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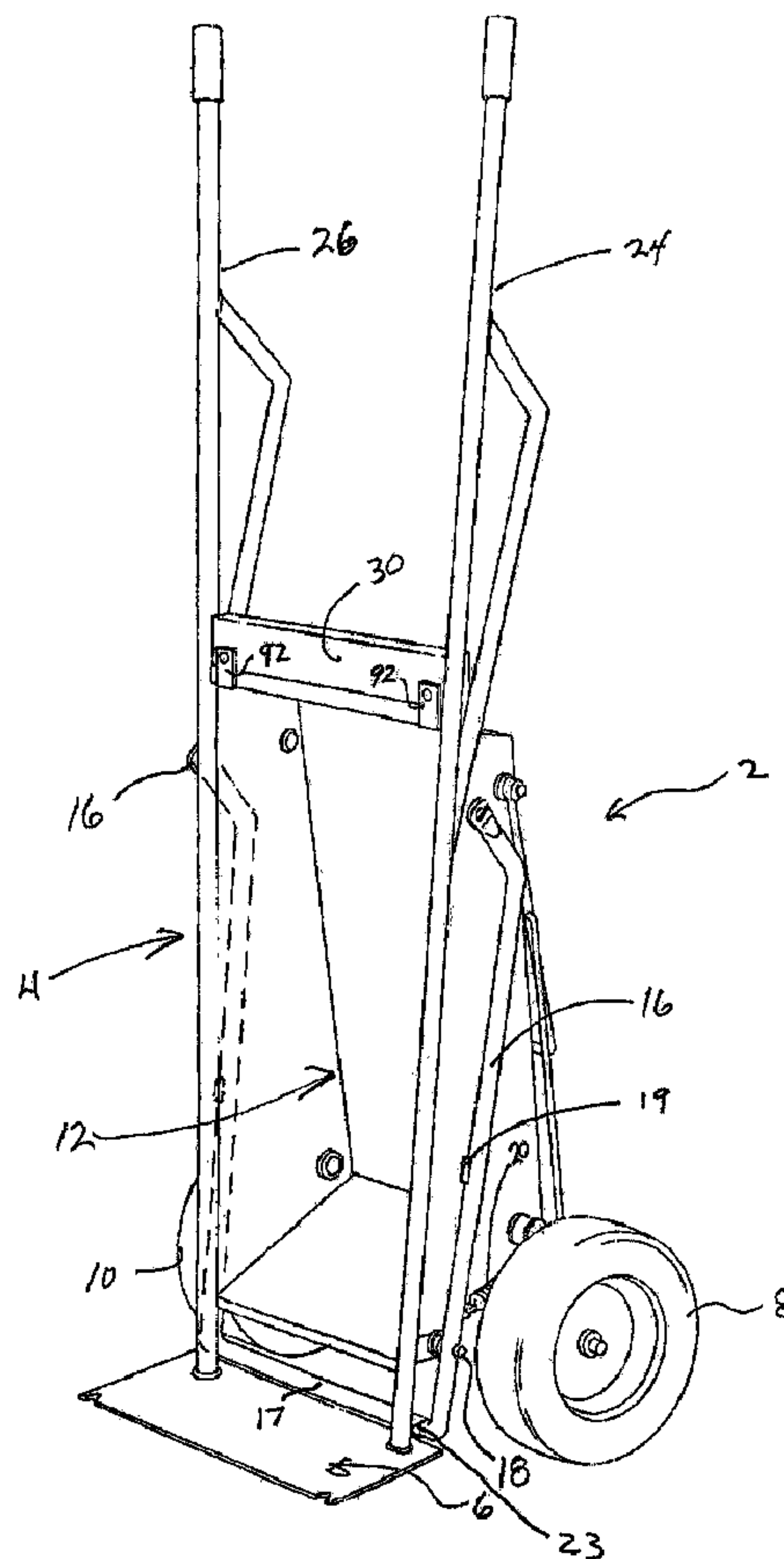
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(54) Titre : DIABLE POLYVALENT

(54) Title: MULTI FUNCTION HAND TRUCK



(57) Abrégé/Abstract:

A multi-function hand truck is convertible to allow lifting of a load at a spaced distance from the truck and/or is convertible for use as a wheelbarrow. A pair of lifting arms co-operate with the frame of the hand truck to extend outwardly therefrom and allow the frame

(57) **Abrégé(suite)/Abstract(continued):**

of the hand truck to provide a mechanical advantage for lifting. The wheels of the truck are moveable rearwardly for conversion to a wheel barrow mode. An open top container is positioned within the frame of the hand truck for receiving material. The multi-function hand truck is efficiently stored in a vertical orientation.

ABSTRACT OF THE DISCLOSURE

A multi-function hand truck is convertible to
5 allow lifting of a load at a spaced distance from the
truck and/or is convertible for use as a wheelbarrow. A
pair of lifting arms co-operate with the frame of the
hand truck to extend outwardly therefrom and allow the
frame of the hand truck to provide a mechanical advantage
10 for lifting. The wheels of the truck are moveable
rearwardly for conversion to a wheel barrow mode. An
open top container is positioned within the frame of the
hand truck for receiving material. The multi-function
hand truck is efficiently stored in a vertical
15 orientation.

WH 11 671CA

TITLE: MULTI FUNCTION HAND TRUCKFIELD OF THE INVENTION

5 The present application is directed to hand trucks used to move a variety of items. In particular, the invention relates to an improved hand truck having a series of operating modes.

10 BACKGROUND OF THE INVENTION

 Two wheeled hand trucks are commonly used for moving of refrigerators, stoves, boxes and other items. These hand trucks typically have an upright frame with two wheels located near the base of the frame and
15 slightly rearwardly thereof. Handles are provided at an upper portion for tipping of the frame once the load has been secured. A projecting plate is provided at the bottom of the frame for placing of the load thereon. In some cases the load can be merely tipped onto the frame
20 or in other cases straps are used to secure the load to the frame such that it tilts with the truck.

 These hand trucks come in various sizes and qualities and have a primary use in association with
25 delivery services such as the delivery of boxes.

 Attempts have been made to make hand trucks of this type suitable for other purposes and some of these hand trucks have removable handles and an extra set of
30 wheels on the frame. The truck can then be converted to a four wheeled wagon type structure for supporting packages or boxes.

 The structure of the present invention allows the
35 hand truck to be used in a host of different applications. In the preferred embodiment the hand truck operates in at least three distinct modes however

WH 11 671CA

operation in either of these additional modes is also valuable.

5 SUMMARY OF THE PRESENT INVENTION

A convertible wheeled device for carrying a load according to the present invention comprises an elongate frame with a pair of handles extending from one end of the frame and a pair of wheels pivotally secured either
10 side of the frame at an end thereof opposite said handles. The wheels are movable between a first operating position where the wheeled device is self supporting in a vertical orientation of the frame and a second position where the frame is at an angle to a
15 support surface and the wheels have moved rearwardly away from the end of said frame opposite the handles.

According to an aspect of the invention, the wheeled device is a hand truck with a support plate
20 extending from the frame at the end opposite the handles.

According to a further aspect of the invention, the wheeled device includes a load carrying cavity member interior to the frame and behind the frame.
25

In a further aspect of the invention, the device includes a control linkage for moving of the wheels between the first and second positions.

30 In yet a further aspect of the invention, a control linkage is provided for moving of the wheels between said first and second positions and the control linkage forms a support leg arrangement rearwardly of said wheels to form a wheelbarrow type device.

35

In a preferred aspect of the device, the control linkage is an over center linkage having a bias maintaining the linkage in the first operating position

WH 11 671CA

unless moved by a user to cause the wheels to move towards the second position.

5 In a different aspect of the invention, the wheels are movable to said second position after a load has been positioned on said support plate and in said second position the force of said load is primarily carried by said frame.

10 In a preferred aspect of the device, in the second position, said device can act as a modified hand truck for carrying of loads to a front side of said frame and can act as a wheelbarrow with a load being supported in an open top container located behind said frame with the
15 open top of said container being accessible through said frame.

In a different aspect of the device, a pair of lifting arms is provided. The lifting arms are movable
20 to a position forwardly of said frame for suspending a load between said support arms as said handles are moved downwardly causing said arms to rise and suspend the load therebetween.

25 Preferably the lifting arms are interconnected and pivotally secured to said wheeled device adjacent said end of said frame opposite said handles.

In a further aspect of the device, the lifting
30 arms include a bias arrangement urging said arms to a storage position generally parallel to said frame.

According to an aspect of the device, a chain and belt lifting arrangement is provided. The belt is
35 adjustable for securing about a periphery of an object to be lifted and the belt includes two chains for engagement with said lifting arms.

WH 11 671CA

In a preferred embodiment, the device is a wheelbarrow which is storable in a vertical orientation with said frame upright with said wheels in said first position. The wheelbarrow in said second position of said wheels is generally in a horizontal orientation of said frame with foldable legs extending downwardly relative to said frame.

In a preferred aspect, the foldable legs are part of a control linkage connected to and controlling the position of said wheels.

