

[54] **LADDER DOLLY AND WINCH**

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[51] Int. Cl. **B66b 9/20**

[58] Field of Search 187/10, 12; 280/47.28, 47.29, 280/47.17; 182/103, 131; 214/85

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[57] **ABSTRACT**

A hand truck mounted on wheels has a load carrying framework and an extendable handle for steering the hand truck to the base of a ladder. The rear side of the hand truck framework has flanged rubber rollers arranged for engagement with the rails of the ladder. A winch mounted at the top of the ladder drives a steel cable which is releasably coupled to the hand truck framework. During operation of the winch, the rollers provide guided upward movement for the hand truck and the load along the rails of the ladder.

7 Claims, 5 Drawing Figures

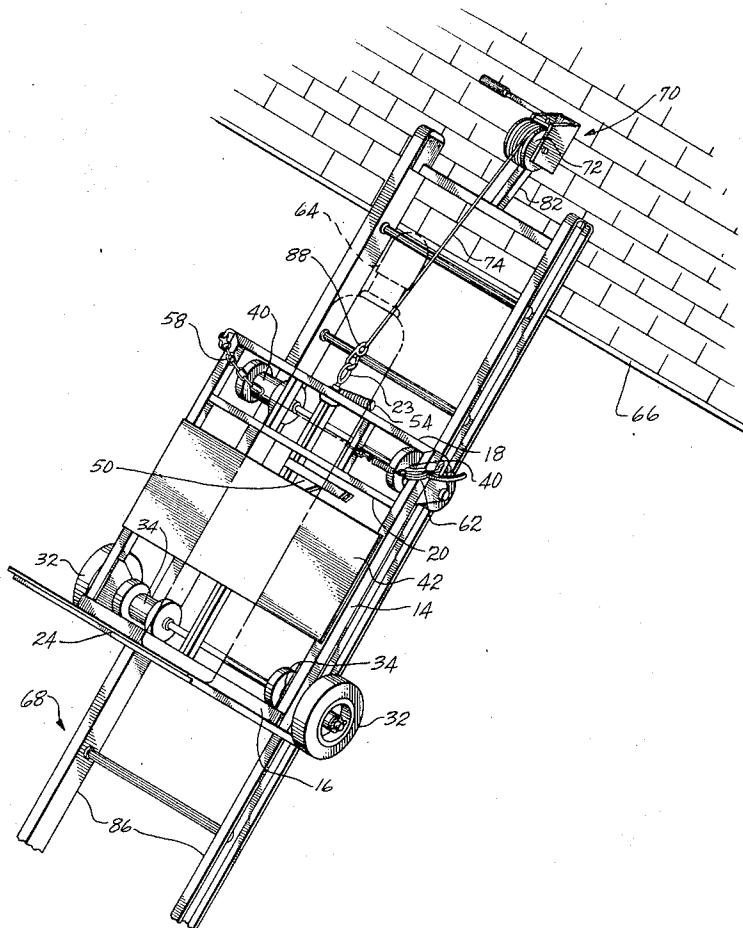


FIG. 1

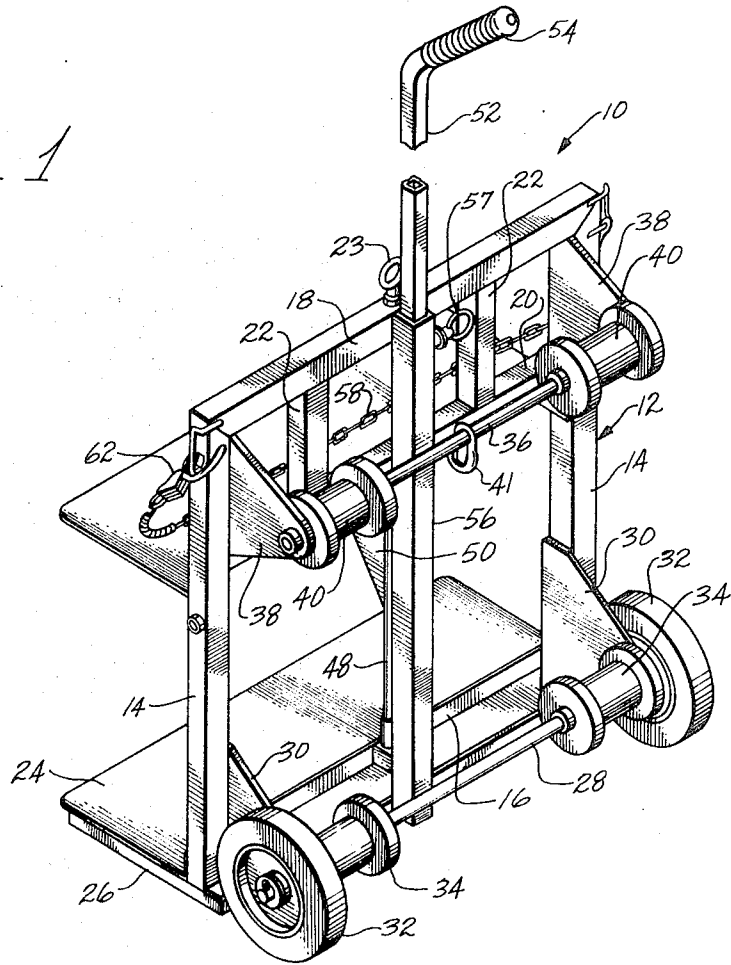
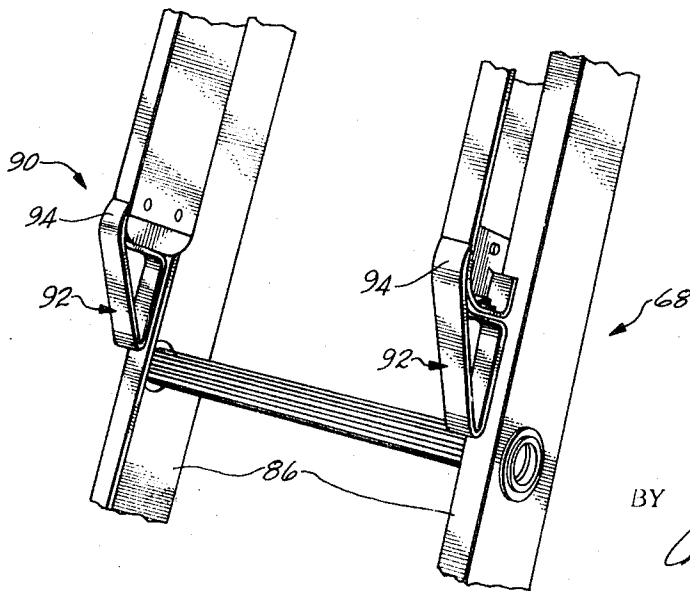


