United States Patent [19]

Walker

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[54] **TWO-WHEEL HAND TRUCK WITH ELEVATOR**

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[52] **U.S. Cl.** ..... **187/9 R;** 214/370; 254/2 R; 280/47.27

[51] **Int. Cl.**[2] **B66B 9/20**

[58] **Field of Search** ..... 187/9, 10, 11, 12, 13, 187/14, 17, 19; 214/100, 370, 372, 515; 280/34 R, 34 B, 47.13, 47.17, 47.24, 47.27, 280/47.28, 47.29; 182/207, 208, 116, 101, 182/102, 103, 166, 168; 254/2 R

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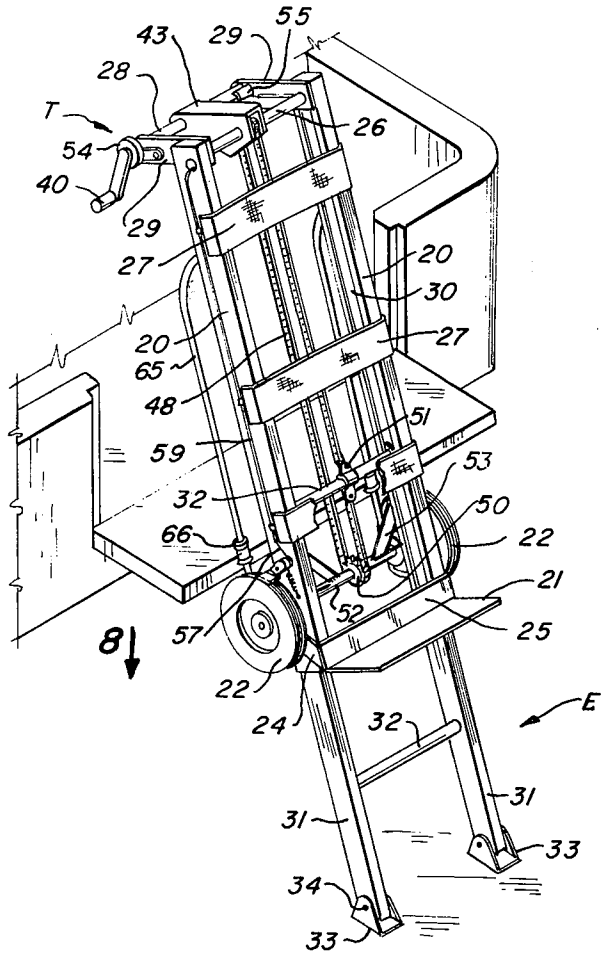
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Assistant Examiner—James L. Rowland
Attorney, Agent, or Firm—Van Valkenburgh, Lowe & Law

[57] **ABSTRACT**

An elevating mechanism is incorporated into the body of a two-wheel hand truck. The upright rails of the hand truck are tubular, slotted and open at their bottom ends. An elevator leg is telescopically mounted in each rail, and the two elevator legs are interconnected by a ladder-like array of cross bars extending from the slots in the truck rails. Accordingly, the elevator legs will move in unison, and a crank-operated chain-pull mechanism at the back side of the truck is attached to an elevator-leg-cross bar to forcibly extend the elevator downwardly. An automatic safety brake on the crank will prevent dropping of the load should the crank be accidentally released, and a hand operated brake will lock the wheels of the hand truck when desired.