In a different aspect of the invention, the device is a hand truck operable in a conventional manner with the wheels in the first position. With the wheels in said second position, the hand truck supports a load positioned adjacent the end of the frame opposite the handles in a counterbalanced manner.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention shown in the drawings wherein;

Figure 1 is a partial perspective view of the multi purpose hand truck;

Figure 2 is a side view of the multi purpose hand truck;

Figure 3 is a perspective view of the dolly with the wheels moved to allow use of the hand truck in a wheelbarrow mode;

Figure 4 is a rear view of the hand truck with the wheels in the hand truck mode;

Figure 5 is a side view of the multi purpose dolly with the wheels being moved from a hand truck position to the wheelbarrow position;

Figure 6 is a partial perspective view showing details of the linkage used to support the wheels of the hand truck and also showing details of the mounting of a

WH 11 671CA

pair of lifting arms on either side of the hand truck frame;

Figure 7 is a side view of the hand truck with the lifting arms moved forwardly and supporting a load at a free end thereof;

Figure 8 is a partial perspective view showing the support of the lifting arms on the support plate of the frame;

Figure 9 is a partial perspective view showing a multi purpose hand truck acting as a storage truck for an outboard motor;

Figure 10 is a perspective view showing a multi purpose hand truck being used to support a bag for containing yard waste;

Figure 11 is a side view of the multi purpose dolly in the wheelbarrow position;

Figure 12 is a perspective view of an alternate embodiment;

Figure 13 is a front perspective view of the dolly with a removable support plate; and

Figure 14 is a rear perspective view illustrating storage of the support plate.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The multi purpose hand truck as shown in Figures 1, 3 and 7 has three separate and distinct modes. The hand truck as shown in Figure 1 is the conventional hand truck mode where the hand truck 2 has a vertical frame 4 with a support plate 6 provided at the base of the hand truck and a pair of wheels 8 and 10 on either side of the frame and adjacent to the support plate. Boxes, refrigerators or other items can be moved by sliding of the plate 6 beneath the load and with the load contacting the vertical frame 4. If desired, straps can also be used to secure the load to the hand truck. The vertical frame 4 has extending handles 24 and 26 which provide additional leverage for tilting of the hand truck and

WH 11 671CA

supporting the load against the frame 4. This is a standard use of a hand truck and it is normally the most common use for hand trucks.

5 The multi purpose hand truck 2 shown in Figure 3 is in the wheel barrow mode. The vertical frame 4 is now generally horizontal. The frame diverges slightly towards the extending handles 24 and 26 to provide space between handles 24 and 26 to allow a person to stand between the
10 handles, in the manner of a conventional open topped wheel barrow. The hand truck includes a load carrying container 12 within the frame to function in the manner of a conventional wheel barrow. This container can be made of metal and inserted in the frame or welded thereto
15 or it can be a reinforced plastic or molded material. As will be more fully explained, the wheels 8 and 10 are moveable rearwardly by a control linkage and are generally positioned below the cavity 12. Part of the linkage forms the support legs for the wheel barrow.

20

 Preferably, the container 12 terminates approximately intermediate the combined length of the frame 4 and the handles 24 and 26 and a wooden board 30 extends between the frames. This board provides a
25 support for one end of the container 12 and also provides a support surface for an outboard motor as will be more fully described in later drawings.

 The movement of the wheels 8 and 10 can be best
30 understood from a review of Figures 3, 4, 5 and 6. The wheels are mounted on shaft 40 which passes through the appropriate ports in the triangular members 42 and 44. These triangular members are pivoted to the hand truck at pivot point 46. The triangular plates 42 can move from
35 the hand truck position shown in solid lines in Figure 5 to the wheel barrow position shown in dotted lines in Figure 5.

WH 11 671CA

Each of the triangular plates has a control arm 48 attached thereto which is also pivotally secured to the leg member 50 intermediate its length. The leg member 50 is pivoted at 52 to the hand truck. The linkage 48 when the wheel is in the hand truck position of Figure 5 forms an over centred type latch and the wheel 8 remains locked in the hand truck position. To shift the wheels to the wheel barrow position, the user grasps the pivoting legs 50 and pulls upwardly as shown in Figure 5. This causes pivoting of the triangular plate 44 about pivot point 46 through the center point and movement of the wheels rearwardly beneath the cavity 12. The triangular plates 44 and 42 each include a stop face 56. These act as stops positioning the wheels in the wheel barrow orientation of Figure 3. The weight of the hand truck on its own maintains the wheels in the position of Figure 3 during use and as such it also maintains 50 pivoting legs in the position of Figure 3. Thus, the hand truck has been converted to a wheel barrow having two wheels either side of the container 12. The wheel barrow is converted back to the hand truck, merely by tipping of the wheel barrow on end and movement of the legs to the position of Figure 4. The linkage effectively forms an over center linkage.

25

The movement of the wheels between the two positions has been described with respect to the control linkage. Other arrangements for locking the wheels in two or more positions are possible and movement of the wheels by means of the control linkage is only the preferred embodiment.

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The foldable legs for the wheelbarrow mode could operate independently of the wheels. For example, each leg could be pivotally movable from a storage to an in use position.

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WH 11 671CA

Figure 5 also illustrates a further use of the hand truck 2 where a load normally moved in the hand truck mode is carried in the wheelbarrow mode. This is accomplished by initially placing the load on the support plate 6 and holding of the load by straps or other means against the frame 4. The wheels of the hand truck are released as the dolly is initially tipped rearwardly. Further tipping of the frame causes the wheels to move to the wheelbarrow position. The base of the frame 4 and the wheels allow the hand truck to be stable or self supporting with the frame at an angled position. The leg members 50 are well above the ground. The cross connecting segment 51 can be used as a handle to pull the linkage rearwardly past the center point as the hand truck is tilted rearwardly. The load is now supported on the hand truck and the handles are pushed downwardly to allow transport. Once the user arrives at the desired location, the hand truck can tip upwardly until the front of the frame contacts the ground. It can stay in this position until the load is to be unloaded. To unload, the user merely tips the hand truck forwardly and the wheels automatically return to the hand truck position and lock in the over center position.

Therefore, the hand truck can be used in the normal hand truck mode or it can be used in a modified hand truck mode by allowing the wheels to move rearwardly as the hand truck is tilted rearwardly. This provides an in use conversion of the hand truck from a standard hand truck mode to a modified hand truck wheelbarrow mode. This feature is useful in moving large items such as air conditioners. The storage at the angled position allows the load to be maintained on the hand truck in a position where it can easily be moved in contrast to a conventional hand truck. This arrangement can be used without the wheelbarrow capability. For example, a dedicated hand truck which is convertible to this second in use position is desirable for many delivery or moving

applications.

Furthermore, once the load is on the frame, and the wheels moved rearwardly, the hand truck can be used in the wheelbarrow orientation. The legs 50 can support the hand truck and any load applied thereto.

Movement of the wheels rearwardly changes the balance point of the hand truck. The hand truck with the wheels moved rearwardly and supported by the front edge of the frame, is stable for most loads. Tilting of the hand truck rearwardly initially requires a downward load on the handles until a balance point is reached. Further, movement past the balance point requires a user applied upward force on the handles. The force the user must apply is more desirable due to the changing geometry and change in the angle of the frame relative to the load.

A further embodiment is shown in Figure 7. A pair of lifting arms 16 are pivotally secured to the hand truck and are moveable against spring bias to a load carrying position shown in Figure 7. In this case, the rear connecting bar 17 of the arms 16 engage the downwardly extending flanges 45 on the surface of the load cavity 12 and also engage the front edge of the support plate 6. Notches 11 have been provided in the support plate 6 and engage complimentary members 19 on the bottom surface of the lifting arms 16. The lifting arms 16 have a hand truck 24 and 26 of the hand truck and provide considerable mechanical leverage for lifting of the generally heavy load suspended in from of the hand truck. The hand truck may be moved towards the appropriate planting location and the ball of the tree lowered into the hole by allowing the handle to move upwardly.

WH 11 671CA

As shown in Figure 7, a spring 70 is connected to the lifting arms 16. The opposite end of the spring is attached to the pivot position 71 which supports one of the plates 42 or 44. The spring 70 provides a bias to bring the lifting arms back to the vertical orientation shown in Figure 1. The spring is extended as the arms to move to the load transfer position of Figure 7 and provides a bias to return the arms to the storage position. A rubber stop 23 engages the frame and limits movement of the arms.

In Figure 7, the arms are engaging the end of the plate and are also engaging front face of the cavity 12. The arms pivot about point 73 however, the load is effectively being transferred to the frame through the cavity 12 and the support plate 6. It has been found that this arrangement is very effective for lifting of heavy loads which are to be maintained in a generally vertical orientation. As can be appreciated the chain allows pivoting of the load. The chain and belt arrangement allows suspension of different loads. The arms 16 include "U" shaped slots for engaging the chains at different positions. This lifting arrangement also has application for large cement pots with soil and flowers or plants which are to be moved.

To use the lifting arms 16, the hand truck is brought up to the item to be lifted and the truck is stood vertically a short distance from the item such as a flower pot. The chain and belt arrangement 95 is secured to the item. The arms 16 can then be lowered by hand to be located on either side of the item. The chains can then be releasably attached to the "U" shaped slots 97. The hand truck may then be pivoted until the arms 16 engage the support plate 6. Further lifting of the hand truck will start to lift the item while allowing it to pivot and maintain a vertical orientation given the weight is generally symmetrical with a low center of

WH 11 671CA

gravity (flower pot, tree with root ball, etc). The lift is from either side of the item leaving the center unobstructed which is particularly advantageous for nursery stock and in use flower pots. The mechanical advantage can be increased by extending the handles 24 and 26 or decreasing the arms 16. A 3 to 1 ratio is easily provided and found to be satisfactory.

It is also possible to use the lifting arms with the wheels moved to the rearward or second position. Some mechanical advantage is lost, however, the angle of the frame has changed and may be more desirable to maneuver, or easier for the user.

Figure 10 shows a further use of the hand truck. Clip members 92 secured to the cross board 30 are used to engage an interior edge of the recyclable compost bag 100. The bottom of the bag 10 is supported by the support plate 6. Any refuse bag or container can be held in this manner. Figure 9 shows the hand truck being used for supporting the outboard motor 110. The support plate 6 provides a positive support to maintain the cart in the vertical orientation for storage. The center of gravity of the motor is generally above and aligned with the board 30.

Figure 12 illustrates an alternate embodiment having a pivoting dolly plate 150 movable from the operating position to a storage beneath and to the exterior of the local cavity 12. The dolly plate 150 has a sleeve bearing 152 mounted on tube 153 which forms a lower portion of the frame of the hand truck. Carriage bolts 158 and 160 pass through holes in the tube 153 and lock the dolly plate in either the operating position shown in Figure 12 or a storage position where the dolly plate is rotated counter clockwise and positioned beneath the hand truck. Carriage bolts 158 and 160 are removable to allow the dolly plate to be locked in one of the two

WH 11 671CA

positions.

Stub arms 154 and 156 are attached to vertical portions of the frame 4. Thus, the upward angling of stub arms 154 and 156 maintain engagement of the arms when a load is applied to the arms.