FIG. 5



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FIG. 2

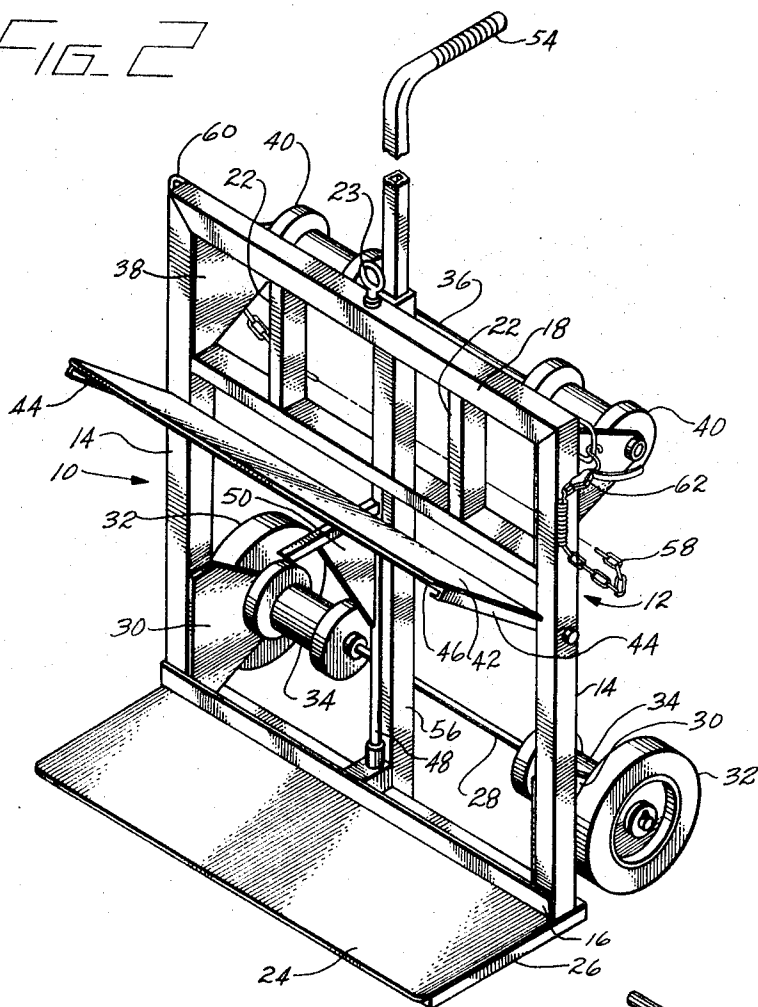


FIG. 3

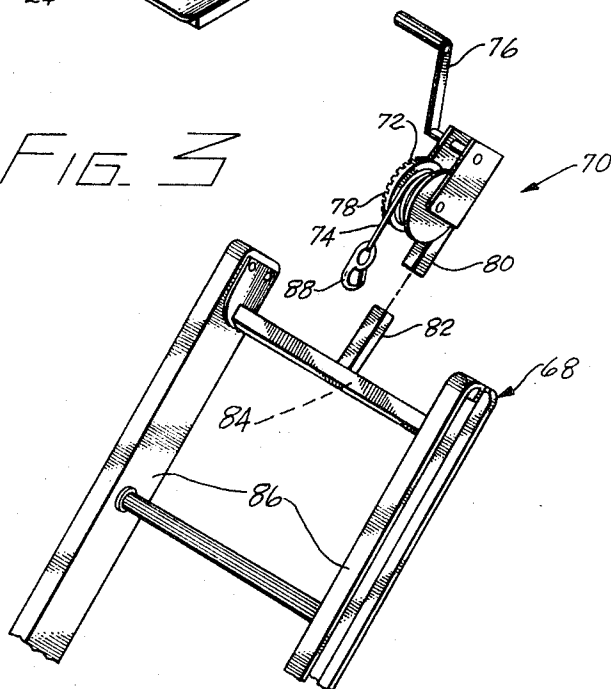
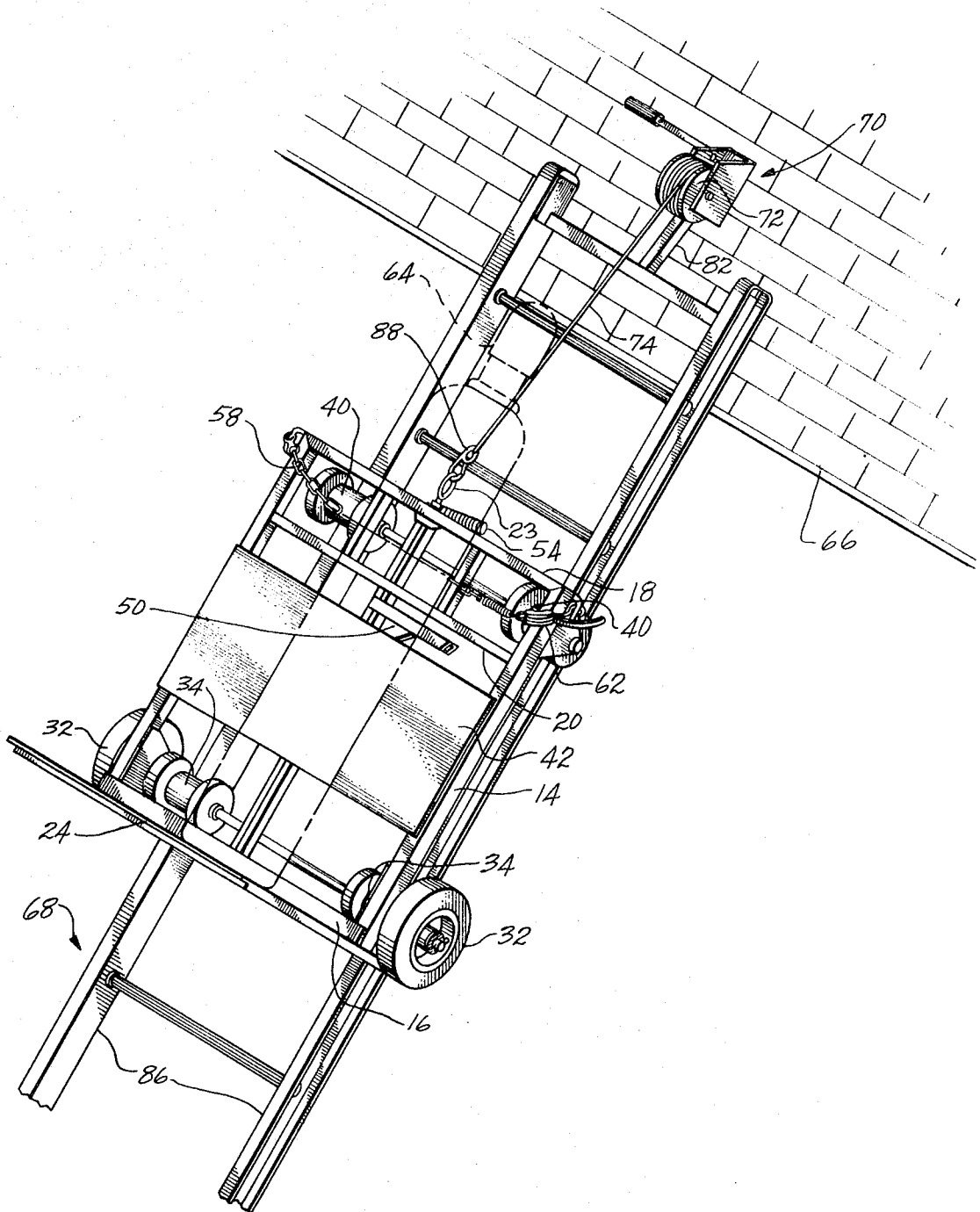


FIG. 4



LADDER DOLLY AND WINCH

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to apparatus for transporting loads, and more particularly to a hand truck adapted for releasable engagement with a ladder and hoist.

2. Description of the Prior Art

In the past, various load carrying devices have been used in combination with a ladder for hoisting objects to elevated locations such as roof tops or the like. For example, the use of a load carrying truck engaged with the rails of a ladder, and a hand-operated winch coupled to the truck for hoisting objects up the ladder has been suggested. These and other known prior art ladder hoist devices are useful because they have better mobility than many hoisting devices, and because they are substantially less costly to construct and maintain than hoisting devices, such as elevators.

However, such prior art ladder hoist devices are not satisfactory when a load must be transported to an elevated location at the top of the ladder from a loading site at a remote location from the base of the ladder. In this situation, a workman at the loading site transfers the load to a carriage for transporting the load to the base of the ladder. The load is later removed from the carriage and re-transferred to the ladder hoist device for lifting the load to the top of the ladder. If the load is a relatively heavy object such as an air-conditioner, the task of lifting it onto the carriage and re-transferring it to the ladder hoist device is particularly difficult. Moreover, if the load comprises construction materials such as bricks or shingles, for example, this task is unnecessarily time consuming.

