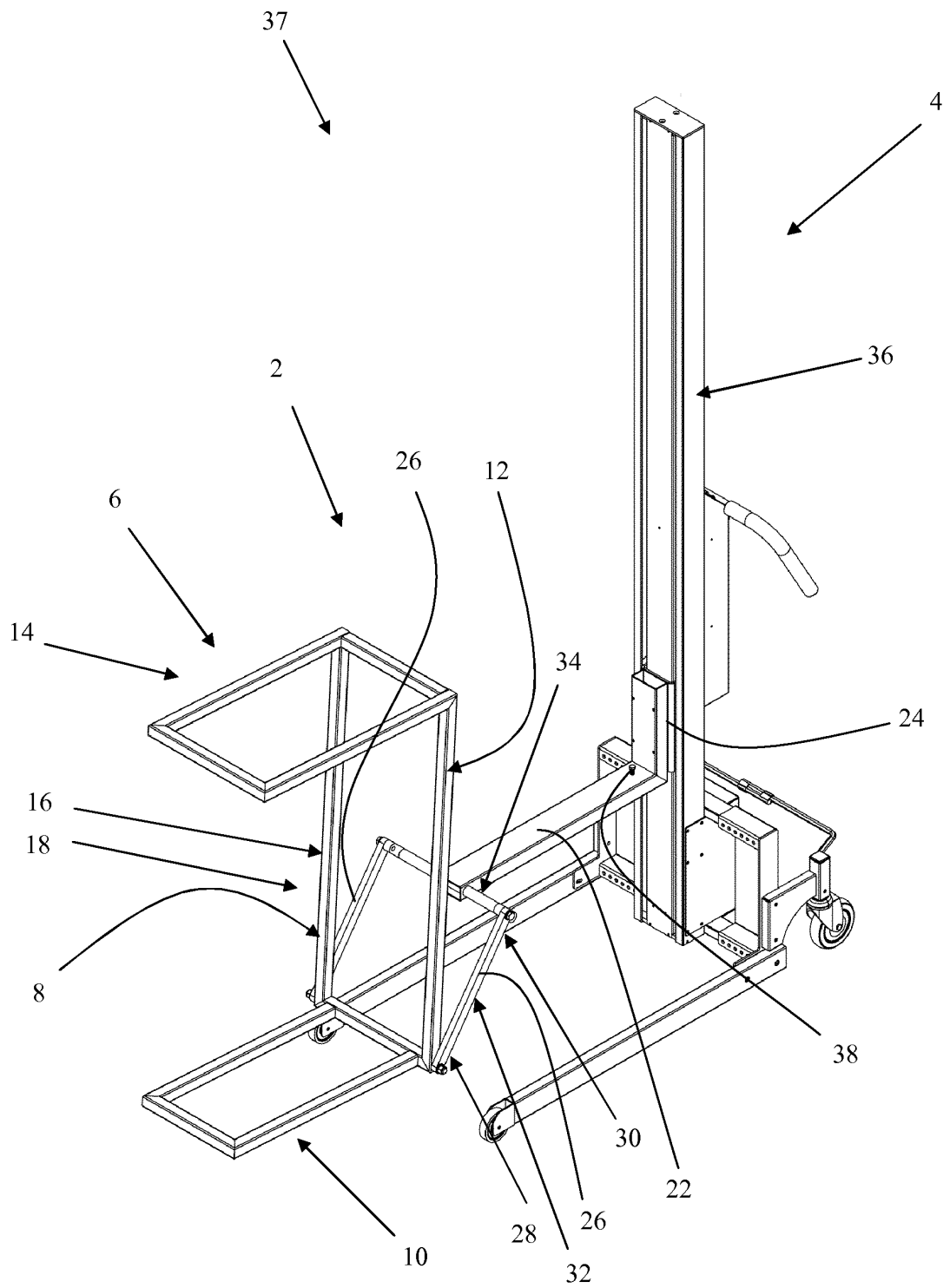


Fig. 1

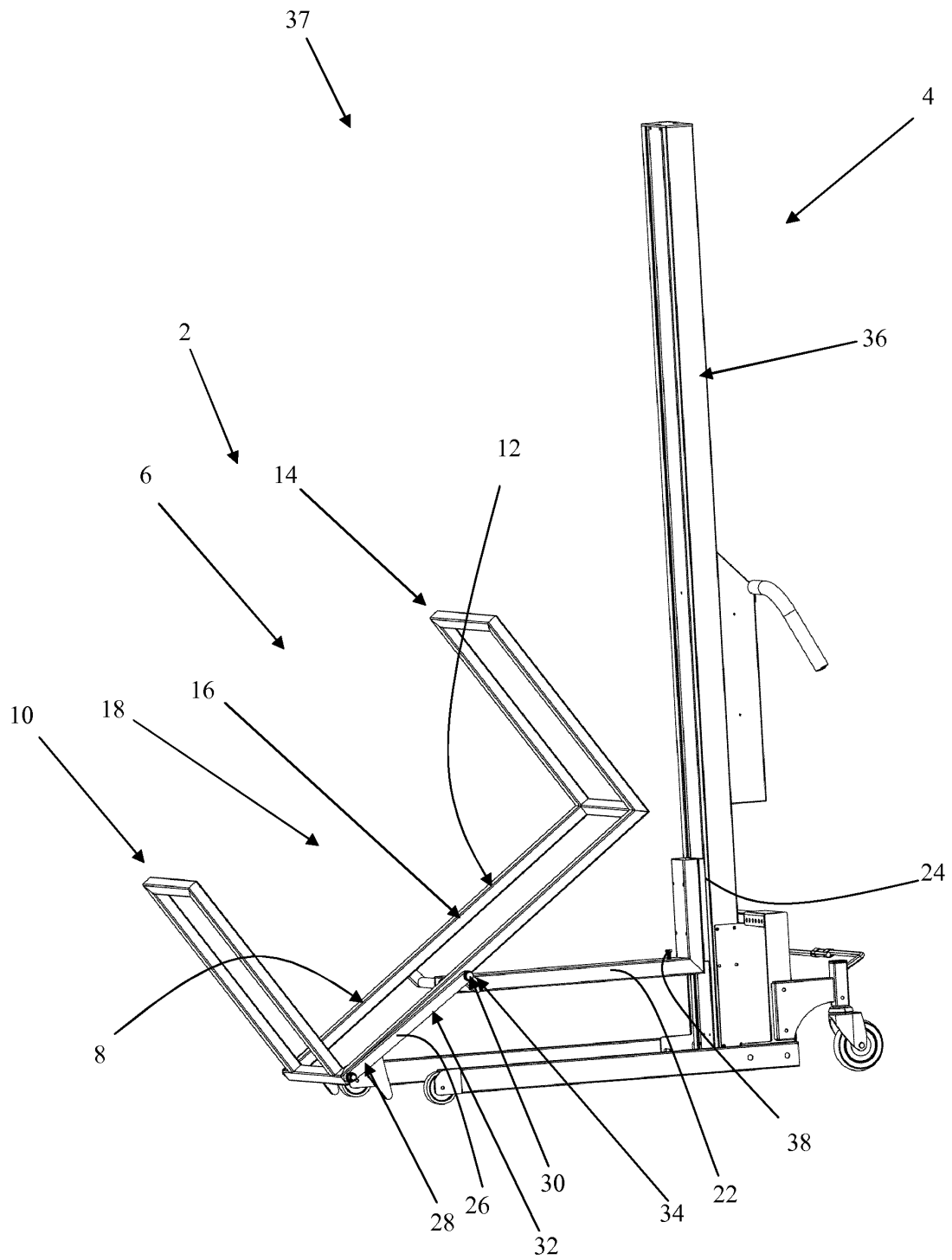


Fig. 2