The pivoting plate 150 is moved to the storage position leaving the front of the hand truck unobstructed by rotating counterclockwise and moving the lifting arms 16 forwardly to allow the dolly plate to clear the connecting bar 17 which has moved rearwardly.

It is also possible to merely have a detachable dolly plate which is releasably secured to the hand truck. Preferably the dolly plate is stored on the hand truck ready for attachment.

Figure 13 shows the mobile hand truck 2b where the plate 6a is removably secured to the base of the frame 4. Two holes 180 and 182 are provided on the frame and receive hook extensions 184 and 186 extending from the rear edge 188 of the flange 7. The support plate is secured by tilting thereof, relative to the frame 4 and inserting the hook extensions 184 and 186 into the holes 180 and 182. The support plate 6a is then pivoted to the in use position.

Figure 13 also shows how the container 12 can extend to the cross member of the frame.

Figure 14 shows storage of the plate 6a to the back of the wheelbarrow container 12. The support plate includes a notch recess 190 and a hole 192 on the flange 7. The notch recess is placed under the rearwardly extending hook 194 which then overlaps with the flange 7. The rearwardly extending hook limits pivoting movement of the stored support plate when the dolly is in use as a

WH 11 671CA

wheelbarrow or other lifting device. The hole 192 is aligned with and inserted on the stud 196. Stud 196 has a hole drilled therethrough for receiving the safety pin 198. Elongate projection 199 serves to space the support plate 6 slightly off the bottom of the container 12. This is preferable if the container is painted. The elongate projection 199 can be shaped as a wedge to provide an interference fit.

10 The removable dolly plate or the pivoting or storing dolly plate is desirable when the hand truck is primarily used as a vertically storing wheelbarrow and is only intended to be used as a hand truck occasionally.

15 Other arrangements for releasably securing and/or movement of the dolly plate between an operating position and a storage position are possible and within the scope of the present invention.

20 The multi purpose hand truck 6 quickly converts from the wheelbarrow mode of Figure 11 to the hand truck mode of Figure 1. The wheel barrow mode of Figure 11 functions in a comparable manner with conventional wheel barrows with the exception that it can be easily stored vertically as a hand truck. Furthermore the wheels 8 and 10 in the hand truck mode are positioned below and within the depth of the cavity 12 providing further efficiency in storage. Many homeowners need a wheel barrow but the storage thereof is difficult. The present design provides an effective solution to this problem.

35 The multipurpose hand truck 6 can be used as a conventional hand truck or dolly and has a further lifting and transport arrangement using the lifting arms 16. Movement of the wheels rearwardly and the cavity 12 allows it to be used as a wheel barrow. Although all three functions are desirable in the single design as shown any two of the functions provide significant

WH 11 671CA

improvements over the prior art. For example, the hand truck and lifting arms can be used with existing hand trucks without the wheel barrow function. In this case, the wheels do not need to move and the design is simplified. Other arrangements for securing of the lifting arms are also possible.

A wheel barrow which can easily be stored is also possible with the present invention. Arrangements other than the support plate 6 can be used for rendering the arrangement stable in the vertical storage orientation. A wheel barrow and lifting arm structure provides a structure particularly suited for gardening and lifting applications around the home.

15

Although various preferred embodiments of the present invention have been described in detail, it will be appreciated by those skilled in the art that variations may be made without departing from the spirit of the invention or the scope of the appended claims.

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WH-11671CA
SN 2,391,204

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A convertible wheeled device for carrying a load comprising an elongate frame with a pair of handles extending from one end of said frame and a pair of wheels pivotally secured either side of said frame at an end thereof opposite said handles, said wheels being movable between a first operating position where said wheeled device is self supporting in a vertical orientation of said frame and a second position where said frame is at an angle to a support surface and said wheels have moved rearwardly away from said end of said frame opposite said handles; and wherein
said frame supports an open top load carrying container located generally within and behind said frame.
2. A convertible wheeled device as claimed in claim 1 wherein said device is a hand truck with a support plate extending from said frame at said end opposite said handles.
3. A convertible wheeled device as claimed in claim 1 or 2 wherein said device includes a pair of lifting arms movable to a position forwardly of said frame for suspending a load between said support arms as said handles are moved downwardly causing said arms to rise and suspend the load therebetween.
4. A convertible wheeled device as claimed in claims 1, 2 or 3 including a control linkage for moving of said wheels between said first and second positions.
5. A convertible wheeled device as claimed in claims 1, 2, or 3 including a control linkage for moving of said wheels between said first and second positions and wherein said control linkage forms a support leg arrangement rearwardly of

WH-11671CA
SN 2,391,204

said wheels to support said convertible wheeled device in said second position.

6. A convertible wheeled device as claimed in claim 5 wherein said linkage is an over center linkage having a bias maintaining said linkage in the first operating position unless moved by a user to cause the wheels to move towards the second position.

7. A convertible wheeled device as claimed in claim 4 wherein said linkage is an over center linkage having a bias maintaining said linkage in the first operating position unless moved by a user to cause the wheels to move towards the second position.

8. A convertible wheeled device as claimed in claim 7 wherein said wheels are movable to said second position after a load has been positioned on said support plate and in said second position the force of said load is primarily carried by said frame.

9. A convertible wheeled device as claimed in claim 8 wherein the force of said load provides a bias moving said wheels to said second position after said linkage has moved through the center position of said linkage.

10. A convertible wheeled device as claimed in claim 2 wherein said support plate is pivotally secured to said frame and movable between a storage position and an operating position.

11. A convertible wheeled device as claimed in claim 10 includes means for locking said support plate in either said storage position or said operating position.

WH-11671CA
SN 2,391,204

12. A convertible wheeled device as claimed in claim 3 wherein said lifting arms are interconnected and pivotally secured to said wheeled device adjacent said end of said frame opposite said handles.

13. A convertible wheeled device as claimed in claim 12 wherein said lifting arms include means for maintaining said arms in a storage position generally parallel to said frame and movable to an operating position.

14. A convertible wheeled device as claimed in claim 13 wherein said lifting arms at free ends thereof including a support arrangement for allowing suspension of load generally centered between said free ends.

15. A convertible wheeled device as claimed in claim 14 said lifting arms are each slotted at the free end thereof to engage a chain.

16. A convertible wheeled device as claimed in claim 15 including a chain and belt lifting arrangement, said belt being adjustable for securing about a periphery of an object to be lifted, said belt including two chains for engagement with said lifting arms.

17. A convertible wheeled device as claimed in any one of claims 1 to 16 wherein said device is a wheelbarrow storable in a vertical orientation with said frame upright and said wheels in said first position, said wheelbarrow in said second position of said wheels being supported in a generally horizontal orientation of said frame by means of said wheels with said foldable legs extending downwardly relative to said frame.