SUMMARY OF THE INVENTION

This invention provides a load carrying hand truck or dolly adapted for engagement with the rails of a ladder, and hoisting means releasably coupled to the hand truck for hoisting the truck and its load up the ladder. In use, this combination provides means for transporting the load from the loading site to the base of the ladder and up to the top of the ladder without the necessity of removing the load from the hand truck. The combination of this invention is useful for a wide variety of servicemen who work on roofs or roof-mounted equipment, because it is capable of lifting relatively heavy equipment and relatively large loads of tools or construction materials. The hand truck is designed to be operated by one workman, and is adapted to fit a variety of ladder sizes without interfering with the normal use of the ladder. Moreover, the combination of this invention has good mobility, and is relatively inexpensive to manufacture.

Briefly, the hand truck contemplated by this invention has a rigid framework mounted on wheels, and means for supporting a load on the front side of the framework. Guide means at the rear of the framework are arranged for engagement with the rails of a ladder. Hoisting means secured to the ladder are adapted for releasable engagement with the hand truck framework. The hoisting means cooperates with the hand truck guide means to provide guided upward movement of the hand truck along the rails of the ladder.

In the preferred form of the invention, the hoisting means comprises a hand-operated winch for driving a cable coupled to the hand truck framework. Preferably, the guide means comprises a pair of vertically aligned flanged rubber rollers on each side of the hand truck framework. The rollers are arranged to ride on the rails of the ladder when the winch is operated, and the side flanges of the rollers overlap the sides of the ladder rails to maintain alignment of the hand truck with the ladder. In the preferred form of the invention, the hand truck includes handle means for use in steering the hand truck to and from the base of the ladder. The handle means preferably includes means for preventing contact with the rungs of the ladder during upward movement of the hand truck relative to the ladder.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features of the invention are more fully set forth in the following detailed description of the embodiments of the invention which are presently preferred, such description being presented with reference to the accompanying drawings, wherein:

FIG. 1 is a perspective view showing the rear side of the hand truck;

FIG. 2 is a perspective view showing the front of the hand truck;

FIG. 3 is a perspective view of the winch and means for coupling the winch to the ladder;

FIG. 4 is a perspective view showing the hand truck and a load engaged with the rails of the ladder; and

FIG. 5 is a perspective view showing an extension ladder and means for transferring the hand truck between ladder sections.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, a hand truck or dolly 10 has a substantially rectangular, rigid load-supporting framework 12 which includes a pair of parallel upright elongated side members 14, an elongated horizontally disposed lower cross-member 16 connecting the lower ends of side members 14, and an elongated horizontally disposed upper cross-member 18 connecting the upper ends of side members 14. The intermediate portions of side members 14 are connected together by an elongated horizontally disposed brace 20 spaced slightly below and parallel to upper cross-member 18. A pair of relatively short upright, laterally spaced apart elongated braces 22 are disposed parallel to each other and connected at their ends between upper cross-member 18 and brace 20.

Side members 14, upper cross-member 18, and braces 20 and 22 are preferably constructed of square steel tubing. Lower cross-member 16 is preferably constructed of a segment of angle iron, and the respective joints of framework 12 are preferably formed by welding the ends of its structural components together.

A heavy duty eye-bolt 23 secured to the upper cross-member 18 is arranged to extend upwardly above the flat upper surface of the cross-member.

A rectangular, horizontally disposed lower load-supporting platform 24 is rigidly secured to the bottom of framework 12 and arranged to extend laterally outwardly from a front side of the framework. The platform 24 is preferably formed from a piece of steel plate material which rests on a pair of laterally spaced apart and parallel struts 26 extending outwardly from the bottom of framework 12. Each strut 26 is preferably formed of a piece of square steel tubing welded to the bottom of a respective side member 14, and each side edge of platform 24 is in turn welded to the upper surface of its respective cooperating strut.