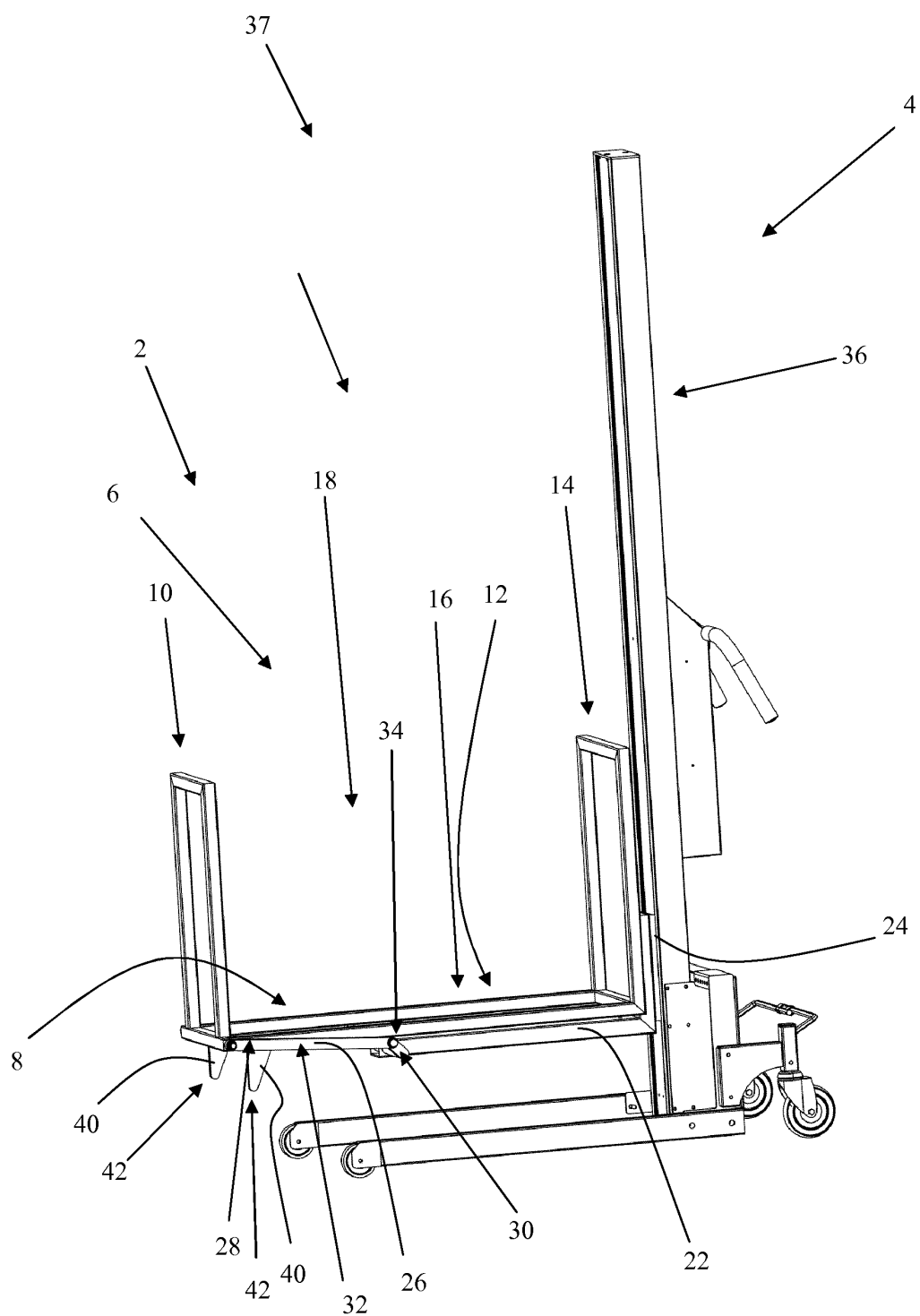


Fig. 3

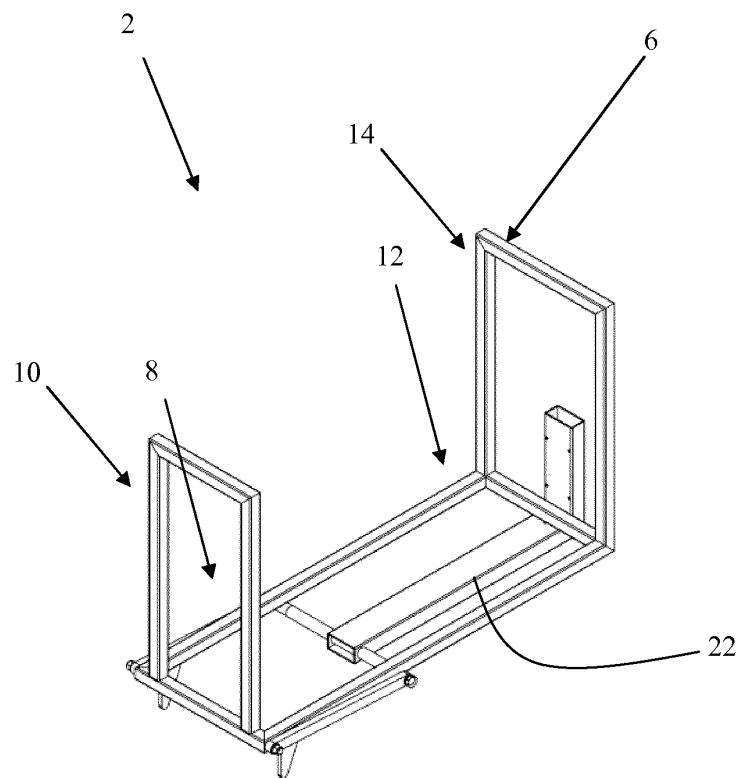


Fig. 4