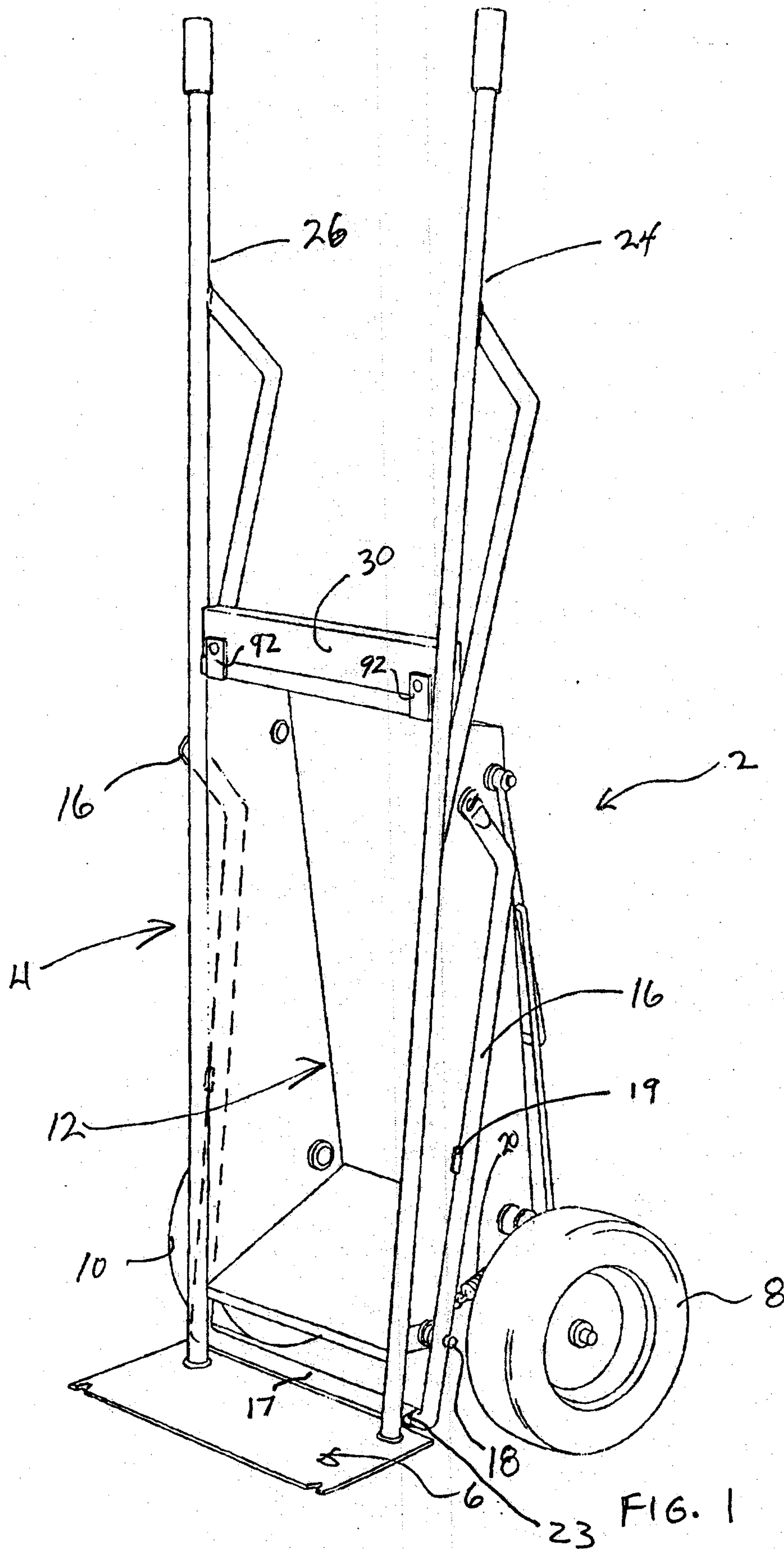
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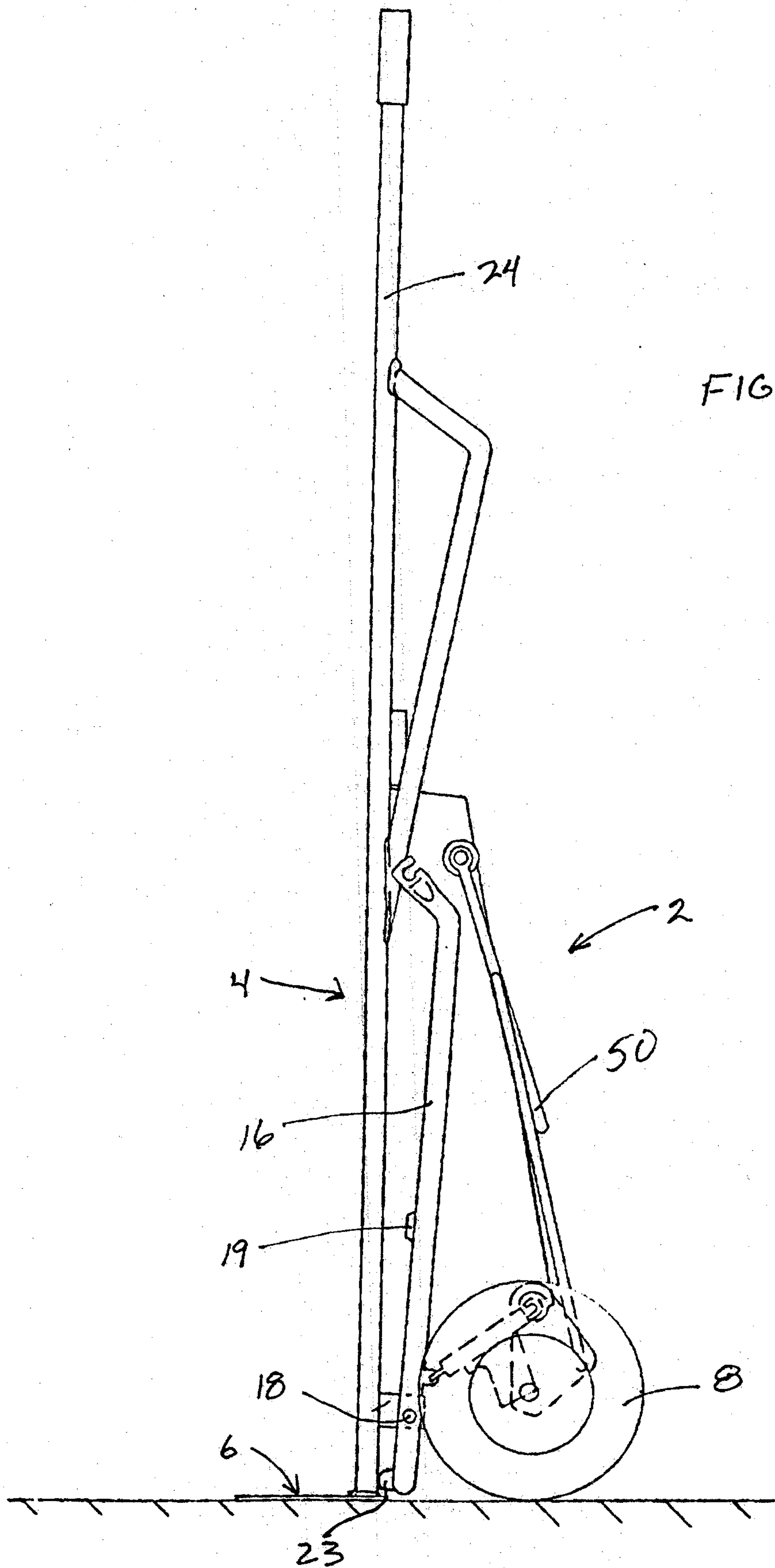
18. A convertible wheeled vehicle as claimed in claim 17 wherein said foldable legs are part of a control linkage connected to and controlling the position of said wheels.

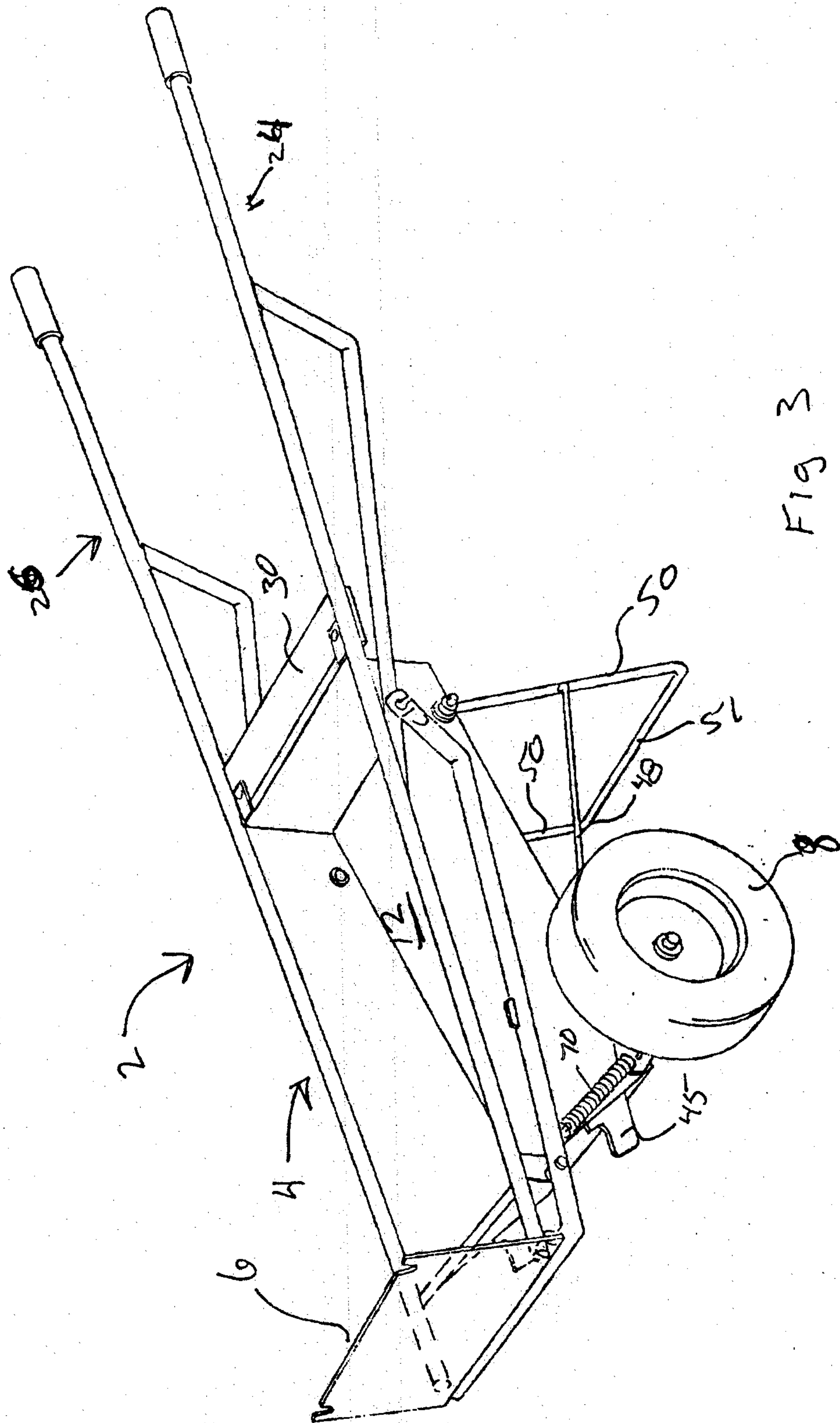
19. A convertible wheeled vehicle as claimed in claim 18 wherein said control linkage engages a stop member attached to said frame.