An elongated horizontally disposed lower rod 28 is secured to the rear side of framework 12 adjacent to its lower end by connecting respective portions of the rod to respective mounting brackets 30 extending rearwardly from side members 14. The ends of lower rod 28 are spaced slightly outwardly from side members 14, and a pair of rubber tired wheels 32 are journaled to the ends of the lower rod 28. When framework 12 is in the upright position shown in FIGS. 1 and 2, wheels 32 extend downwardly below platform 24 to rest on the ground (not shown).

A pair of elongated flanged rubber rollers 34 are journaled to respective portions of rod 28 and positioned adjacent to the inner side walls of side members 14. An elongated, horizontally disposed upper rod 36 is secured to the rear side of framework 12 adjacent to its upper end by connecting respective portions of the rod 36 to respective mounting brackets 38 extending rearwardly from side members 14. A pair of elongated flanged rubber rollers 40 are journaled to respective portions of upper rod 36 and positioned adjacent to the inner side walls of side members 14 so that each roller 40 is verti-

cally aligned with a respective one of rollers 34. A releasable safety hook 41 is secured to an intermediate portion of rod 36.

A rectangular, horizontally disposed foldable load-supporting shelf 42 is hinged to an intermediate portion of the framework 12, and is preferably positioned slightly above the center of the framework. Shelf 42 is preferably formed of a piece of steel plate material welded to a lower supporting framework comprising a pair of outwardly extending struts 44 hinged to the sides of side members 14, and an elongated brace 46 connecting the outer ends of struts 44 together. Shelf 42 is adapted to pivot relative to framework side members 14 from a folded position (see FIG. 4) extending downwardly and lying flat against side members 14 to a load-carrying position (see FIGS. 1 and 2) in which the shelf extends laterally outwardly from the front side of framework 12. Shelf 42 is supported in its load-carrying position by an upright elongated rotatable rod 48 disposed centrally of framework 12, and an elongated outwardly projecting supporting brace 50 welded to an intermediate portion of rod 48. The upper and lower ends of rod 48 are pivotally secured to upper and lower braces 18 and 16, respectively, to permit the rod to rotate about its longitudinal axis so as to pivot supporting brace 50 from a closed position (see FIG. 4) lying in a flat plane parallel to framework 12 to a load-supporting position (see FIGS. 1 and 2) extending laterally outwardly from the front side of the framework 12. Supporting brace 50 includes an elongated piece of square steel tubing, and the brace is positioned relative to rod 48 so that the upper surface of the tubing lies flat against the bottom surface of foldable shelf 42 when the brace is rotated outwardly to its load-supporting position.

An upright elongated telescoping rod 52 with a laterally extending handle 54 at its upper end is mounted on the rear side of framework 12. The rod and handle combination is adapted to extend upwardly above the framework to provide means for moving hand truck 10. Preferably, the rod 52 is constructed of square steel tubing, and is slidably disposed within a slightly over-sized upright elongated sleeve 56 also made of square steel tubing material. Sleeve 56 is rigidly secured to the rear side of framework 12 and is arranged to lie along the central upright axis of the framework. The rod 52 slides axially within sleeve 56 and has a cross-sectional area which permits it to rotate about its longitudinal axis relative to the sleeve. The rod and handle combination defines an extended position (see FIG. 1) in which the rod extends upwardly above framework 12 exteriorly of sleeve 56, with the handle extending rearwardly of the framework. In this position the rod 52 is maintained in a fixed position relative to the sleeve 56 by a screw clamp 57 secured to the side of the sleeve. The rod and handle combination also defines a closed position (see FIG. 2) in which the rod is disposed within the sleeve 56 and is rotated relative to the sleeve so that the handle lies in a plane parallel to the plane of the framework 12.

An elongated chain 58 is releasably secured at its ends to the upper corners of framework 12 so that it extends side-to-side across the front side of the framework. One end of the chain is fastened to a corner of the framework by a releasable hook 60, and the other end of the chain is releasably fastened to the other corner of the framework by a spring and lever-action clamp hook 62.