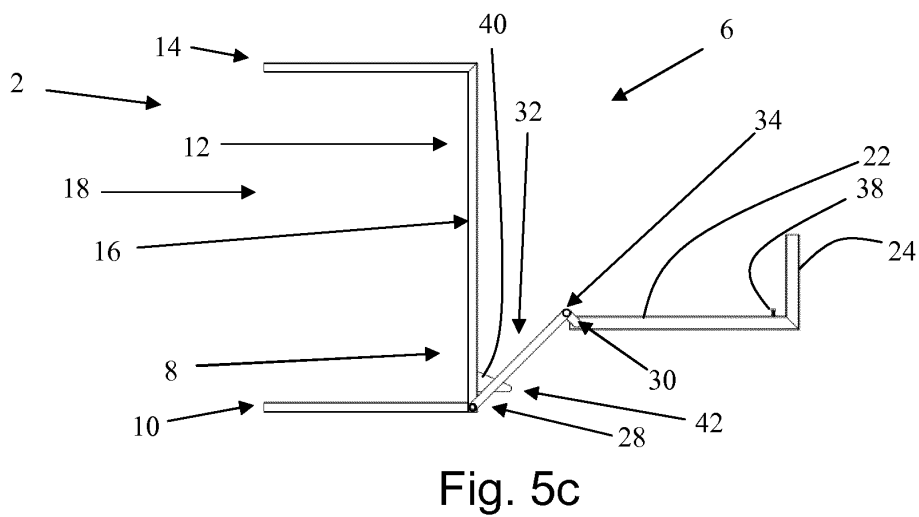
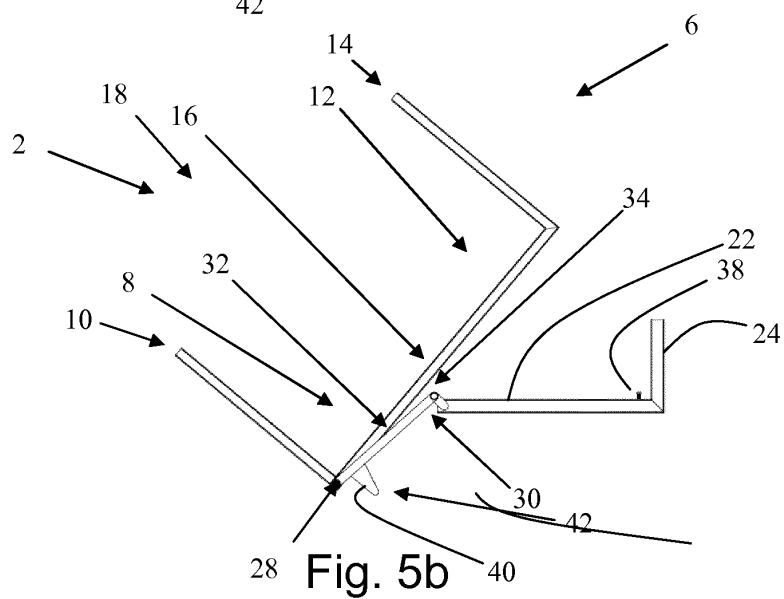
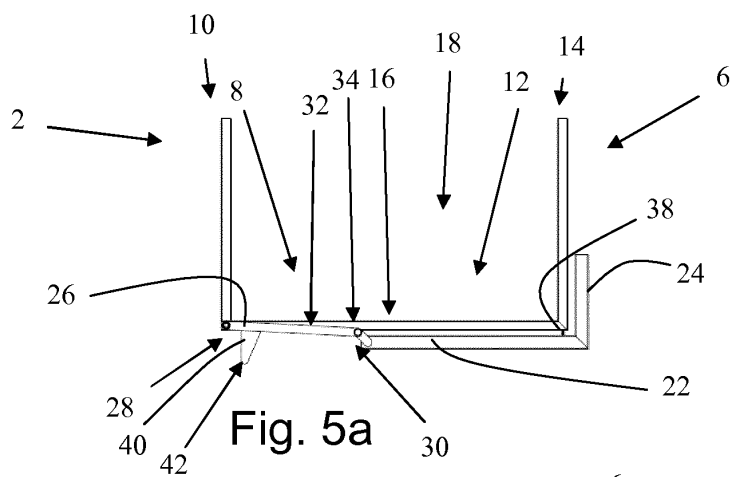