12 Claims, 14 Drawing Figures



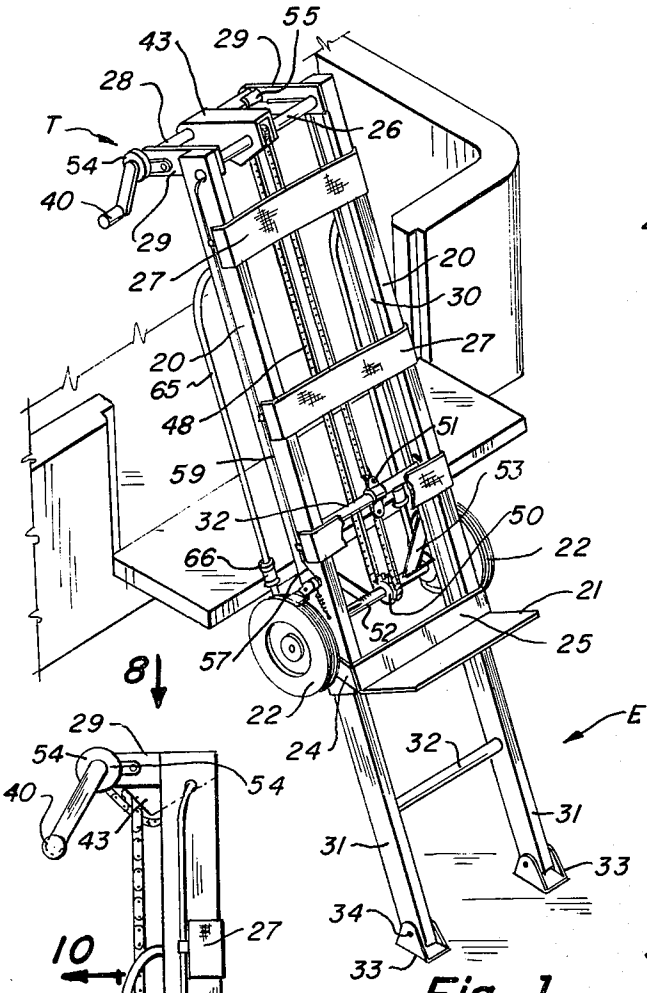


Fig_1

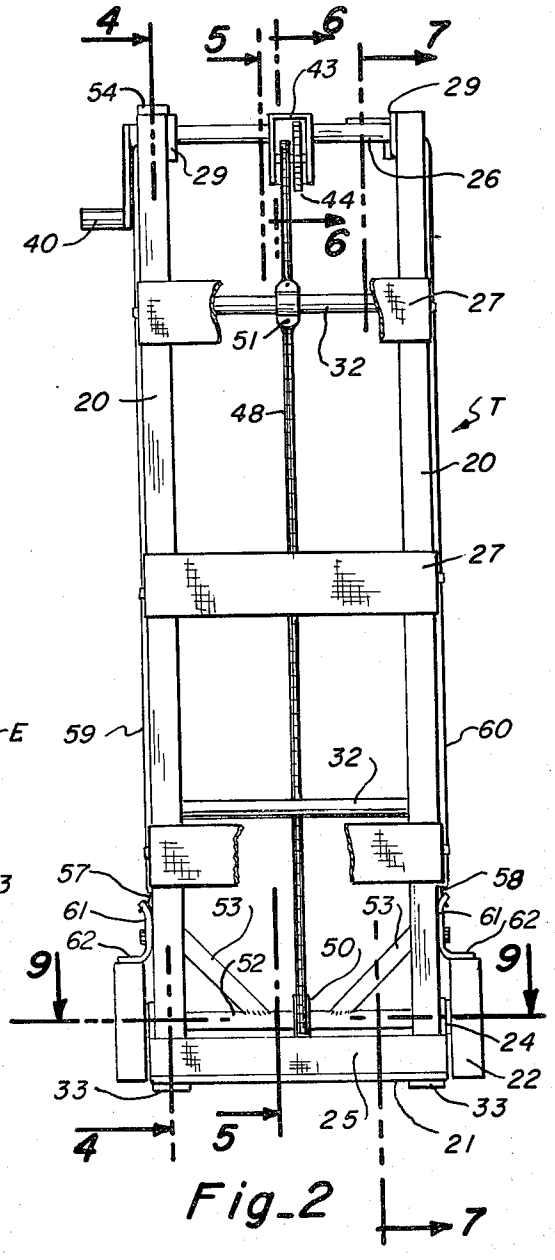


Fig_2

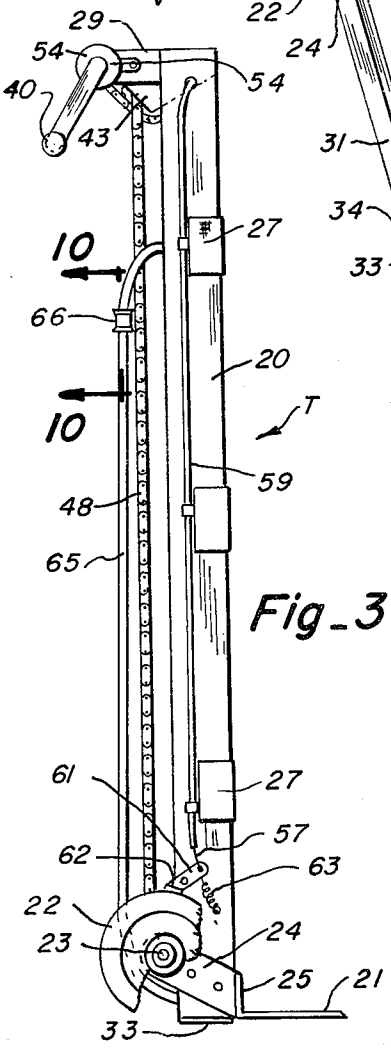


Fig_3

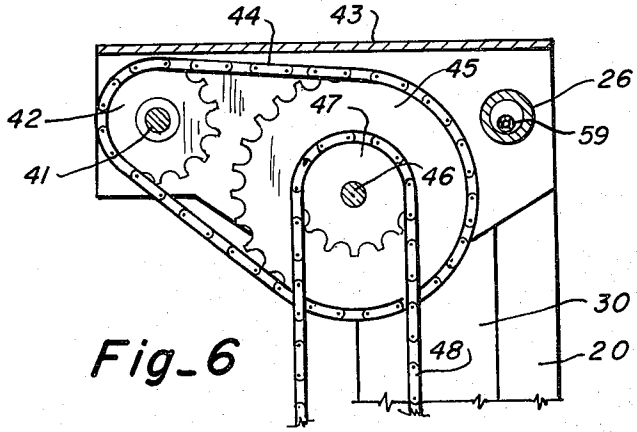


Fig_6

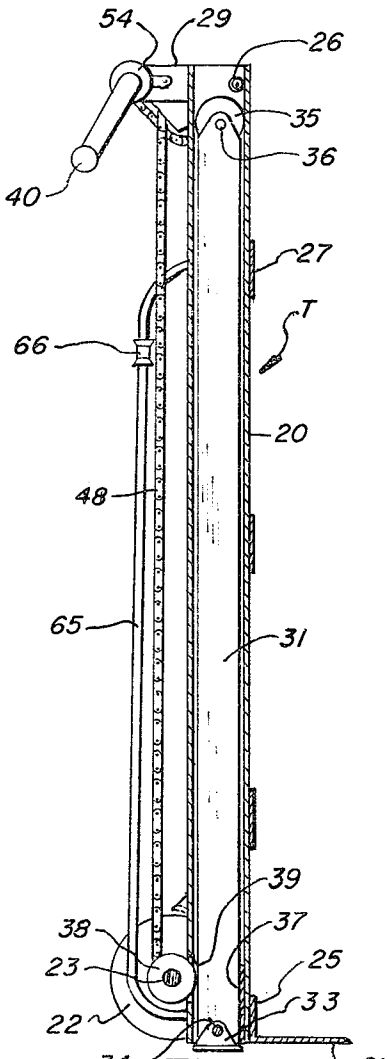


Fig_4

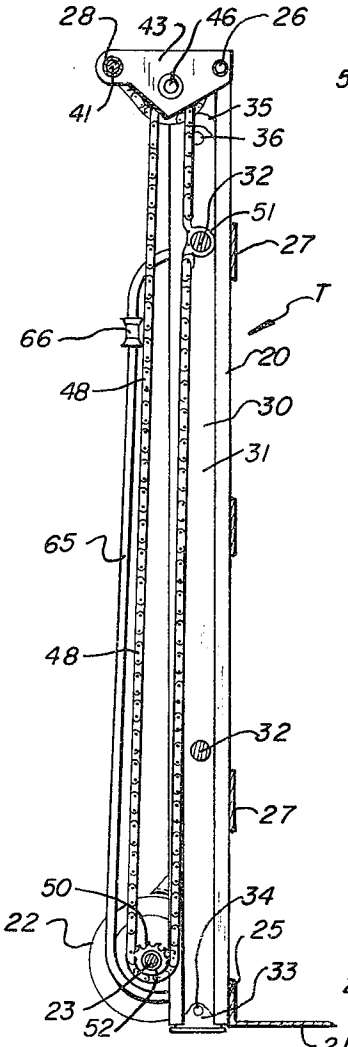


Fig_5

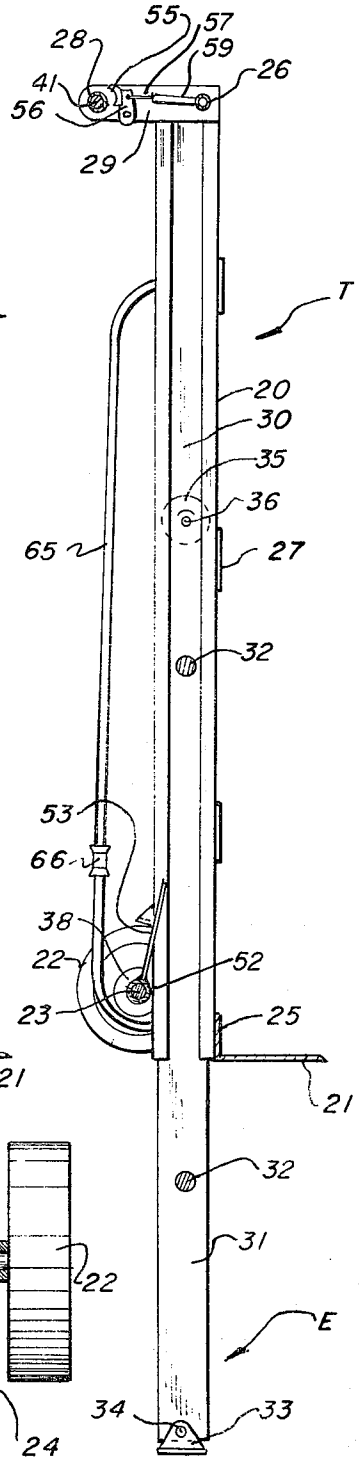


Fig_7

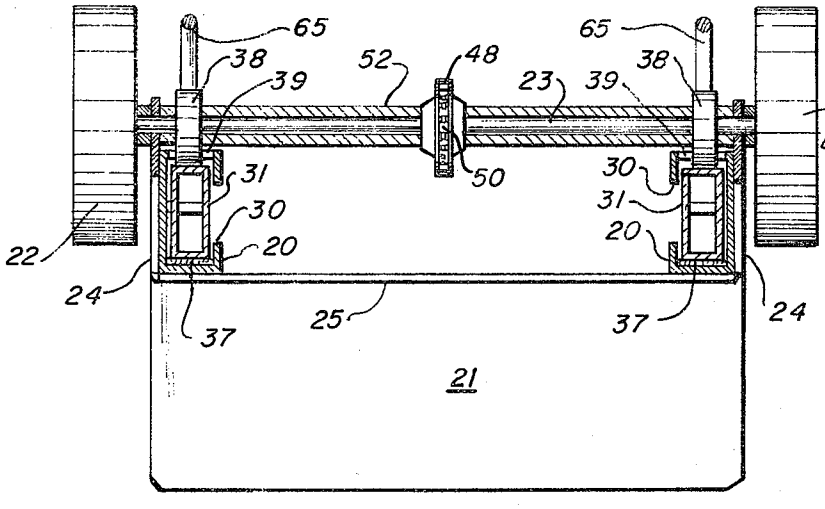


Fig_9

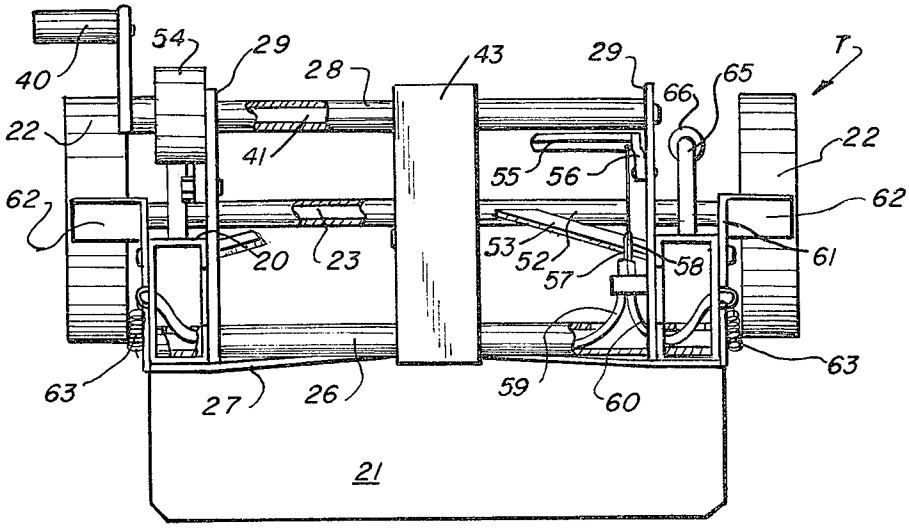


Fig_8

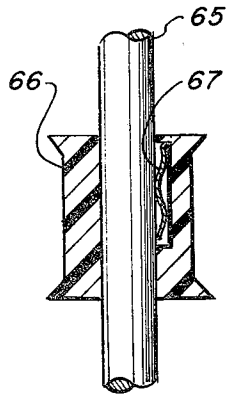


Fig_10

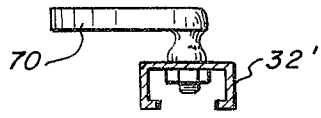


Fig_14

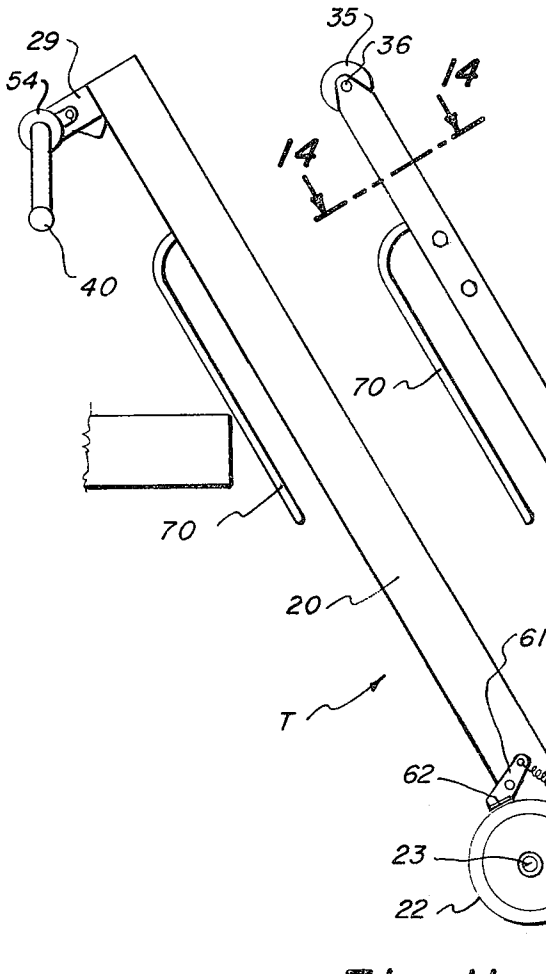


Fig_11

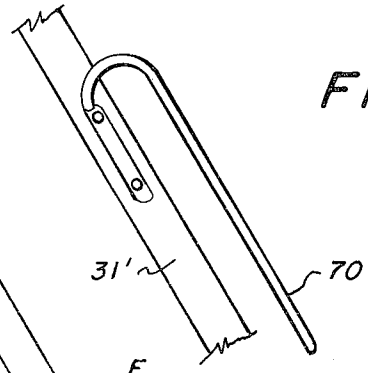


Fig_13

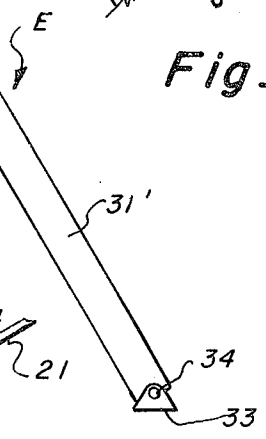


Fig_12

TWO-WHEEL HAND TRUCK WITH ELEVATOR

The present invention relates to two-wheel hand trucks and more particularly to means and apparatus to facilitate the raising and lowering of a loaded two-wheel hand truck from one level to another.

In the present invention, the raising and lowering apparatus is incorporated into the hand truck itself and thus, a primary object of the invention is to provide, in a two-wheel hand truck, a novel and improved elevating mechanism capable of raising and lowering a two-wheel hand truck from one level to another. As such, the invention will be hereinafter called a "two-wheel hand truck with elevator" and the elevator will also be referred to as an "elevating mechanism."

Another object of the invention is to provide a novel and improved two-wheel hand truck having an elevating mechanism which is adapted to raise and lower the hand truck from one level to another, not only for short distances such as up and down a stair, but also in situations where the vertical distance is substantial, such as, for example, from the ground level to the deck of a van or to a loading dock, several feet above the ground.

Another object of the invention is to provide a two-wheel hand truck which carries a novel and improved elevating mechanism within it which is capable of raising and lowering the hand truck, when loaded, from one level to another by simple, easy, manual operations without the need of the operator straining or overly exerting himself.