In use, hand truck 10 is disposed in its upright position shown in FIGS. 1 and 2 to receive a load, such as a pressurized gas container 64 (see FIG. 4), or other items such as an air-conditioner, vacuum pump, tools, construction materials, and the like. The load can be secured to the front side of the framework 12 by mounting it on lower platform 24 and clamping the chain 58 tightly around the load, as seen in FIG. 4. Alternatively, shelf 42 can be pivoted outwardly and held in its load-carrying position by support brace 50 to support a smaller sized load (not shown). To transport the load from a loading site to the base of a ladder, the rod 52 and handle 54 combination is moved upwardly to its extended position, and the load is then transported by the hand truck in the conventional manner using the rod and handle combination to push

and steer the truck. It is often necessary to lift a load to an elevated position, such as a rooftop 66 (see FIG. 4). The structure of the hand truck 10 of this invention permits a load to be transported away from a loading site to the base of a ladder 68 and up the ladder to the edge of rooftop 66 without the necessity of removing the load from the hand truck.

Referring to FIG. 3, a preferred means for hoisting the load up the ladder 68 comprises a hand-operated hoist 70 releasably secured to the top of the ladder. The hoist 70 includes a conventional winch 72 having an elongated cable 74 wound on a drum (not shown) by turning an outwardly extending handle 76. One end of the drum is fixed to a ratchet gear 78 which is engaged by a pawl (not shown) to prevent reverse rotation of the drum. The cable 74 preferably comprises a length of plastic-coated stranded steel, but it can be made of other strong and flexible materials capable of being coiled around a drum, such as a rope or chain, for example. The winch 72 is secured to the top of an elongated sleeve 80 preferably formed by a length of square steel tubing. An upwardly extending, elongated mounting stud 82 is secured to an upper rung 84 of ladder 68, and winch 70 is releasably secured to the top of the ladder by sliding sleeve 80 downwardly over mounting stud 82, as seen best in FIG. 3.

Hand truck 10 is adapted to be releasably engaged with the rails 86 of ladder 68 by positioning hand truck framework 12 in an upright position with its rear side against the ladder. The rollers 34 and 40 at the rear of the hand truck framework are arranged so that they ride on the upper surfaces of ladder rails 86 to provide means for moving the hand truck longitudinally relative to the ladder. When it is desired to hoist a load up the ladder, a releasable hook 88 secured to the bottom of cable 74 is fastened to eye-bolt 23 at the top of the hand truck framework. A workman at the top of roof 66 then cranks handle 76 of winch 72, causing the cable 74 to wind itself around the drum of the winch and hoist the hand truck upwardly along the rails of the ladder. The flanged sides of rollers 34 and 40 overlap the sides of the ladder rails, and in use they provide means for both guiding the hand truck along the rails and for maintaining the hand truck on the ladder rails during its upward movement.

When the hand truck is hoisted to a position adjacent to the edge of rooftop 66 as shown in FIG. 4, the pawl of the winch 72 falls into one of the notches of ratchet gear 78 to prevent further uncoiling of the cable 74, with the result that the hand truck is locked against downward movement relative to the ladder rails. When the hand truck and load are thus locked in the elevated position shown in FIG. 4, safety hook 41 at the rear of the hand truck framework is preferably fastened to upper rung 84 of the ladder to safely maintain the hand truck and load in the elevated position, whether or not the ratchet 78 of winch 70 is released. The load 64 is then removed from the hand truck by releasing clamp 62 of chain 58 and lifting the load upwardly onto the roof. The safety hook 41 is then released from engagement with the upper rung of the ladder, and the pawl of winch 72 is disabled so that the workman can lower the hand truck downwardly along the ladder to the ground. When the hand truck reaches the bottom of the ladder, the hook 88 on cable 74 is released from engagement with eye-bolt 41, and the hand truck is then wheeled to a loading site for receiving another load.