Fig. 5

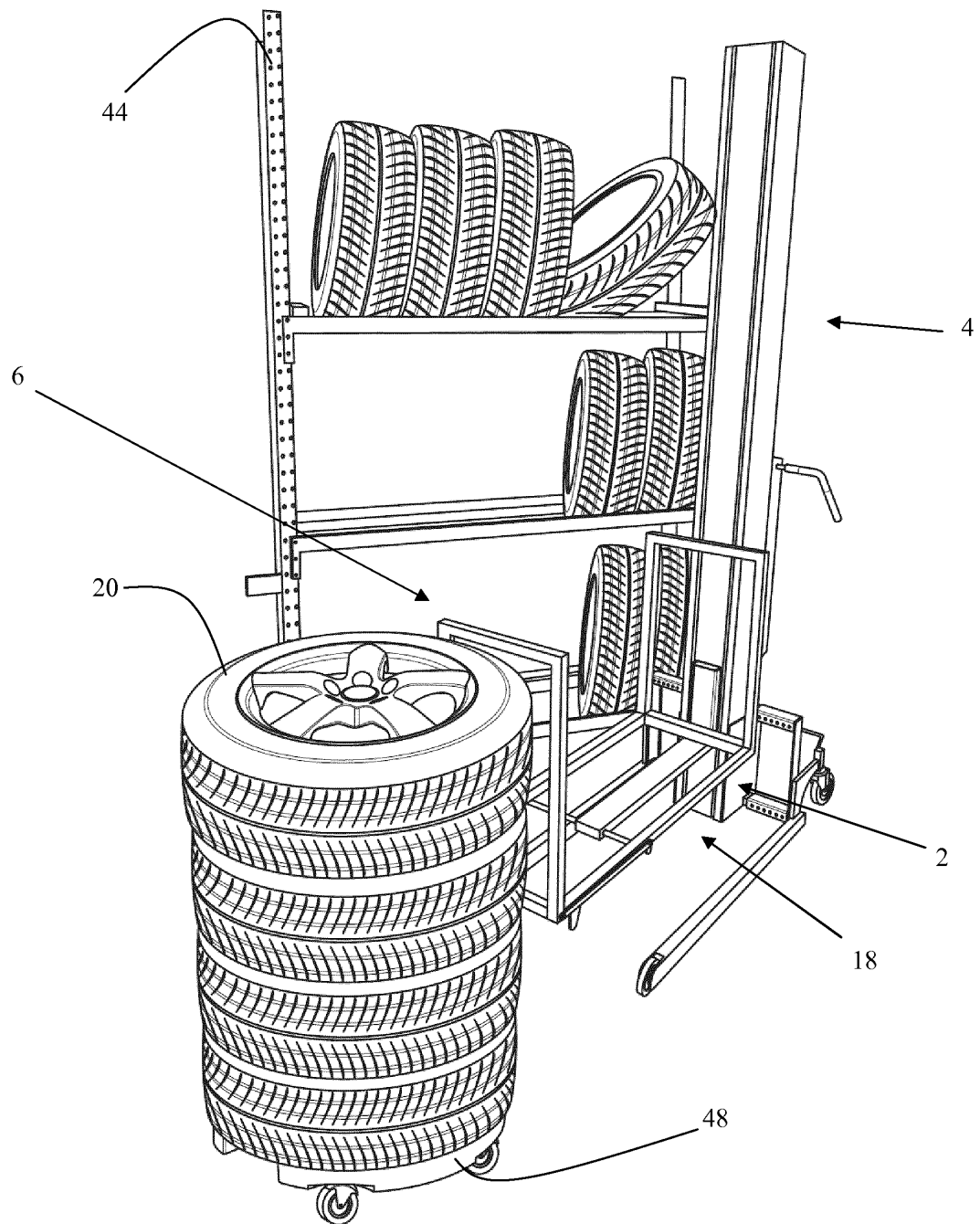


Fig. 6

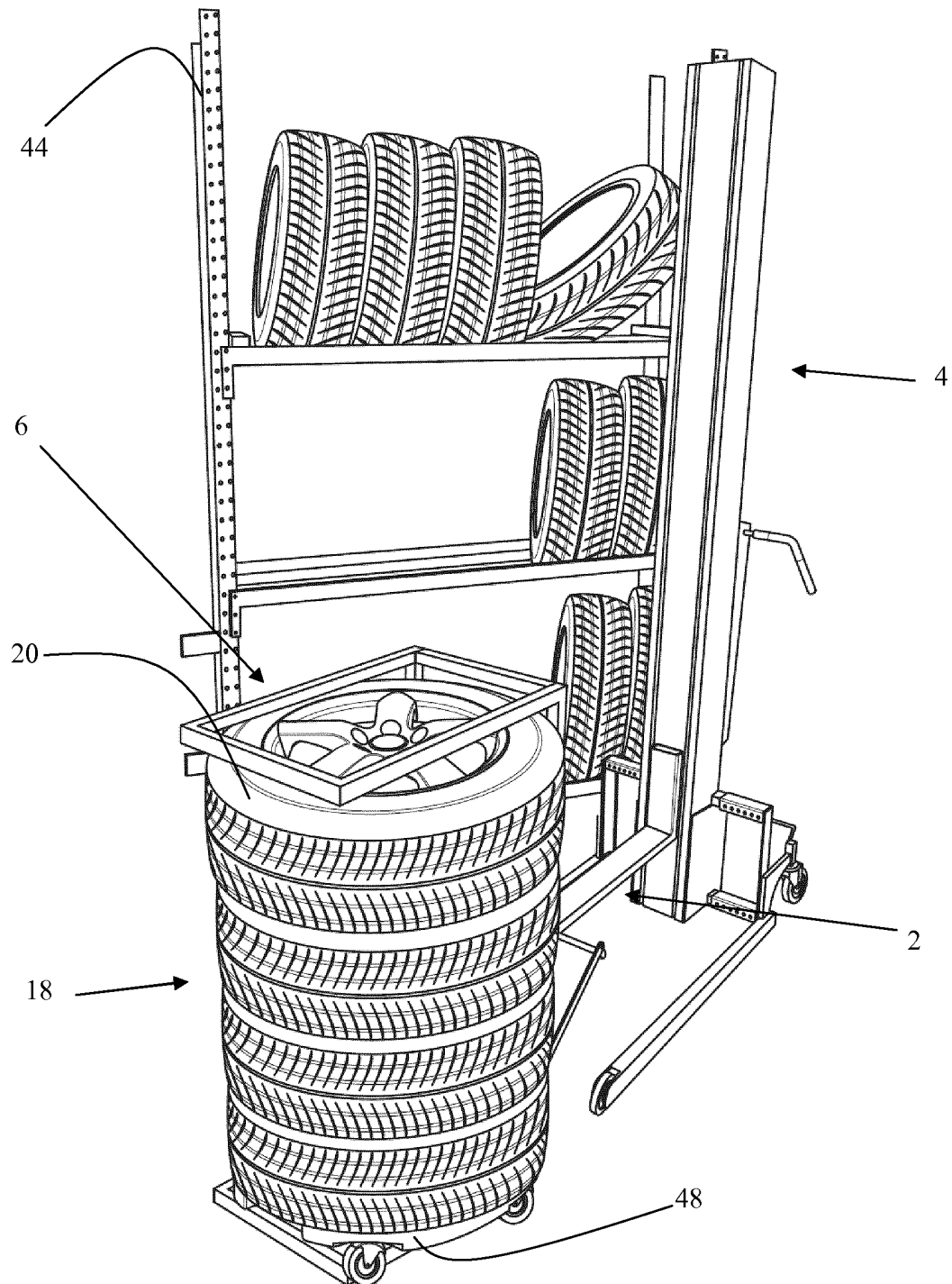


Fig. 7