Another object of the invention is to provide a novel and improved elevating mechanism which is incorporated into a hand truck in a simple, structurally-sound, reliable and effective manner, which does not impair or significantly alter the balance of the hand truck while an operator is handling and elevating it, and which can easily accommodate conventional safety features to minimize the chances of the hand truck getting out of control.

Other objects are to provide, in a novel and improved two-wheel hand truck with an elevator, a construction which is a low-cost, simple, rugged, neat-appearing arrangement, and which does not detract from the value of the hand truck when it is used in a conventional manner.

With the foregoing and other objects in view, my present invention comprises certain constructions, combinations and arrangements of parts and elements as hereinafter described, defined in the appended claims and illustrated in preferred embodiment by the accompanying drawings in which:

FIG. 1 is a isometric view of a two-wheel hand truck constructed according to the present invention by incorporating an elevator within its frame, the elevator illustrated as being partially extended to lift the hand truck upwardly against the tailgate of a pickup truck to ultimately place the hand truck onto the deck of the pickup truck;

FIG. 2 is a front elevation view of the two-wheel hand truck with the elevator retracted and with strap portions of the hand truck being broken away to show parts behind the straps;

FIG. 3 is a right-side elevation view of the hand truck with a portion of a side wheel being broken away to show the frame structure behind the wheel;

FIG. 4 is a sectional side elevation view as taken from the indicated line 4—4 at FIG. 2;

FIG. 5 is a sectional side elevation view as taken from the indicated line 5—5 at FIG. 2;

FIG. 6 is a fragmentary sectional detail to show the upper portion of the elevating mechanism as taken from the indicated line 6—6 at FIG. 2, but on an enlarged scale;

FIG. 7 is a sectional detail as taken from the indicated line 7—7 at FIG. 2, but with the leg of the elevating mechanism being extended downwardly the same as illustrated at FIG. 1;

FIG. 8 is a plan view of the hand truck as from the indicated arrow 8 at FIG. 3, but on an enlarged scale;

FIG. 9 is a sectional plan view as taken from the indicated line 9—9 at FIG. 2, but on an enlarged scale;

FIG. 10 is a fragmentary sectional detail as taken from the indicated line 10—10 at FIG. 3, but on an enlarged scale;

FIG. 11 is a side elevational view of a hand truck similar to FIG. 3, but showing the hand truck as being tilted against the deck of a truck with a modified arrangement for supporting the back of the truck against the corner of the deck;

FIG. 12 is a fragmentary detail view of a leg per se used in the truck shown at FIG. 11 to further illustrate the supporting member;

FIG. 13 is a fragment of the back side of the leg shown at FIG. 12 to illustrate further the manner of connecting the support to the leg; and

FIG. 14 is a sectional view as taken from the indicated line 14—14 at FIG. 12, but on an enlarged scale.

The common two-wheel hand truck is used extensively to handle heavy, rigid, box-like loads, especially on a one man job. The body of such a truck consists of a pair of upright rails which are spaced apart by crossbars and these rails are tipped to hold a load at their front faces. A lip outstands from the bottom edge of the front faces of the rails to reach underneath a load to pick it up and to place it upon the rails when the truck is tipped. Two spaced-apart wheels are mounted upon a shaft at the back side of the rails and at the bottom of the truck so that when the truck is tilted, it will be upon these wheels. Finally, a handle is provided at the top of, and at the back side of, each rail to enable an operator to hold the truck. In picking up a load, the operator pushes the truck against the side of a box-like load and pushes the lip underneath it. He then tips the truck and the load rearwardly to place the load upon the truck. So positioned, an operator can balance the load over the wheels and easily move the loaded truck to its destination.

Such hand trucks are useful for moving loads across level, smooth surfaces, but they are awkward to handle when they must be lifted or lowered, such as up and down a stairway, and even more so where the lift is a substantial distance such as from the ground surface to a truck bed or from a ground surface to a loading dock. In many instances, ramps are provided where such lifting problems exist, but pulling a loaded hand truck up a ramp is hard muscle-straining work, while guiding a truck down a ramp involves the risk of the load getting away from the operator.

It follows that there is a need for an improved system for handling heavy loads with hand trucks where they must be lifted or lowered vertical distances as to and from truck beds and loading docks. The present invention was conceived and developed with the above considerations in view and comprises, in essence, a two-

wheel hand truck having a pair of downwardly extendible legs forming part of an elevating mechanism for raising and lowering the hand truck. In the preferred embodiment, the elevating legs are within hollow, slotted rails to telescopically extend therefrom. The rail slots permit the legs to be tied together to assure their movement in unison. The truck structure is also modified to an arrangement which permits the legs to be extended below the truck without interfering with the regular structural components of the truck. The legs are forcibly extended by a suitable, simple, chain-pull mechanism which is operated by a crank located on the handle at the top of the truck. Safety brake features may be included in this organization to prevent the crank from getting away from an operator and also hold the truck wheels.

Referring more particularly to the drawing, FIGS. **1** to **10** depict a preferred embodiment of the invention, a two-wheel hand truck T. This hand truck is essentially conventional in its general form and can be used the same as a standard hand truck. The body of the truck T includes a pair of longitudinal upright rails **20** which are held apart in spaced parallelism. These rails are slotted, tubular members and the bottoms are open to carry extension legs E as hereinafter described. The other regular components of the truck are mounted upon the rails in an arrangement which will not interfere with the movements of these extension legs.