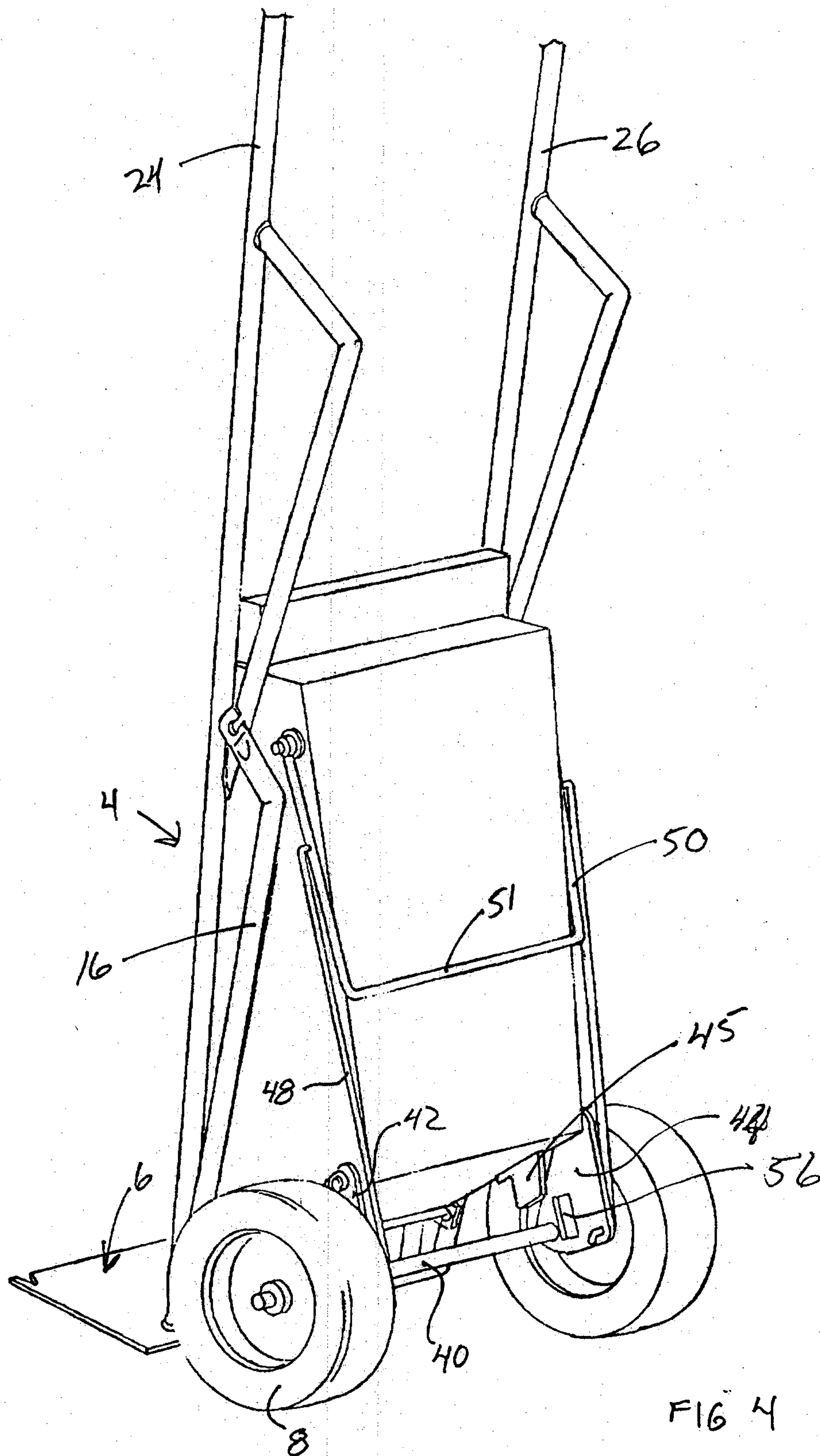
20. A convertible wheeled vehicle as claimed in claim 1 wherein said vehicle is a hand truck operable in a conventional manner with said wheels in said first position and with said wheels in said second position said hand truck supports a load positioned adjacent said end of said frame opposite said handles in a counterbalanced manner.

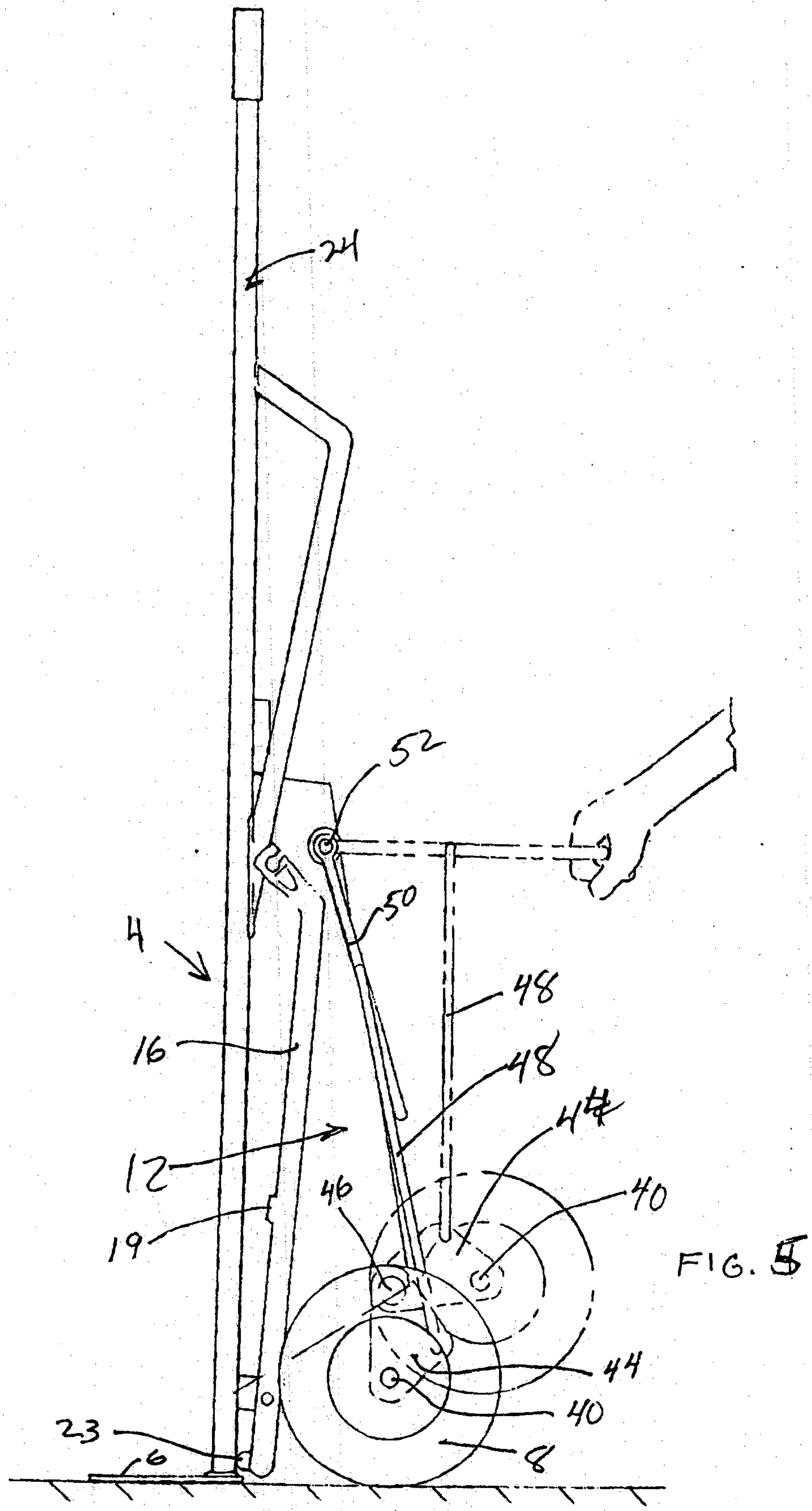
21. A convertible wheeled device comprising an elongate frame, a pair of coaxial wheels attached at one end of said frame and movable between a first position allowing vertical storage of said device partially supported by said coaxial wheels and a second position defining a wheelbarrow configuration of said device, a pair of handles extending from said frame at an end thereof opposite said wheels, an open top container located generally within and behind said frame, and accessible through said frame, foldable leg means attached to said elongate frame and movable between a storage position collapsed adjacent said elongate frame and an in use position extending outwardly away from said frame.