In some cases an extension ladder is required to hoist a load to a given elevation. As shown in FIGS. 4 and 5, the hand truck 10 is adapted to be hoisted up an extension ladder 90 by fastening a relatively short ramp 92 to the lower end of each upper ladder section. Each ramp 92 is preferably constructed from a piece of metal plate material formed in the shape of a triangle and having a curved upwardly extending projection 94 which provides a smooth transition from the triangular portion of the ramp to the rail of the upper ladder section. As seen best in FIG. 5, the hand truck is adapted to make a smooth transfer between ladder sections, although the upper ladder section is narrower than the lower ladder section. This transition is preferably provided by arranging rollers 34 and 40 so

that their outer flanges lie adjacent to the outer edges of the rails of the lower ladder section, and their inner flanges lie adjacent to the inner edges of the rails of the upper ladder section. The hand truck of this invention can be adapted to fit various sizes of ladders by making rollers 34 and 40 slidable relative to rods 28 and 36, respectively, so as to adjust the lateral spacing between respective pairs of rollers depending upon the lateral spacing between ladder rails.

I claim:

- 1. Apparatus for transporting a load comprising:
 - a. a ladder having parallel rails;
 - b. a rigid hand truck framework having a top and bottom, and front and rear sides;
 - c. a pair of wheels on the bottom of the framework arranged to rest on the ground when the framework is in a substantially upright position;
 - d. means for supporting a load on the front side of the framework;
 - e. flanged rollers mounted on the rear side of the framework at the top and bottom ends thereof for engagement with the rails of the ladder such that the framework is able to travel on the rollers along the rails of the ladder;
 - f. manual handle means on the framework positioned relative to the wheels such that the handle means may be used to steer the framework along the ground to and from the ladder, the handle means being movable between a first position for hand steering and a second position relative to the rollers for allowing the framework unobstructed travel on the rails of the ladder; and
 - g. hoisting means adapted for releasable engagement with the hand truck framework for cooperating with the ladder and the rollers to move the hand truck and the load along the rails of the ladder.
- 2. Apparatus according to claim 1 wherein the hoisting means comprises a winch adapted for driving an elongated cable, means for releasably coupling the cable to the hand truck framework, and means for mounting the winch at the top of the ladder.
- 3. Apparatus according to claim 1 wherein the ladder comprises an extension ladder defining a lower ladder section and an upper ladder section; and further including ramp means extending from the ladder lower section to the ladder upper section for permitting a smooth transfer of the hand truck guide means between the ladder sections.
- 4. A combined hand truck for transporting a load in an approximately horizontal direction and hoist for transporting the

same load in an approximately vertical direction by cooperation with a ladder and a means for hoisting comprising:

- a rigid framework having a top and bottom, and front and rear sides;
- means for supporting a load on the front side of the framework;
- means for steering the hand truck in a fore and aft direction on the ground comprising:
 - a pair of wheels adjacent the bottom of the framework arranged to rest on the ground when the framework is in a substantially upright position;
 - manual handle means on the framework at the rear side thereof adjacent the top so that the handle means may be used to steer the hand truck;
- means for hoisting the hand truck in an up and down direction without removing a load from the means for supporting comprising:
 - a first pair of rollers adjacent the top of the framework on the rear side thereof for engagement with the rails of a ladder;
 - a second pair of rollers adjacent the bottom of the framework on the rear side thereof for engagement with the rails of a ladder such that the framework is able to travel on the rollers along the rails thereof, said second rollers being coaxial with the wheels, said rollers each comprising an elongated central cylindrical portion and a flange at each end of the cylindrical portion; and
 - means for releasably coupling the framework to a means for hoisting; and
 - means for displacing the handle means between a first position for hand steering and a second position for unobstructed travel on a ladder.
- 5. Apparatus according to claim 4 including a horizontally disposed load supporting platform at the bottom of the framework arranged to extend laterally outwardly from the front side of the framework.
- 6. Apparatus according to claim 4 including a horizontally disposed shelf positioned at an intermediate portion of the front side of the framework, means for pivoting the shelf outwardly into a load-carrying position, and means for maintaining the shelf in its load-carrying position.
- 7. Apparatus according to claim 4 including releasable clamping means secured to the hand truck framework for fastening the load to the framework.

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