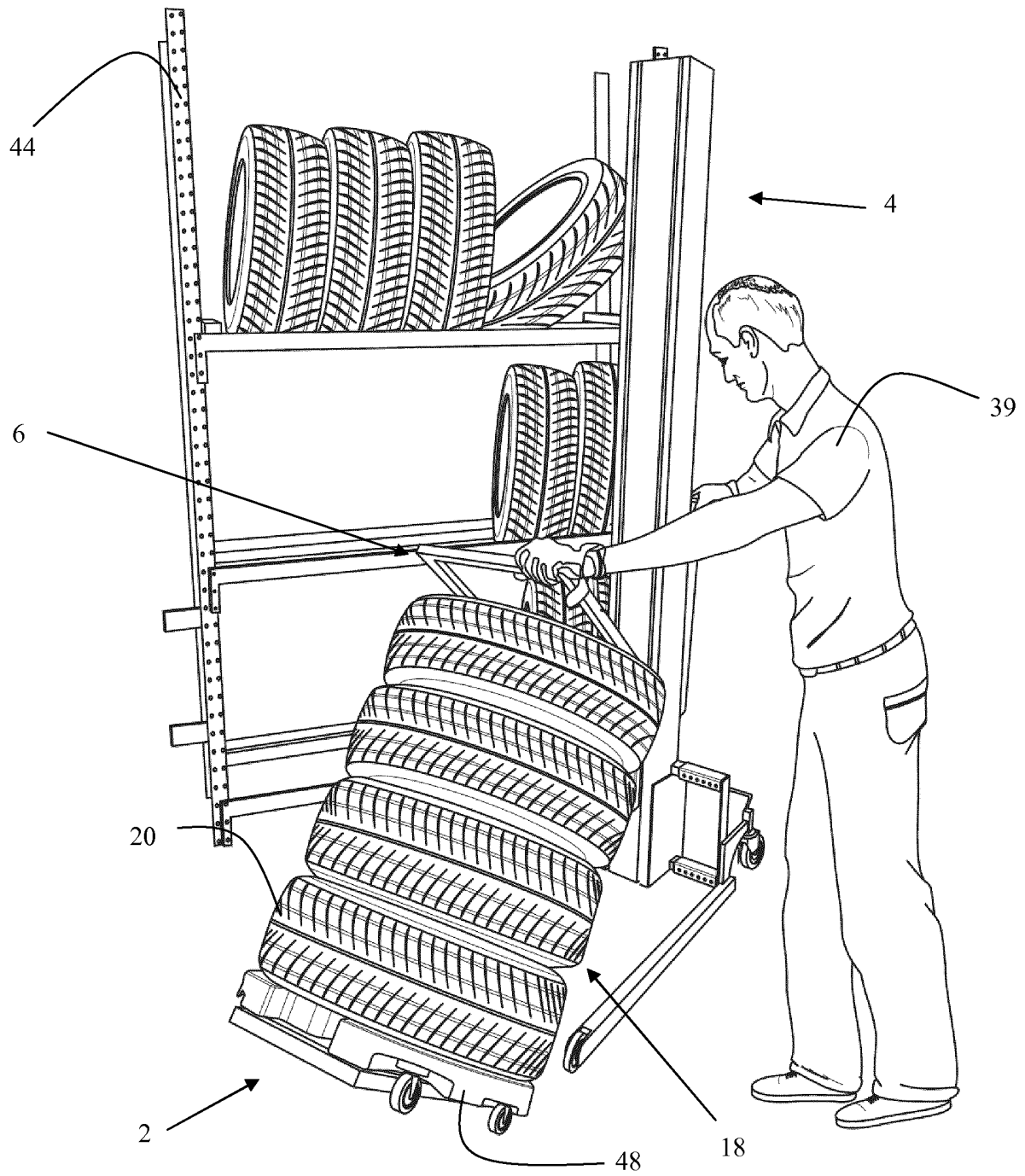


Fig. 8

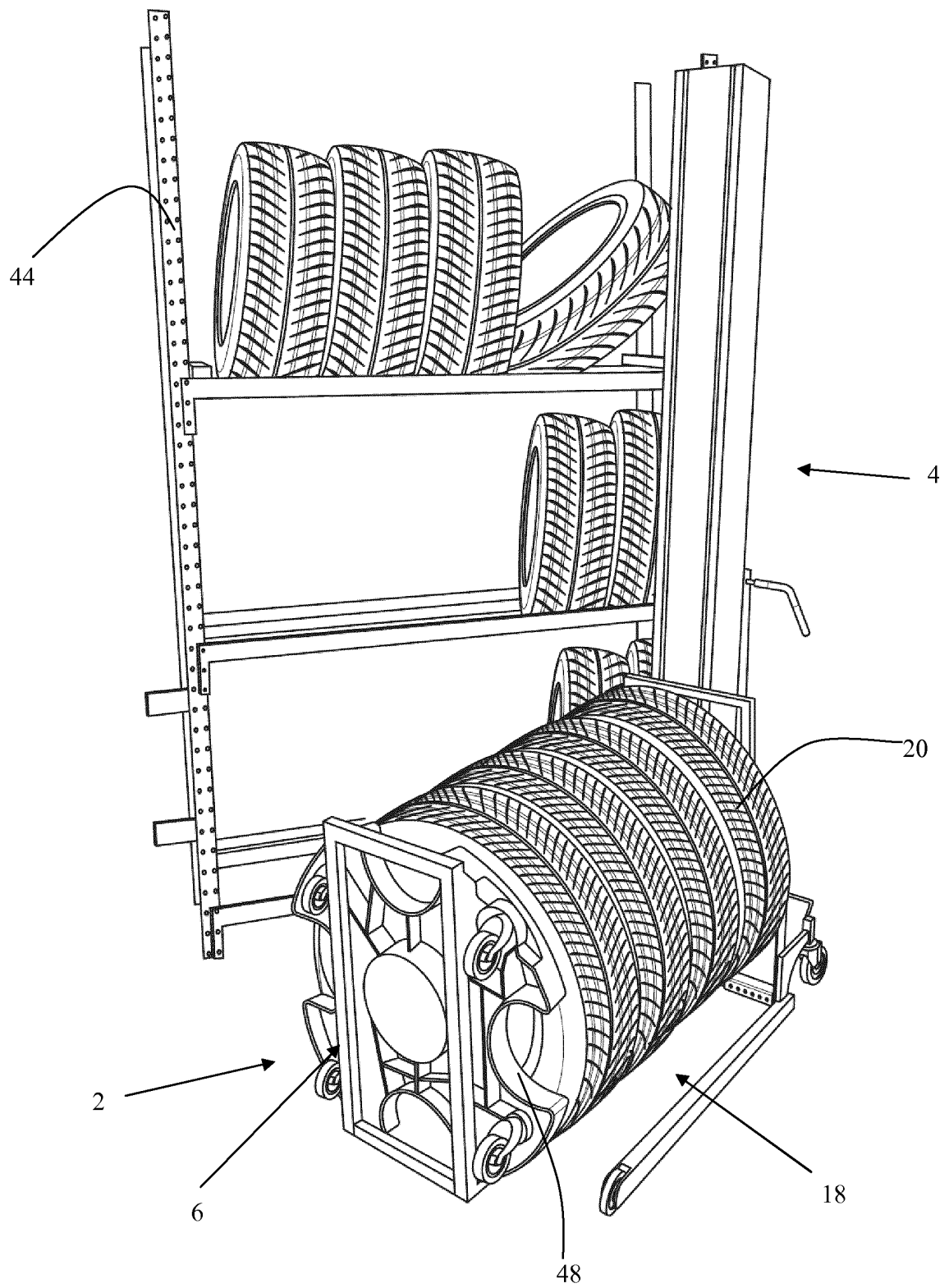


Fig. 9