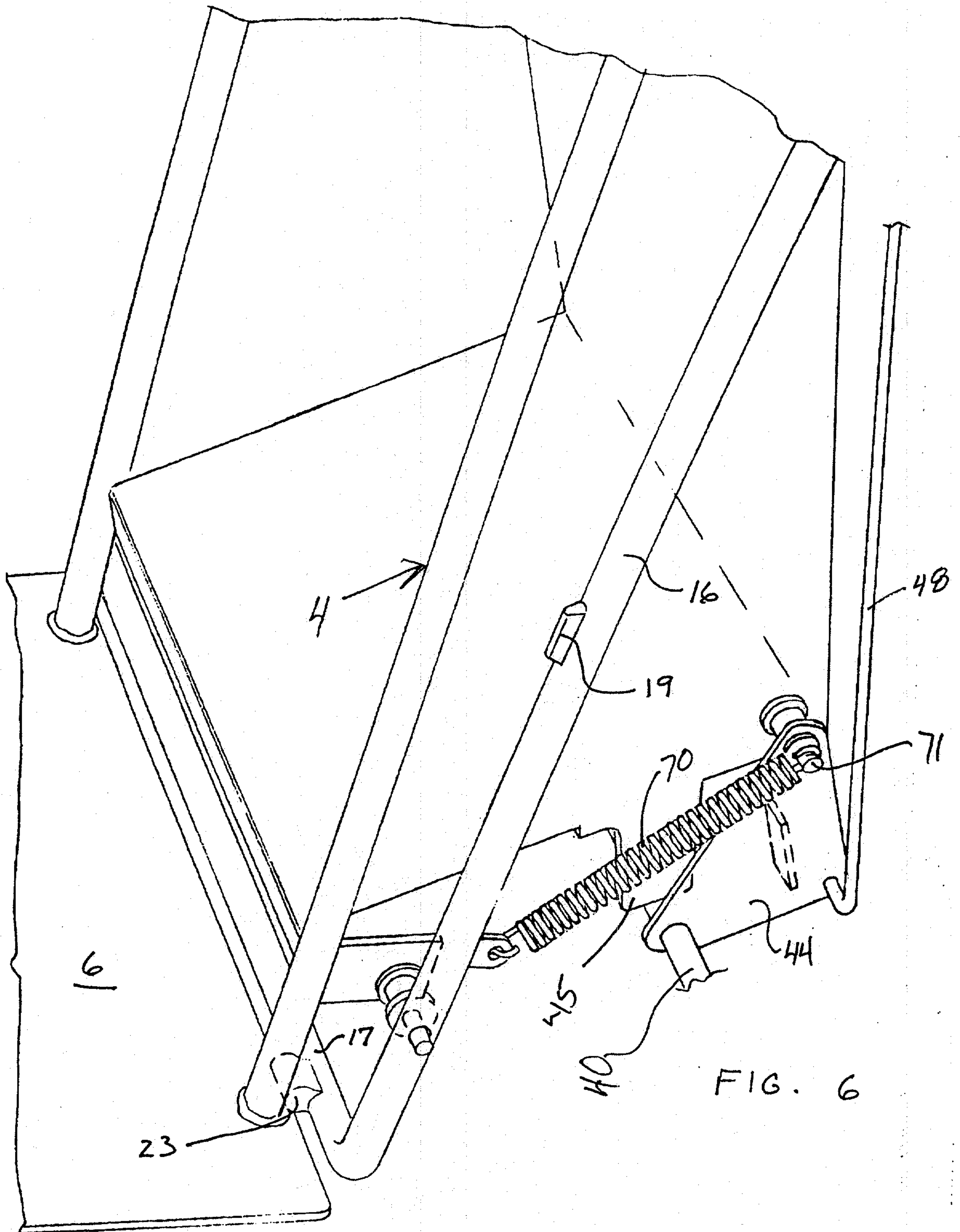


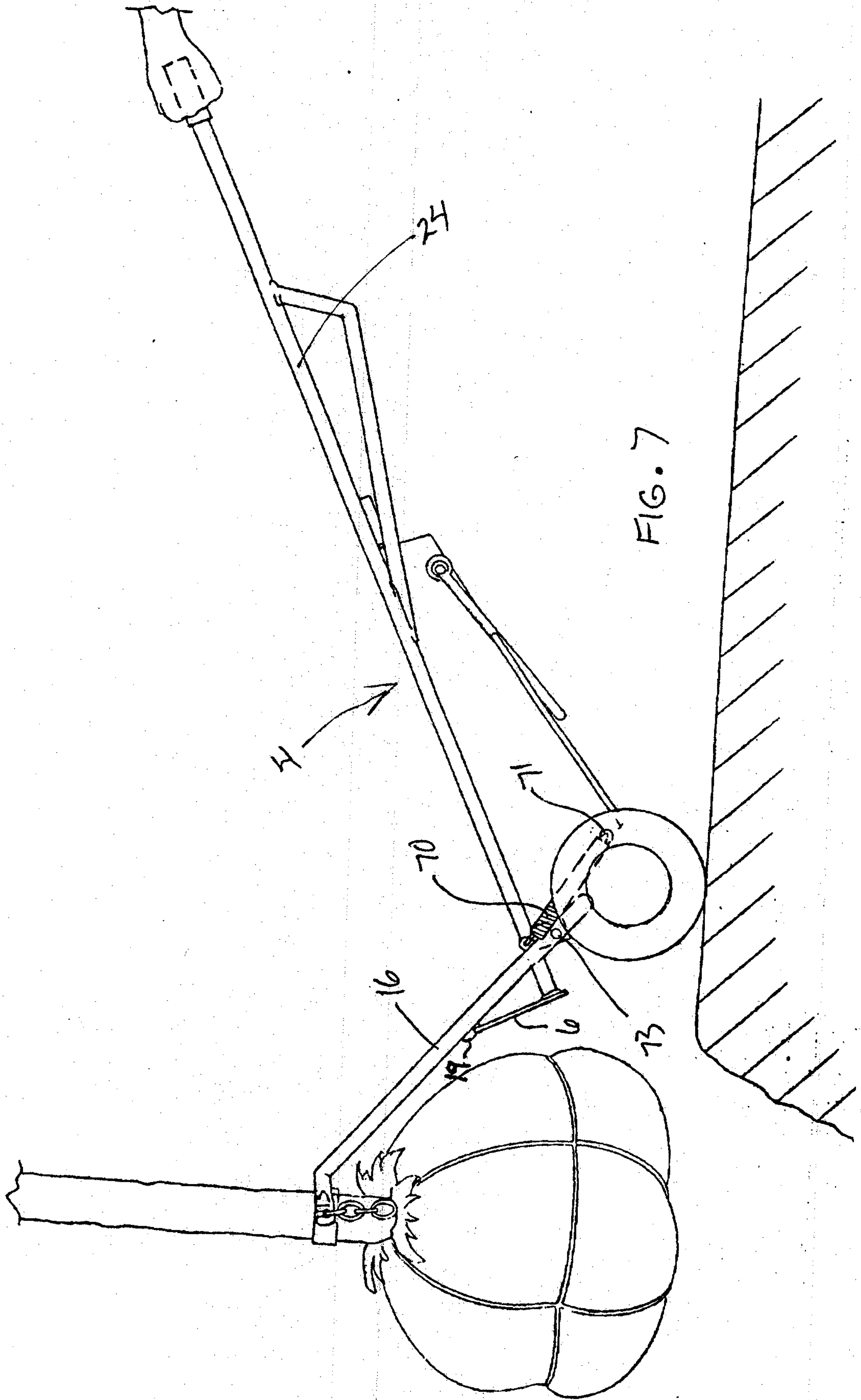












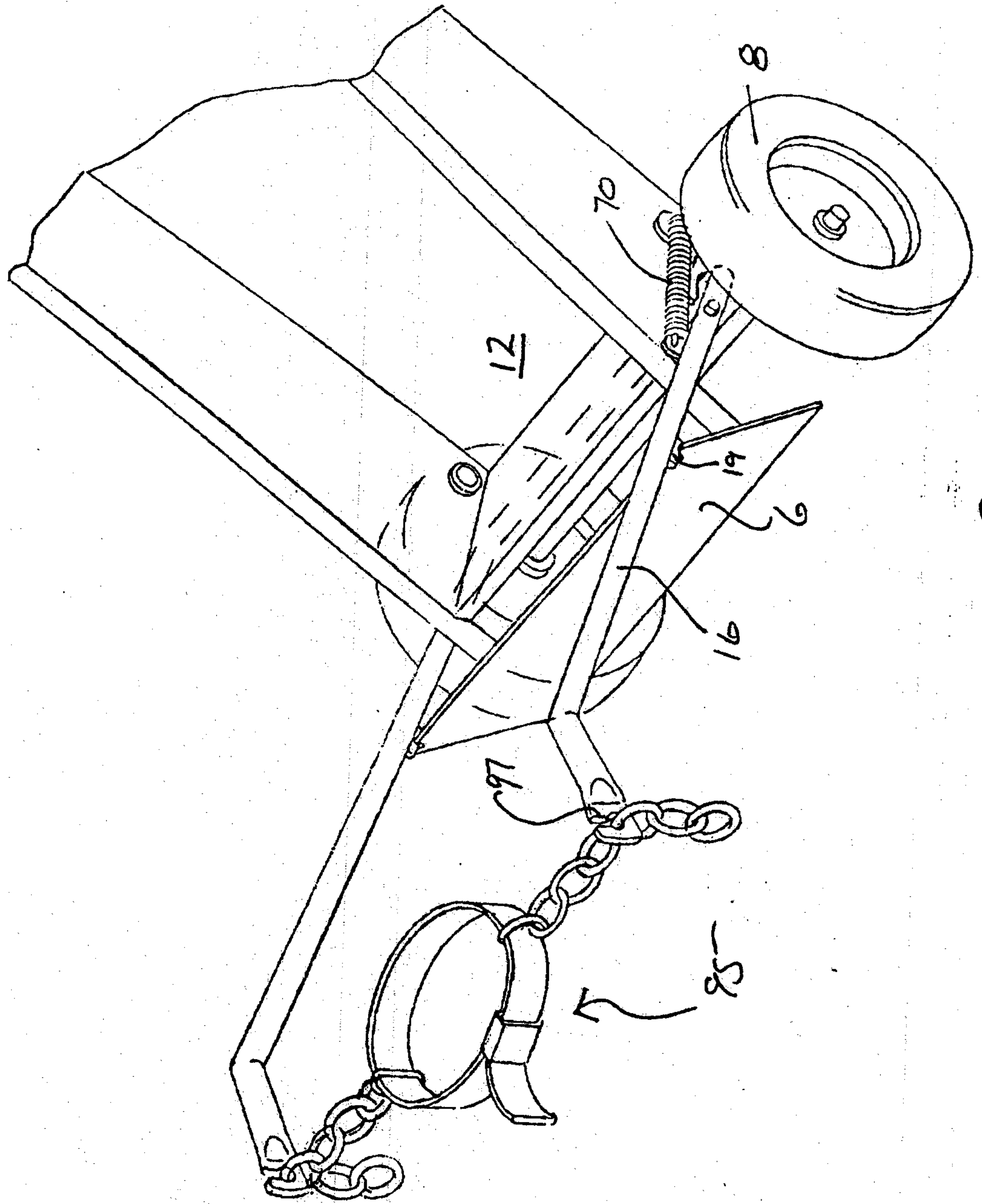


FIG 8

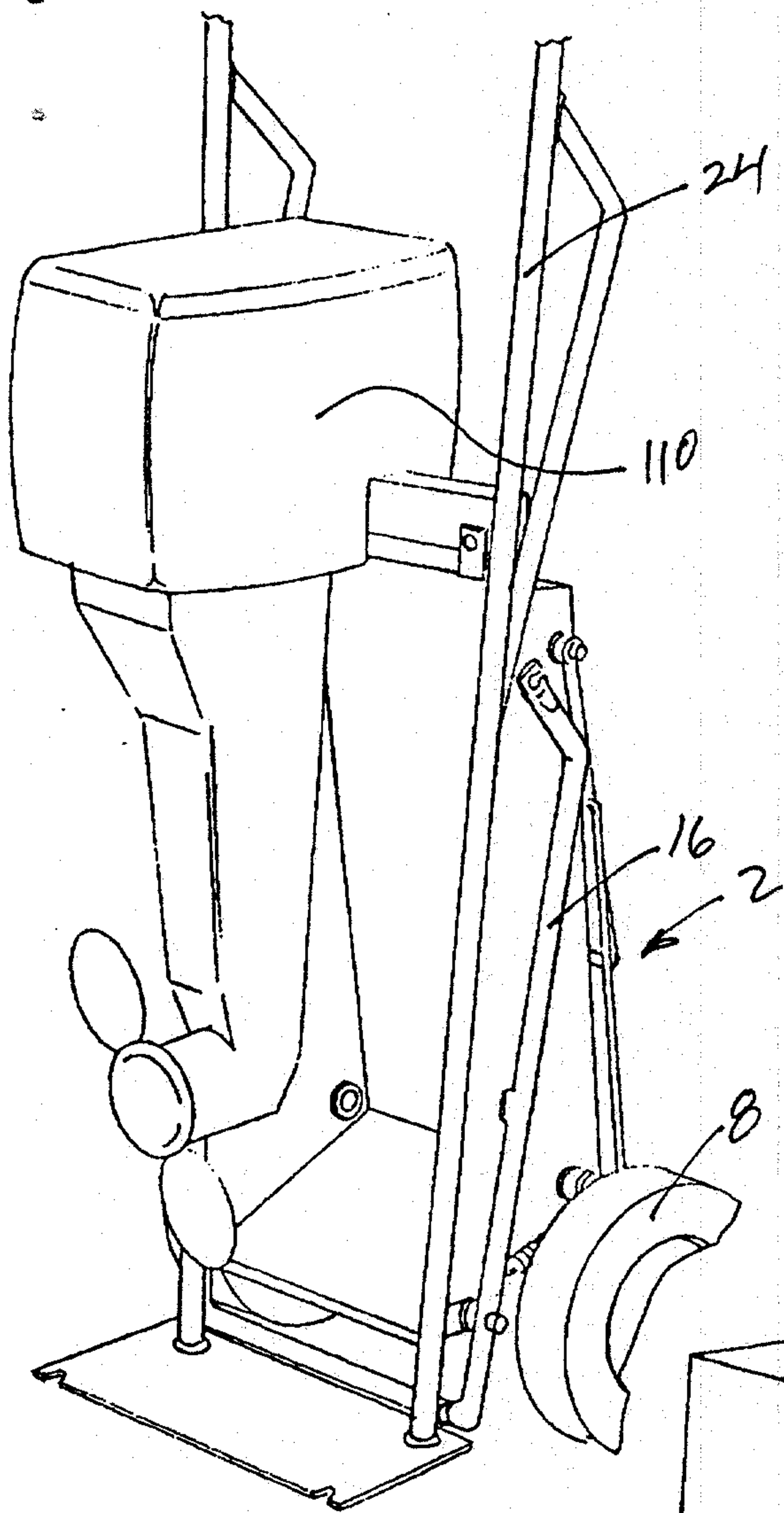


FIG. 9

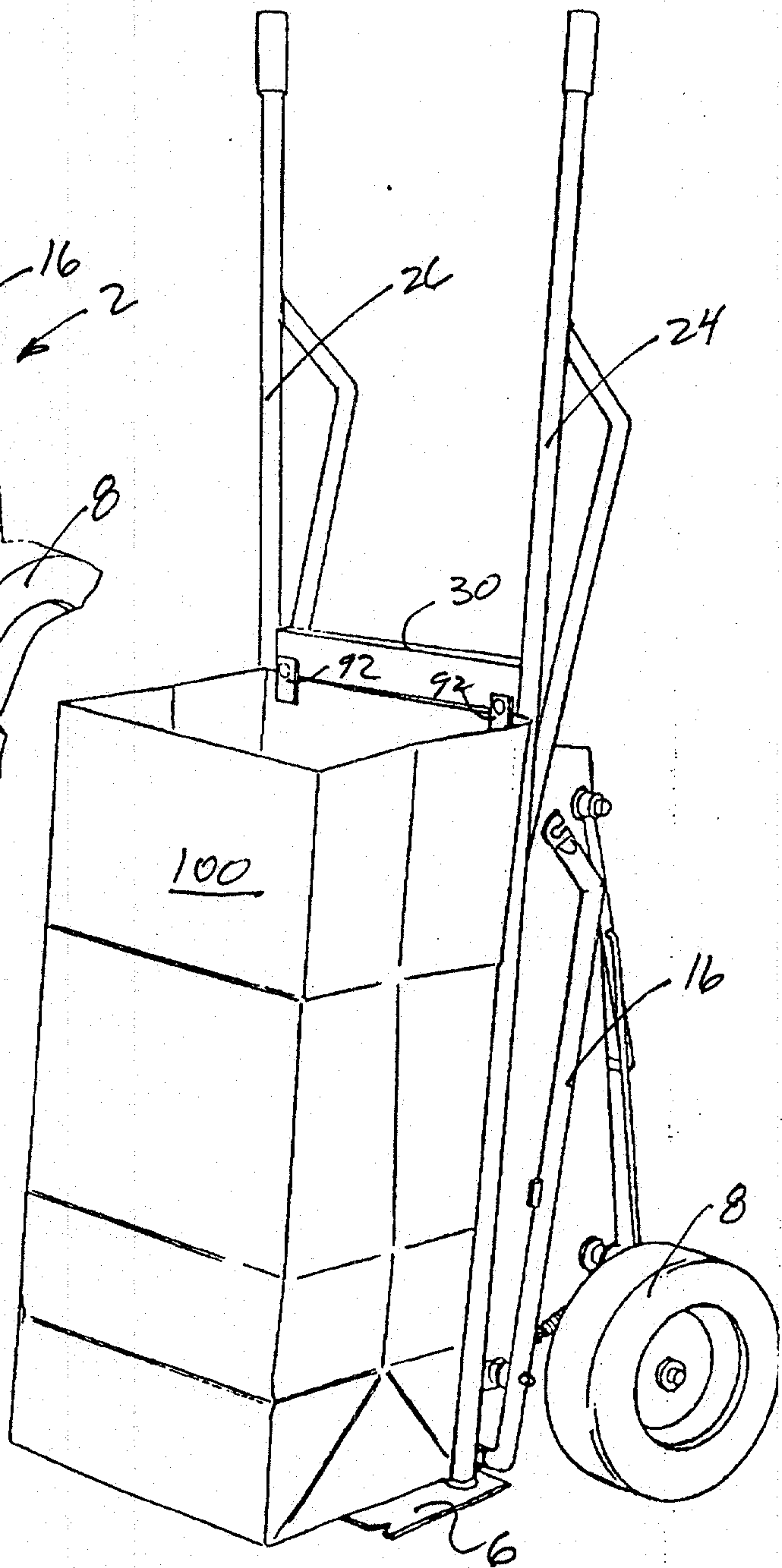
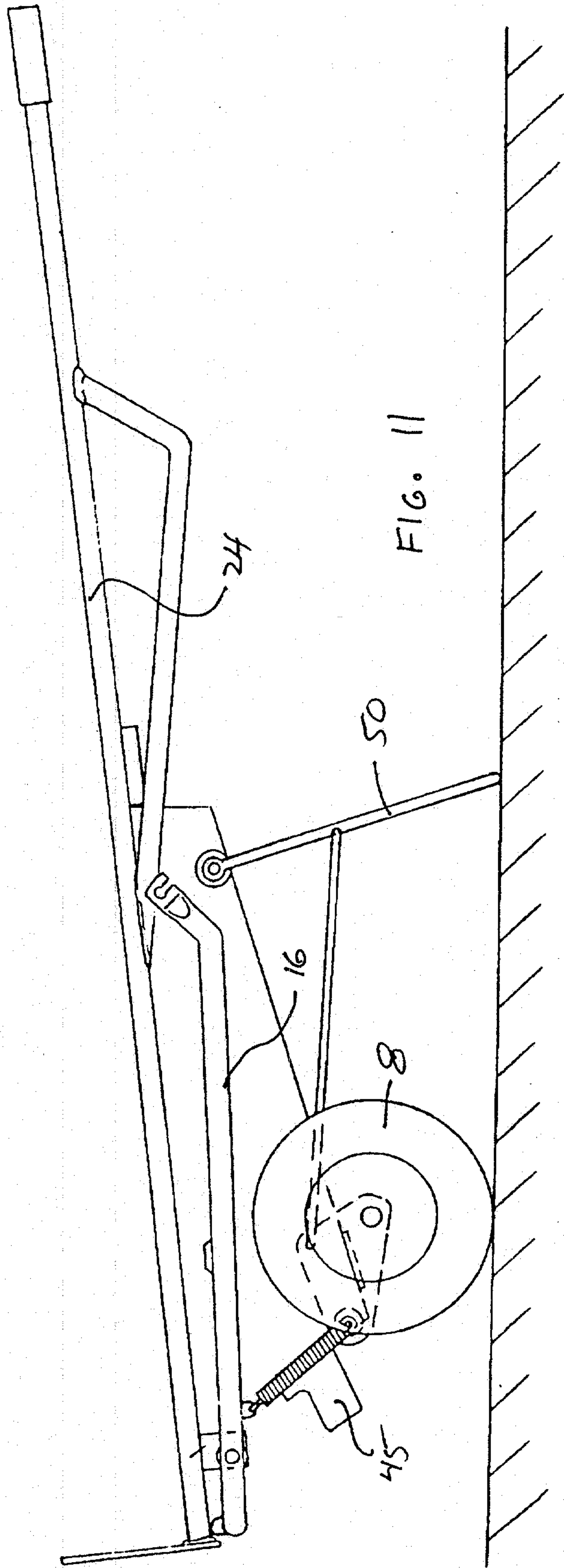
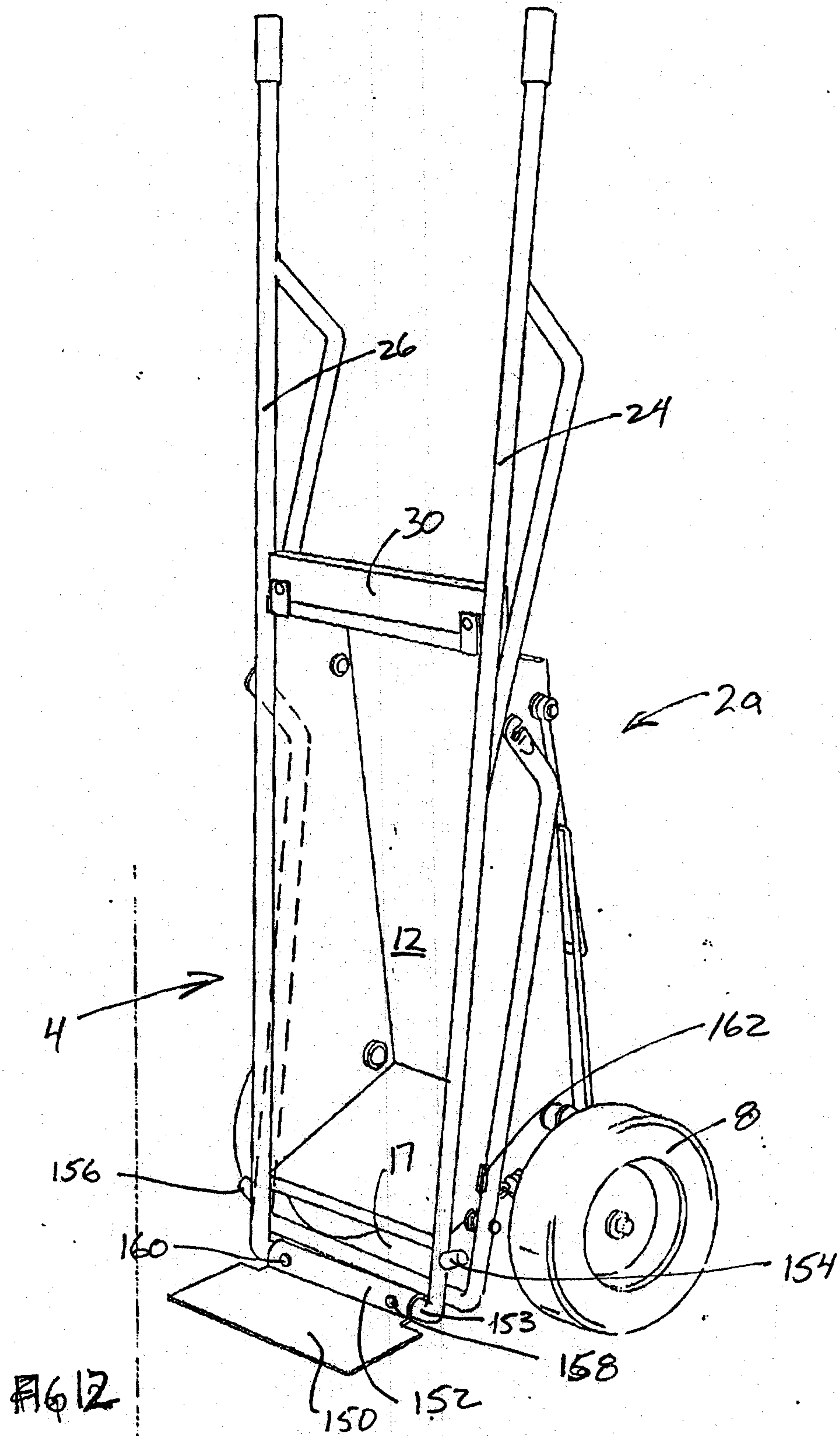