A transverse pickup lip **21** outstands from the front face of the body at the bottom of the rails to lift a load which is to be tilted against the front of the body when the truck is being used in a conventional manner. Left and right side wheels **22** are mounted upon a transverse shaft **23** behind the rearward faces of the rails **20** and near the bottom of these rails, with a wheel being at each outer side of each rail. The shaft **23** is held in position by bearing clips **24**, and a clip **24** is affixed to the outward side of each rail **20** with the shaft **23** projecting therefrom to carry the wheels **22**, as best shown in FIG. **3**.

The two parallel rails **20** are held apart and in position at the bottom of the truck by a face plate **25** welded or otherwise fastened to the front faces of the rails. Preferably, the face plate **25** is formed by folding the rearward portion of the lip **21** upwardly to lie against the front face of the rails. These rails are also held apart and in position at the top of the truck by a transverse structural pipe or tube **26** extending between and being securely welded to the rails. Other intermediate structural components may also be included to hold these rails in position providing they are at the front or rear faces of the rails and in a position which will not interfere with the movement of the extension legs as hereinafter described. In addition, a number of pliable straps **27** may be spaced between the rails at the outer face thereof to hold a load thereon.

To complete the conventional arrangement, a transverse, tubular handle **28** is carried at the rear end of bars **29** projecting rearwardly from the top of each rail. In the present invention, the handle **28** is modified to carry a transverse crankshaft, as hereinafter described.

This essentially conventional arrangement of a two-wheel hand truck, as above described, is modified to carry an extension mechanism E by using tubular or hollow rails **20** as heretofore mentioned. These rails are rectangular in cross section and have elongated slots **30** at the inner face of each rail which extend the entire length of the rails. So positioned, the slots **30** in the rails oppose each other. Structural steel hollow sections suitable for the purpose are commonly available in various standard sizes. For example, a suitable size for the purpose is a 2 × 4-inch hollow rectangular tube of 14 or 16 gage thickness having a 2-inch slot at one face, the slot **30** at the inner face of each rail **20**.

The extension mechanism E includes a pair of legs **31** and a leg **31** is slidably fitted into each rail **20** to project from the bottom of the truck body. The legs **31** are interconnected by rung-like cross bars **32** in a ladder-like arrangement at any selected spacing, and although two cross bars **32** are shown, any number of cross bars, and even diagonal brace bars, may be selected for the purpose. The cross bars **32** extend from the opposing rail slots **30** between the rails and thus the legs may freely slide into and out of the rails **20** without the cross bars **32** interfering with the structure of the truck T.

Since the truck will be lifted upon and supported by these legs **31**, as illustrated at FIG. **1** and hereafter further described, the base of each leg **31** is desirably fitted with an anti-slip shoe **33**, a U-shaped member having an anti-slip undersurface, having its side portions connected to the base of each leg by a pivot **34** so that the shoe can be tipped to adjust to any tilt of the hand truck, or irregularity of the ground surface.

It is desirable to have the legs **30** to move in the rails with a free, easy sliding action. Accordingly, the legs **31** are rectangular in cross section, similar in form to the rails **20** but smaller so that they may telescope into the rails with a free-sliding fit. To minimize frictional resistance to movement of the legs within the rail, the top of each leg **31** is formed as a clevis-like crotch to hold a roller **35** upon a short shaft **36** between the arms of the crotch. The roller **35** will bear against the front face or rear face of the rails, inside the rails, to keep the top portion of the legs from dragging. To minimize the frictional resistance of a leg **30** bearing against the base of each rail **20**, an anti-friction slide plate **37** is located at the front side of the base of the rail passageway and a roller **38** is carried upon the wheel shaft **23** to project through an opening **39** in the back side of the rail **20**, the slide **37** and roller **38** being best shown at FIGS. **4** and **9**.

The extension legs **31** are forcibly extended downwardly from the body of the truck and upwardly into the truck by turning a crank **40** mounted upon a transverse shaft **41** which extends through the transverse, tubular handle **28**. The handle **28** is located approximately 9 inches or so behind the rails, and is supported by the short flat bars **29**, as heretofore described. For a right-hand operator, the crank **40** is located at the outward side of the right-hand bar **29**. The shaft **41** transmits torque to a drive sprocket **42** mounted on the shaft **41** at the center of the handle **28**. The handle **28** is divided into two sections to allow for this sprocket. The sprocket **42** and other mechanisms are housed in a simple gearcase **43** in the form of a plate, folded to an inverted U and mounted at the center of the truck between the handle **28** and the spacer rod **26**. The drive sprocket **42** is connected by a chain **44** to a torque-increasing sprocket **45** carried upon a shaft **46** within the gearcase **43**, as shown at FIG. **6**. The shaft **46** also carries a driven sprocket **47**, connected with the torque-increasing sprocket to rotate therewith, and a lift chain **48**, extending to the base of the truck is carried on the driven sprocket **47**.