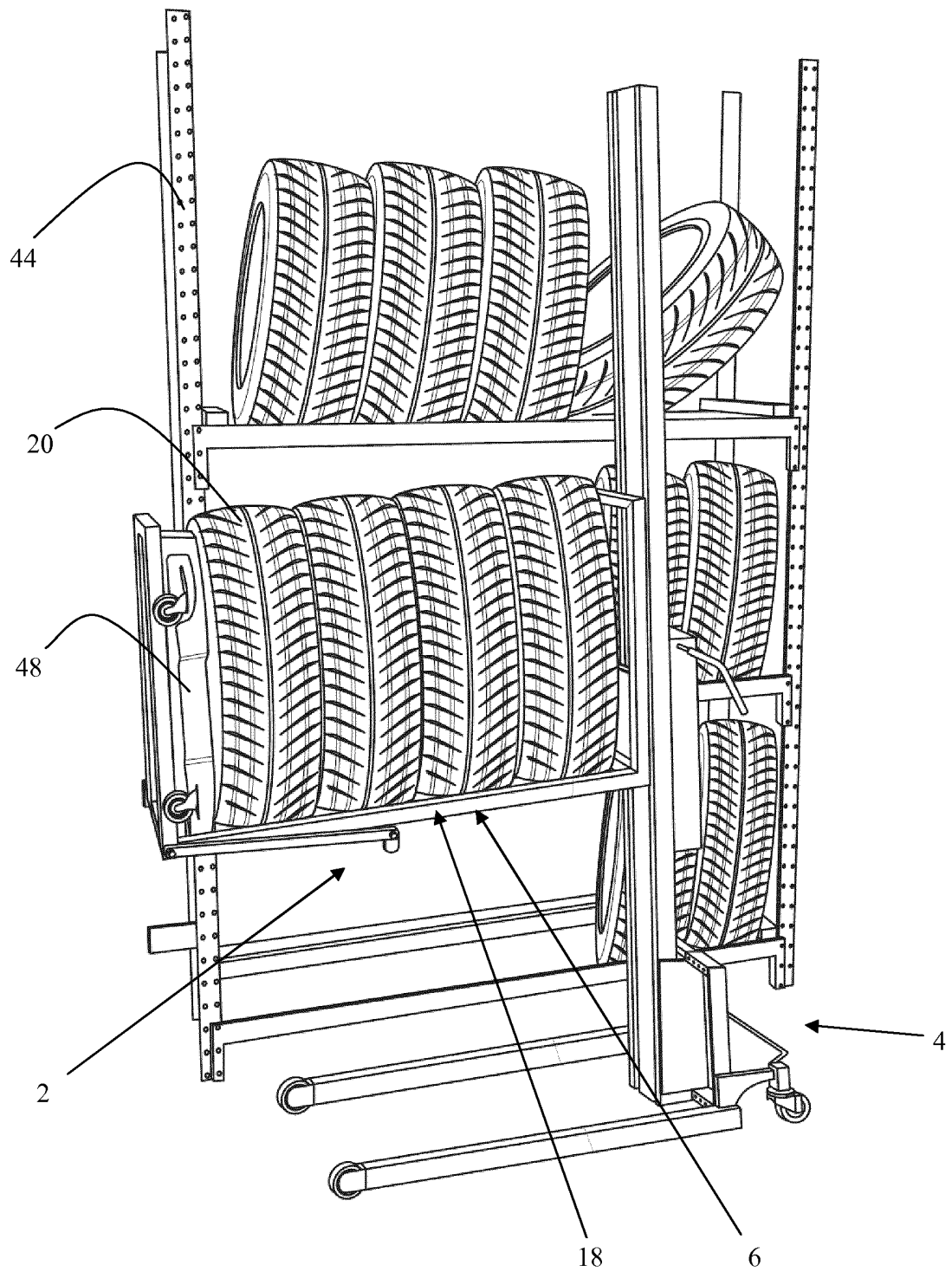


Fig. 10

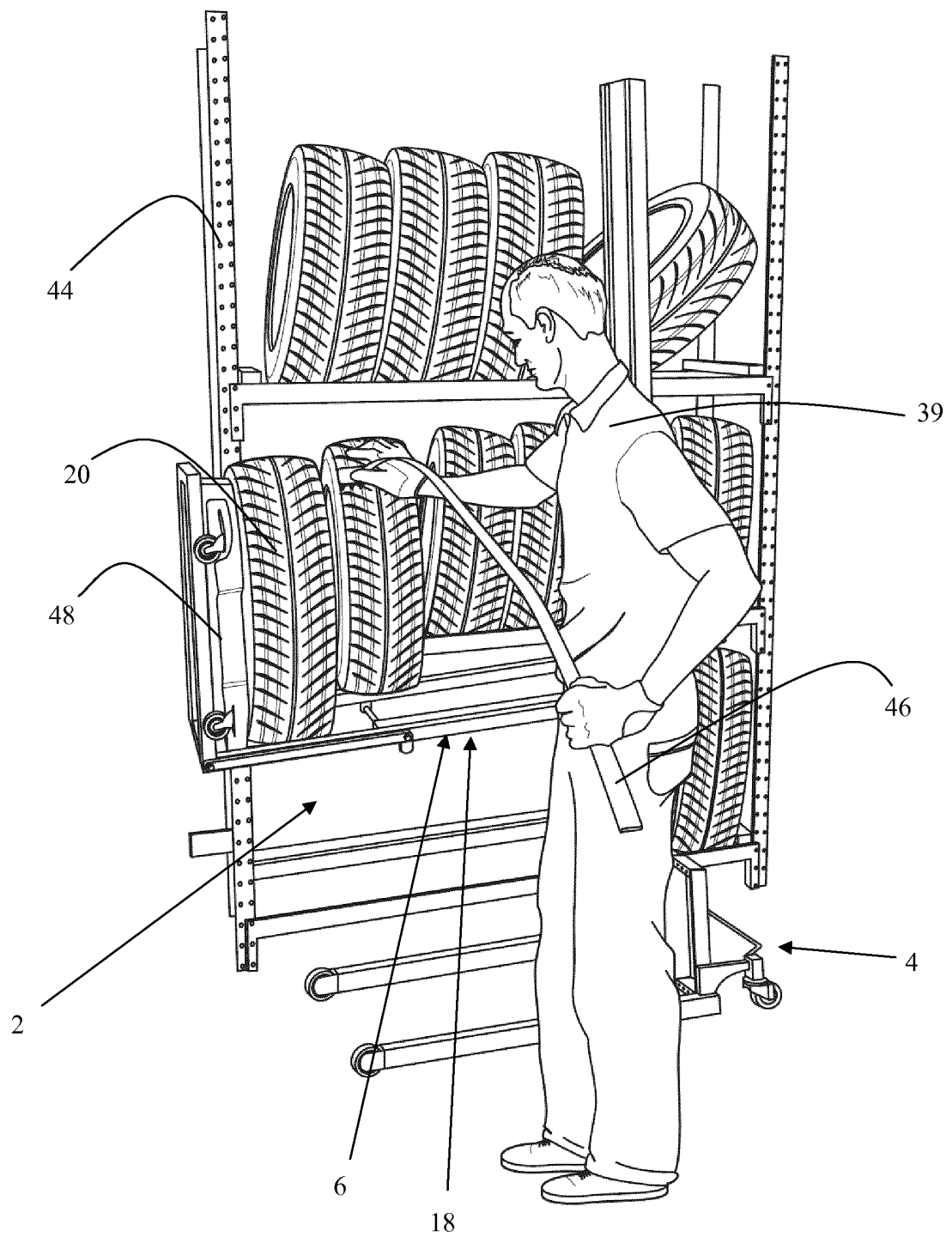


Fig. 11

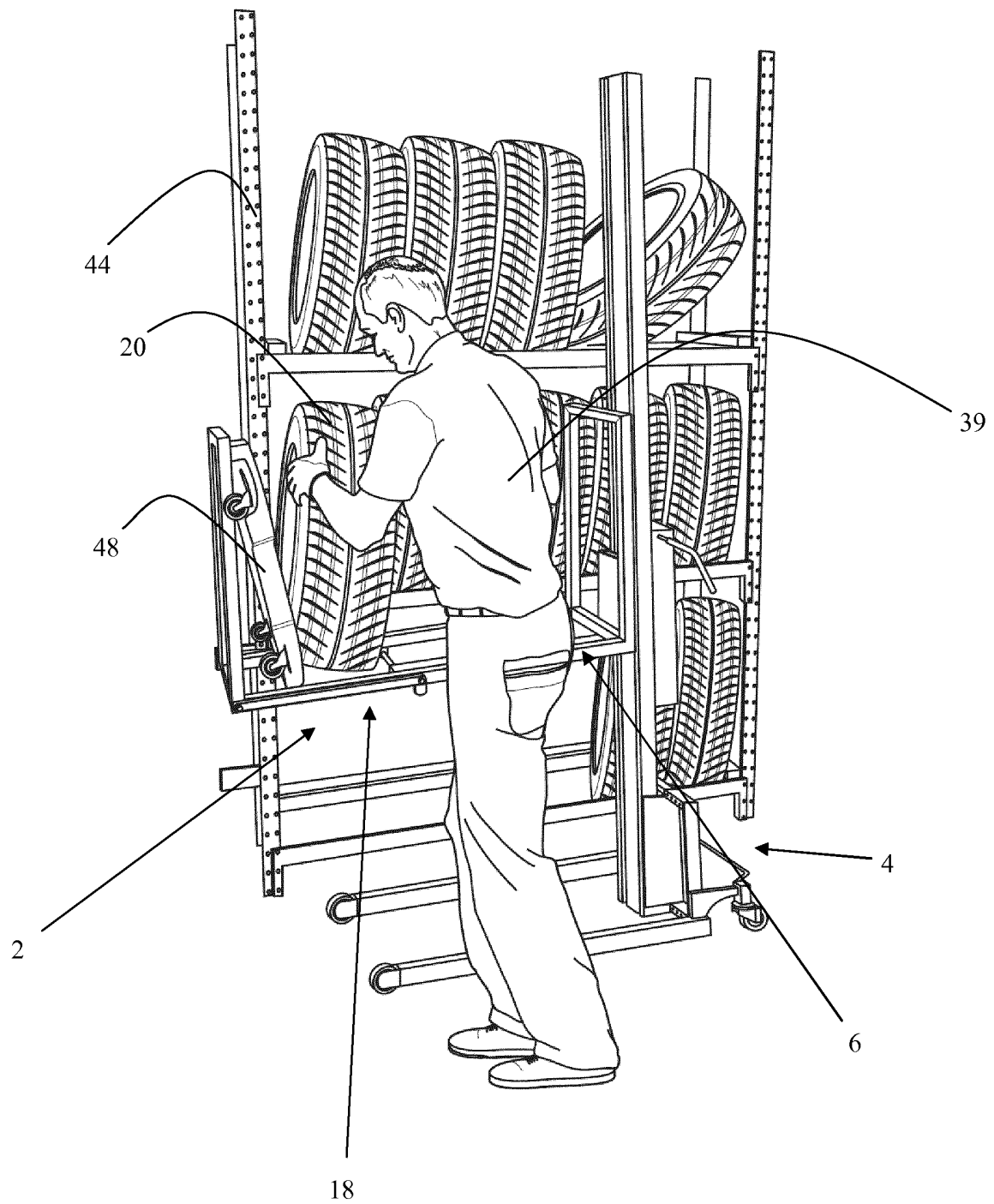


Fig. 12

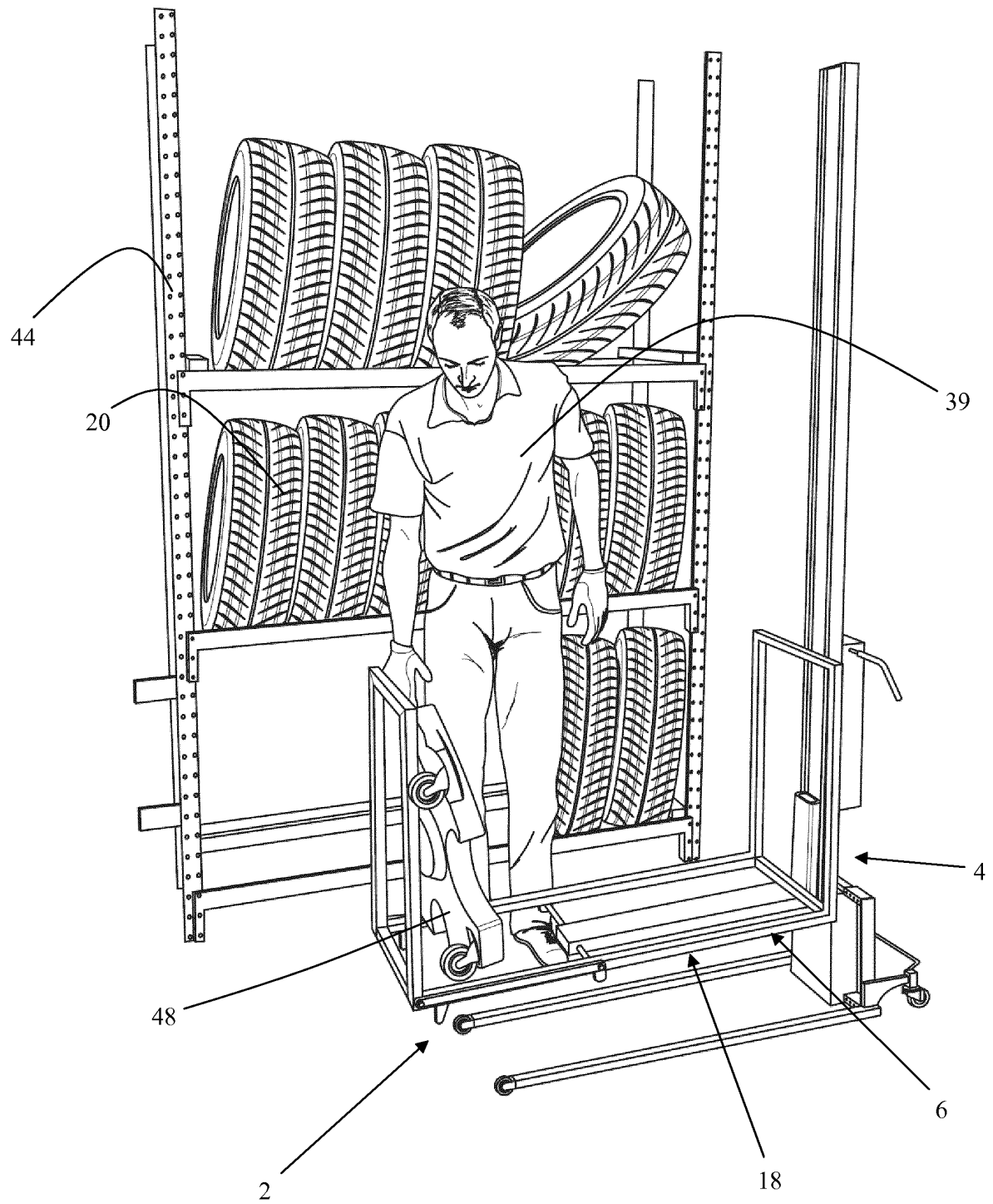


Fig. 13



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Application Number  
EP 12 19 1073

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