FIG. 10





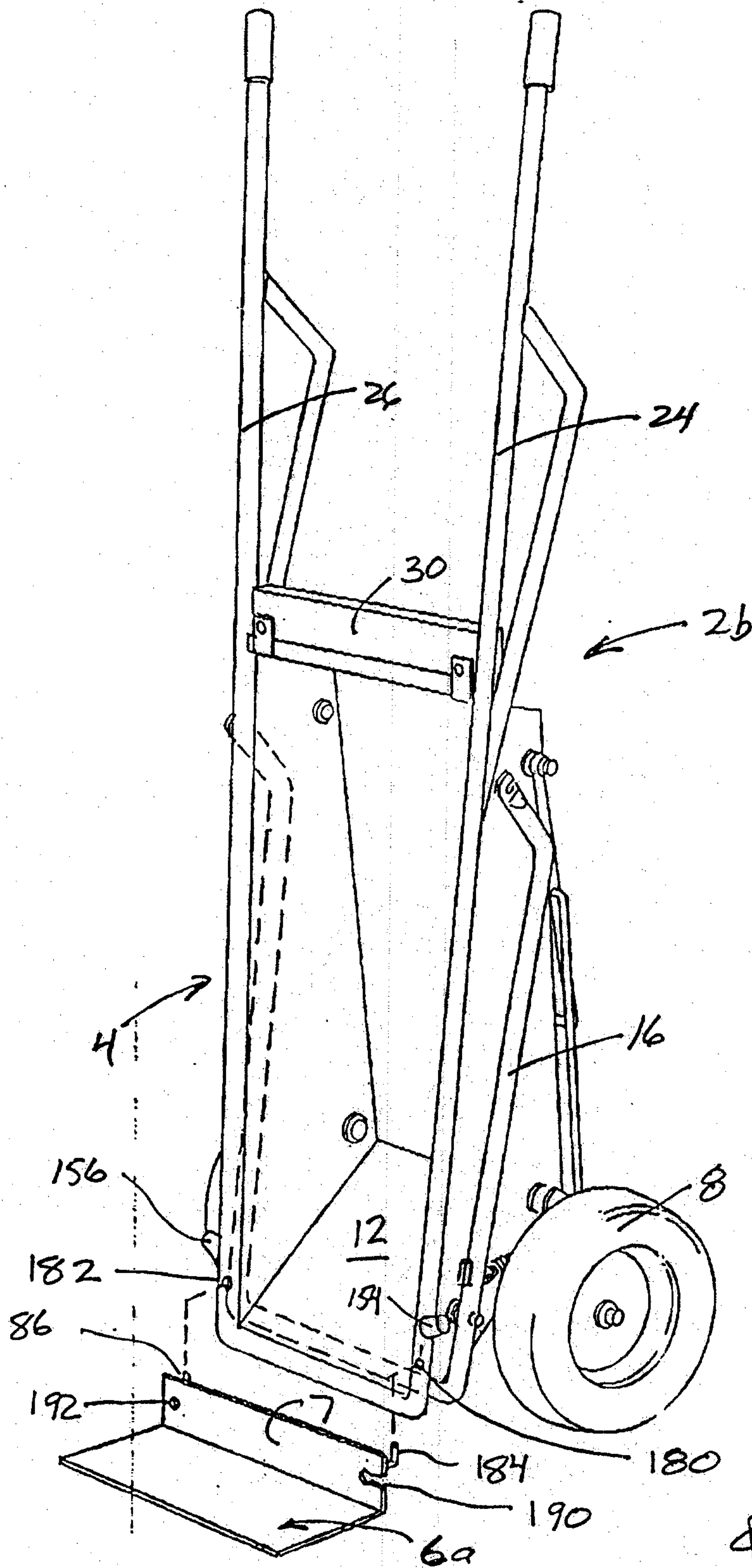


Fig 13.

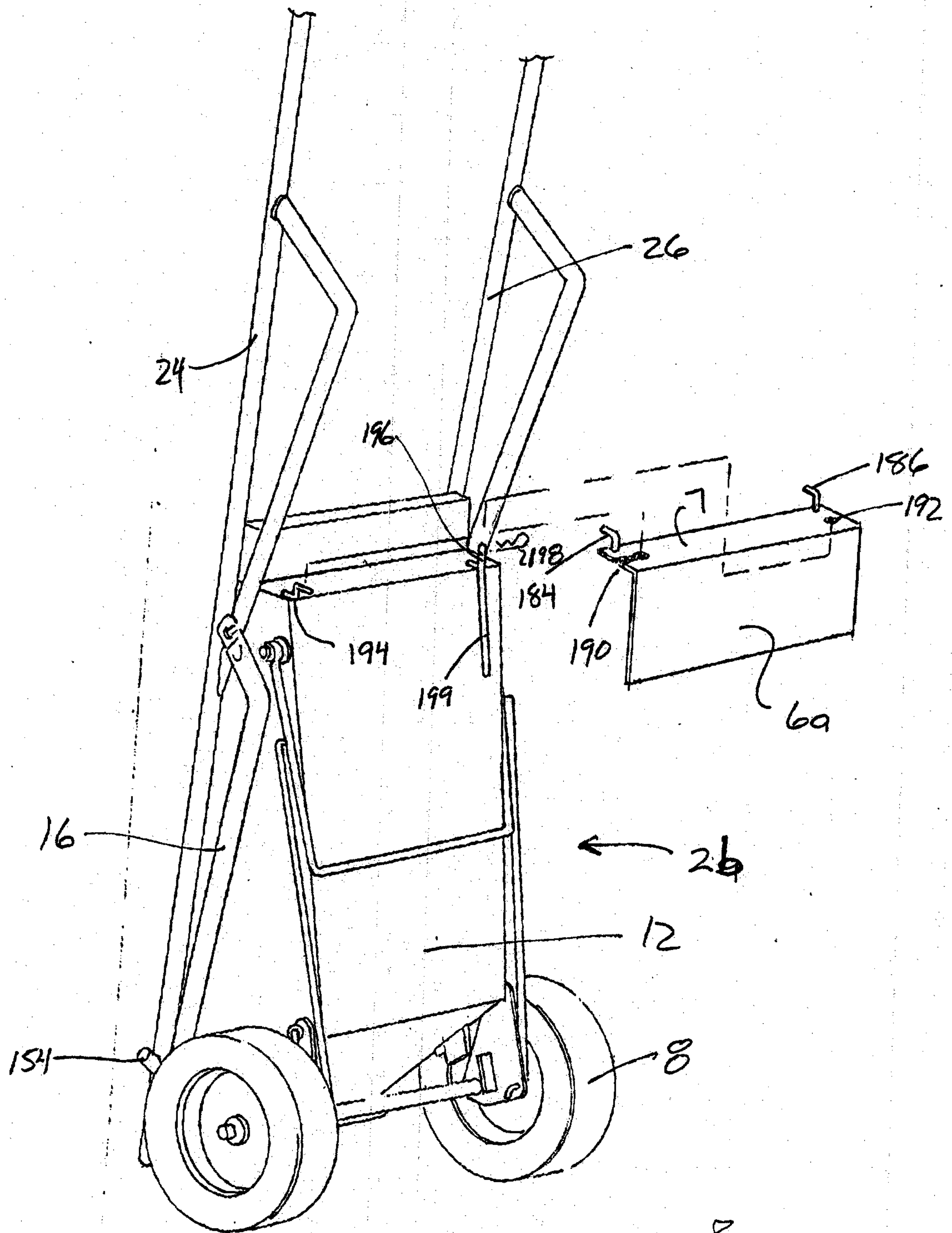


Fig 14.