The lift chain **48** extends downwardly between the rails, at the back side of the truck and to the bottom of the truck to an idler sprocket **50** mounted upon the wheel shaft **23.** The lift chain **48** thus forms a loop about the drive sprocket **47** and the idler sprocket **50.** A clip **51** at the forward reach of this chain loop connects with a selected cross bar **32** which interconnects the extension legs **31.** Accordingly, the rotation of the crank **40** turns the several sprockets within the gearcase **43** to operate the lift chain, which, in turn, will extend or retract the elevator E to raise and lower the truck T to various positions such as illustrated in FIG. **1.** When lifting the truck, the entire pull of the chain will be upon the idler sprocket **50,** and upon the wheel shaft **23.** To facilitate supporting this shaft **23,** the shaft is carried in tubular support sections **52,** as illustrated at FIG. **9,** and these sections are supported by struts **53,** as best illustrated at FIGS. **2, 7** and **8.**

The movement of the extension legs from the rails **20** is limited by the location of the clip **51** on chain **48** with respect to the legs **31** since this clip cannot move downwardly beyond the sprocket **50** about which the chain **48** turns. This clip is necessarily located a short distance from the top of the legs **31** below the roller **35,** as upon a crossbar **32,** as best illustrated at FIG. **5.** This permits the upper portion of each leg **31** to remain within the embrace of the rails **20** when the legs are, operatively, fully extended. Such prevents a buckling of the legs at the bottom of the rails such as would occur if the top of the legs were at the bottom of the rails. This location of the clip **51** with respect to the top end of the legs **31** thus provides a structure which will not be overstressed when the legs are, operatively, fully extended. A properly proportional arrangement, such as that illustrated, can be easily determined by any skilled designer.

A crank brake **54** of a standard type which is normally locked and which will release only when the crank **40** is turned, is mounted upon the outer face of the handle support bar **29** adjacent to the crank **40.** This brake prevents the truck from accidentally, suddenly dropping if an operator accidentally releases the handle **40** and is an important safety feature. This brake may be a conventional type, type, such as the hand brake manufactured by the Fulton Mfg. Co. of Milwaukee, Wisconsin, cataloged as No. 560 hand brake and hence it need not be described.

In addition to the automatic crank-brake **54** to prevent the truck from dropping when it is loaded, a hand brake **55** is provided for preventing rotation of the wheels **22.** This hand brake is conveniently located at the left side of the truck in association with the handle **28** so that an operator may apply the brake **55** with his left hand while cranking with his right hand. The hand brake **55** is formed as a gripper bar adapted to lie alongside the handle **28** and to be pulled thereagainst. As such, it is carried upon a lever arm **56** pivotally connected to the left side bar **29** as best illustrated at FIG. **7.** The lever, in turn, is connected with a pair of braking cables **57** and **58** which are housed in cable sheaths **59** and **60,** respectively. The cable sheaths **59** and **60** extend from the bifurcation point of the cables to the interior of the support tube **26** to divert to the left and right hand sides of the truck, as best illustrated at FIG. **8.** The sheaths then extend from their respective ends of the tube and through the walls of the rails **20** to lie alongside the outer face of the respective rails to extend downwardly alongside the rails and to terminate at a point near the wheel **22** at the base of the truck. Each brake cable **57** and **58** extends from its sheath and connects with a lever arm **61** adjacent to the wheel **22.** This lever arm includes an outstanding tab **62** to engage the wheel. Each lever **61** is pivotally connected to the rail in a position to move the pad **62** against the wheel whenever its cable **59** or **60** is pulled upwardly. A spring **63** opposing the cable tends to normally pull the pad away from the wheel. It follows that whenever an operator squeezes the brake handle, both of the cables will be pulled to lock both wheels.

It is a relatively simple matter to lift a loaded two-wheel hand truck with the elevator E. The elevator is normally kept at a retracted position and a load is placed upon the hand truck in a conventional manner. The hand truck is then tipped to ride upon the wheels **22** on a level surface to the rear of a vehicle or to the edge of a dock whereon it is to be lifted. The hand truck is then moved to rest in a tipped position against the edge of the vehicle or dock as illustrated in FIG. **1.** Next, the operator will get upon the deck of the vehicle or dock to hold the hand truck in place and he commences to turn the crank **40** with his right hand to cause the elevator legs to be extended downwardly, lifting the truck and its load. By continuing this cranking operation, the hand truck is raised to a point where the wheels **22** ride over the edge of the vehicle tailgate or dock. The hand brake **55** locks the wheels **22** to prevent the truck from getting away from the operator, and the elevator legs may then be retracted to permit the hand truck to continue its trip on the vehicle or dock to bring the load to its destination.

An operation to lower a load from a vehicle or a dock to the ground surface is easily accomplished in substantially the same manner, but with the steps being in the opposite sequence. The hand truck is rolled to the edge of the dock, the hand brake **55** is applied to prevent the loss of the load. Next, the legs **30** are extended downwardly to engage the lower surface and to then lift the vehicle and its load from the dock or truck deck. Subsequently, the truck is lowered downwardly to the base elevation of the vehicle deck or dock.

In order to slide the hand truck smoothly against the edge of a vehicle dock or tailgate and to ease the wheels **22** over this edge, a slide bar **65** is secured to the rearward side of each rail to engage the edge of the dock or tailgate. The slide bar extends from a point near the top of the hand truck to a position adjacent to the wheels **22** as illustrated and it is spaced rearwardly from the rearward edge of the rail to provide clearance for the lift chain **48** and to provide a smooth transition from the slide bar to the wheels **22** as they move upon the deck of a vehicle or dock. A slide bobbin **66** may be mounted upon each slide bar **65** to be held against the edge of a vehicle tailgate or loading dock deck, as illustrated at FIG. **1.** This bobbin may be a simple, plastic member, as illustrated at FIG. **10,** and it may be proportioned to slide freely upon its bar **65.** A small frictional drag may be provided by a clip **67** so that the bobbin can be placed at any selected position upon the slide bar. It is also contemplated that the slide bar **65** will be of fairly hard material and will freely slide along the edge of a truck deck or loading dock if the bobbin is not used.

Other arrangements for easing the sliding action of the back edge of the rails **20** against the edge of a tail-

gate or dock are also possible, such as slide pads at the edge of the tailgate or dock or a pulley-belt arrangement at the back of the rails. Such arrangements are not shown since they are entirely conventional.

An alternative arrangement for holding the rear edge of the hand truck away from the corner of a vehicle deck or loading dock deck is illustrated at FIGS. **11, 12** and **13** where a fender **70** is provided on each leg **31'** to contact the corner of the deck. This fender **70** is formed as a looped arm which extends behind the rear edge of the hand truck and extends downwardly from the arm in spaced parallelism with the leg **32'**. The spacing of each fender **70** from the truck rails is at a distance sufficient to straddle the shaft **23** and roller **38** upon this shaft to permit the wheels **22** to move past the fender arms and onto the deck in a manner essentially the same as heretofore described.

I have now described my invention in considerable detail. However, it is obvious that others skilled in the art can build and devise alternate and equivalent constructions which are nevertheless within the spirit and scope of my invention. Hence, I desire that my protection be limited not by the constructions illustrated and described, but only by the proper scope of the appended claims.

I claim:

1. A two-wheel hand truck having an elevator mechanism to facilitate raising and lowering the hand truck to and from an elevated deck and comprising:

a. a hand truck structure including a pair of longitudinally extended tubular rails open at their bottom ends, a transverse pickup lip outstanding from the bottom front edge of the rails, a pair of spaced wheels mounted upon a transversely disposed wheel shaft adjacent to the bottom back edge of the rails and a handle at the top of the rails, all in an arrangement which permits a load to be picked up by the lip and lie against the front side of the rails when the truck is tipped rearwardly onto the wheels;

b. said elevator mechanism including a leg telescopically carried in each rail; and

c. a means to extend and to retract a substantial portion of the legs from the bottom of the rails in unison to raise and lower the truck with a load thereon.

2. In the organization defined in claim **1** wherein:
the inner side of each rail is slotted and the legs are joined together by cross bars extending from the slots.

3. In the organization defined in claim **2** wherein:
the extension means includes a pull chain connected to a cross bar and extending downwardly therefrom to a connecting means near the bottom of the hand truck.

4. In the organization defined in claim **2** wherein:
the extension means includes a transverse shaft near the top of the hand truck, a second transverse shaft near the bottom of the hand truck, a sprocket on each shaft, a chain loop between the sprockets having one point connected to a cross bar of the legs and a cranking means associated with a sprocket to forcibly pull the chain loop about the sprockets and lower the cross bar with respect to the rails when the legs are being extended.

5. In the organization defined in claim **4** wherein:
the aforesaid truck handle comprises a tubular member positioned behind the rails and the cranking means includes a shaft through the handle, a hand crank connected with the shaft at one side of the handle and gear means operatively interconnecting the shaft and the aforesaid top shaft sprocket.

6. In the organization defined in claim **5** wherein:
said gear means includes a drive sprocket connected to the crank shaft at the center of the handle, said top shaft parallels the crank shaft and the aforesaid top shaft sprocket thereon connects with the said drive sprocket through a driven sprocket on the said top shaft which, in turn, connects with the said top shaft sprocket.

7. In the organization defined in claim **5** including:
a braking means associated with the said hand crank adapted to prevent rotation of the crank whenever the same is released.

8. In the organization defined in claim **4** wherein:
the aforesaid second transverse shaft near the bottom of the hand truck is in the said wheel shaft and means to support this shaft at each side of the bottom shaft sprocket.

9. In the organization defined in claim **1** including:
a slide means at the back side of each rail adapted to hold the rails away from an edge of an elevated deck whereonto the truck is being lifted or wherefrom the truck is being lowered.

10. In the organization defined in claim **9** wherein:
each slide means comprises a rigid slide bar spaced rearwardly from the back side of the rails and a slide spool thereon adapted to engage the edge of the deck to permit the slide bar to slide within the spool.

11. In a two-wheel hand truck of the type having a pair of longitudinally extended rails, a transverse pickup lip outstanding from the bottom, front edge of the rails, a pair of spaced wheels mounted upon the truck in transverse axial alignment with a wheel being at each side of the truck near the bottom back edge of a rail, and a handle means at the top of the rail, all in an arrangement which permits a load to be picked up by the lip and to lie against the front side of the rails when the truck is tipped rearwardly onto the wheels;
the improvement consisting of an elevator mechanism to facilitate raising and lowering the hand truck to and from an elevated deck and comprising: Ser. No. 464,805

a. a leg telescopically associated with each rail to normally nest with the rail, but to extend downwardly below the bottom of the rail; and

b. a manually actuated means interconnecting the legs to forcibly move said legs in unison to extend a substantial portion of the legs below the rails and to retract the same whereby to raise and lower the truck to and from an elevated deck through such extension and retraction of the legs.

12. In the organization defined in claim **11**, wherein:
said manually actuated means includes a braking means adapted to hold the legs at any position whenever they are being extended and to retard and/or stop the movement of the legs whenever they are being retracted.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,896,904 Dated July 29, 1975

Inventor(s) Bruce A. Walker

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

CLAIM 11, Column 8, line 49, "Ser. No. 464,805" should be deleted.

Signed and Sealed this

thirtieth Day of September 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks