April 4, 1950 E. A. WAGNER 2,503,180

MOBILE LIFT

Filed June 21, 1947 4 Sheets-Sheet 1

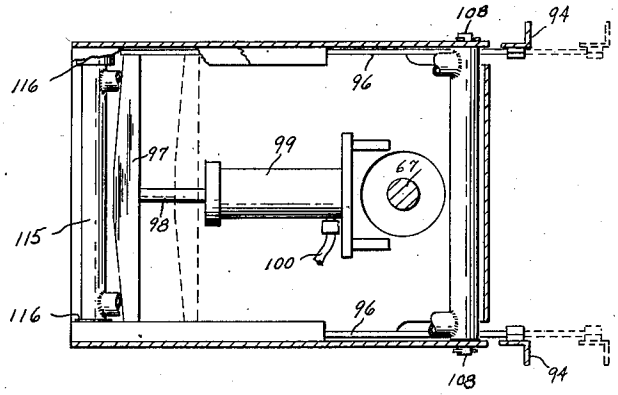

Fig. 11

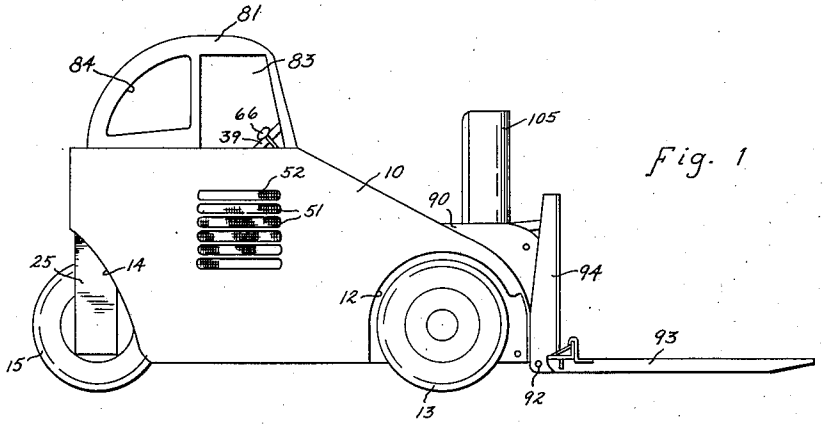

Fig. 1

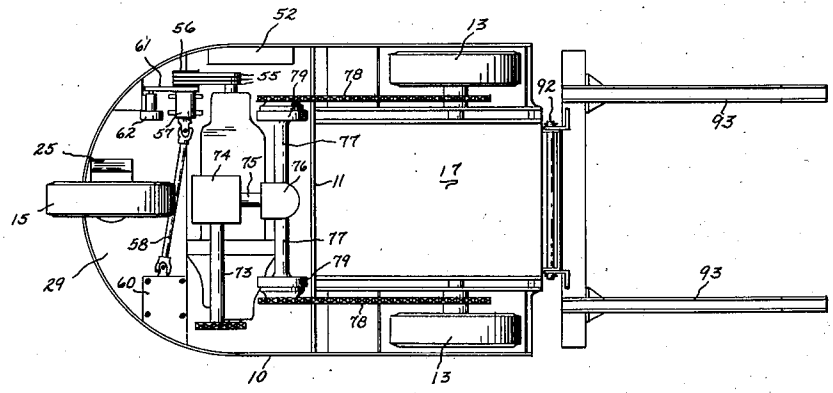

Fig. 2

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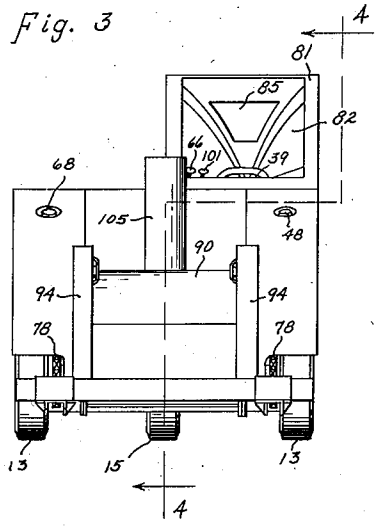
Fig. 3



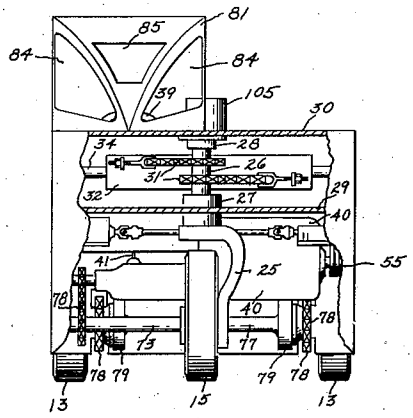


Fig. 5

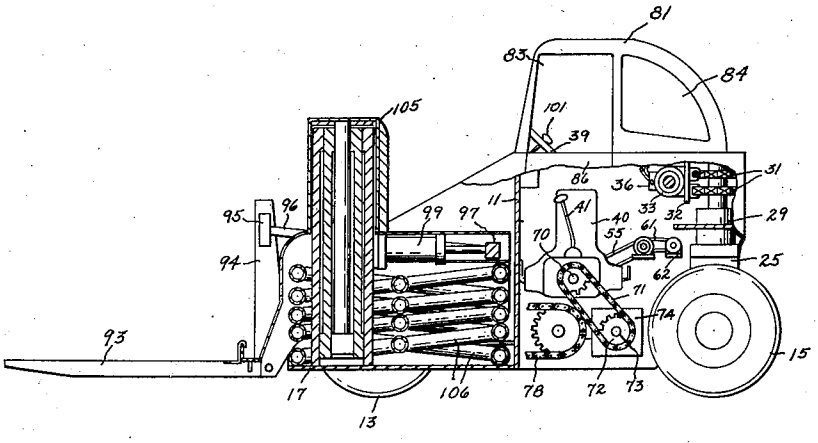


Fig. 4

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MOBILE LIFT

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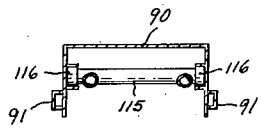

Fig. 8

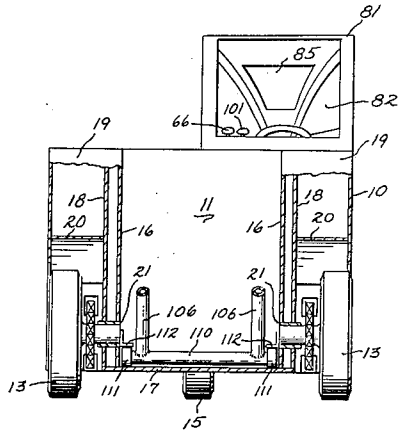

Fig. 7

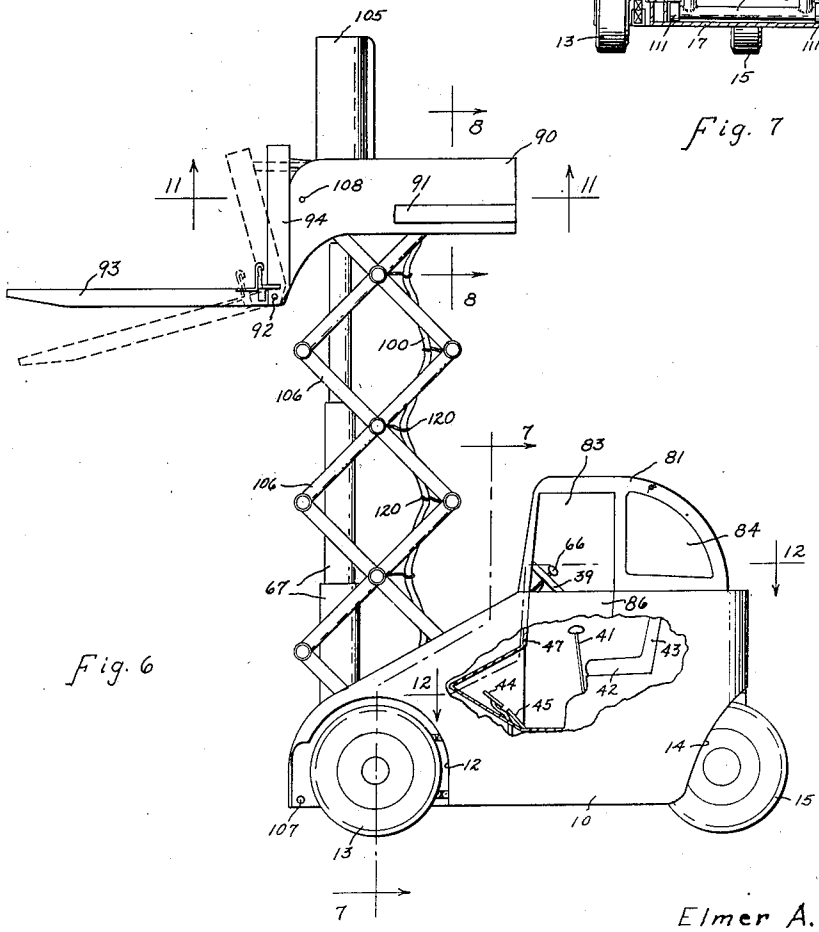

Fig. 6

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MOBILE LIFT

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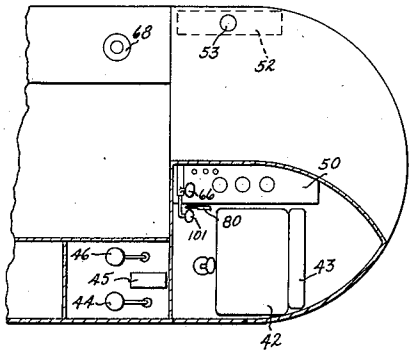

Fig. 12

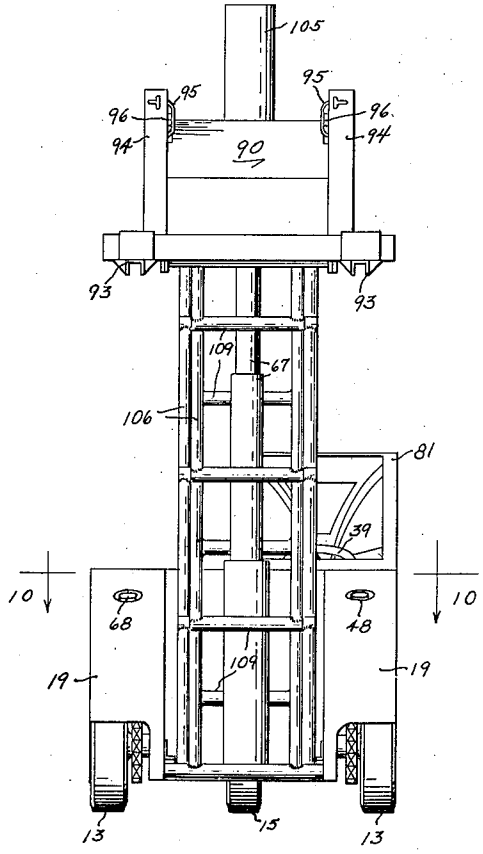

Fig. 9

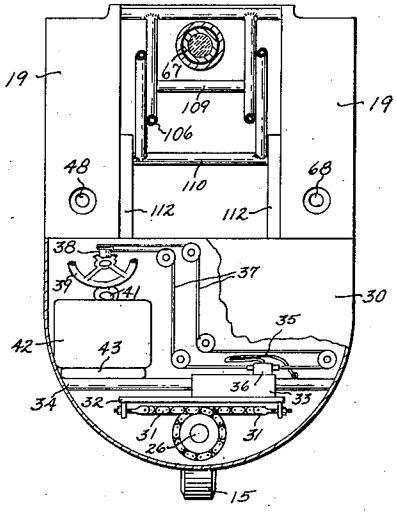

Fig. 10

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Patented Apr. 4, 1950 2,503,180

UNITED STATES PATENT OFFICE

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MOBILE LIFT

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Application June 21, 1947, Serial No. 756,224

8 Claims. (Cl. 187—9)

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My present invention relates to mobile lifts, or as they are sometimes called, utility trucks. The principal object of the present invention is to provide an automotive lift of extremely small size having a long lifting range and large capacity. The purpose of the principal object of the invention is to provide means for transporting heavy articles such as packaged machinery and the like short distances in manufacturing establishments, on a truck of such dimensions that it will pass through normal factory doors and the doors of box cars or vans so that extra handling of materials and goods is eliminated.

A further object of the present invention is to provide a utility truck or lift truck of small dimensions which possesses a high degree of stability so that heavy loads may be lifted to greater height than previously permitted by the use of such trucks.

A further object of the present invention is to provide a lift of the mobile type possessing strength, durability and a capacity for conveying heavy loads, which is formed of relatively simple and easily fabricated parts.

A further object of the present invention is to providing a mobile lift utilizing the principle of a lazy tongs for imparting stability to a telescoping hydraulic lift utilized as the means for lifting loads to varying heights.

A further object of the present invention is to provide a utility lift in which hydraulic mechanism is utilized for a number of functions, including steering, lifting and dumping, thereby simplifying the mechanism to a greater degree than heretofore encountered in such devices.

A further object of the present invention is to provide a utility truck having thereon a material handling device which may be easily and rapidly replaced by a material handling device of another type, for example, a lift fork may be utilized part of the time, and a scoop or platform at other times, interchangeability from one to the other being readily permitted.

The foregoing and other objects and advantages of the present invention will be more readily apparent from inspection of the accompanying drawings taken in connection with the following specification wherein like numerals refer to like parts throughout.

In the drawings

Fig. 1 is a side elevation of the present invention with the lift in its fully lowered position;

Fig. 2 is a bottom view of the present invention;

Fig. 3 is a front view of the present invention with the lift in lowered position;

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Fig. 4 is a partial sectional view taken substantially along line 4—4 of Fig. 3;

Fig. 5 is a rear view of the present invention with a portion of the rear wall broken away;

Fig. 6 is a side view of the present invention with the lift fully extended;

Fig. 7 is a vertical section taken substantially along line 7—7 of Fig. 6;

Fig. 8 is a vertical section taken substantially along line 8—8 of Fig. 6;

Fig. 9 is a front elevation of the invention with the lift fully extended;

Fig. 10 is a section taken substantially along line 10—10 of Fig. 9;

Fig. 11 is a vertical section taken substantially along line 11—11 of Fig. 6; and

Fig. 12 is a schematic view taken substantially along line 12—12 of Fig. 6.

The present invention is illustrated in a preferred form and comprises a three-wheeled vehicle in such preferred form. The vehicle comprises a body 10 formed by bending a sheet of boiler plate and connecting the arms of the bent plate by suitable cross braces, such as the partition 11 (Fig. 2). The forwardly extending portions of the outer plate are recessed at 12 to provide access to forward wheels 13, and the curved rear portion of the plate 10 is recessed at 14 to provide clearance for a central steering wheel 15. A pair of plates 16 extend forward from the partition 11 parallel to the arms of the plate 10 and are joined at their lower edges by a floor plate 17 which extends beyond the plates 16 and is attached to the lower edges of intermediate plates 18 (Fig. 7). The upper edges of the plate 10 and the plates 16 and 18 extend downwardly from the partition 11 and are joined together by top plates 19. Wheel wells for the forward wheels 13 are provided by positioning fenders 20 between the plates 18 and the outer plate 10. Rigid support for the wheels 13 is provided by fastening journals 21 in aligned openings in the plates 16 and 18 (Fig. 7). The space provided between the partition 11, plates 16 and floor plate 17 provides a well for the reception of the lift mechanism when in collapsed position as seen in Figs. 1 and 2.

The rear wheel 15 is mounted upon a member 25 fastened to the lower end of a tiller post 26 (Fig. 5) mounted in journals 27 and 28 fastened to an intermediate horizontal plate 29 and the upper deck plate 30 respectively. The post 26 supports a pair of sprocket gears about which are wrapped in reverse direction a pair of sprocket chains 31 having their inner ends attached to the sprocket gears and their outer ends fastened to

the ends of a movable member 32. The member 32 is adapted to be moved longitudinally by a hydraulic motor including a cylinder 33 mounted upon a cross strut 34. A suitable piston guided within cylinder 33 is fastened to the member 32 so that the cylinder 33 may be moved in opposite directions by fluid admitted to the opposite faces of the piston within cylinder 33 through a supply tube 35 and valve 36. The valve 36 is shifted to direct the flow of fluid therethrough by means of a pair of cables 37 extending over suitable guide pulleys from a steering post 38 having a steering wheel 39 thereon. Rotation of the steering wheel therefore causes movement of the wheel 15 in one or the other direction so that the vehicle may be guided from place to place. A large clearance is provided for the steering wheel 15 so that the vehicle may be turned through a very short radius, thus being made capable of negotiating the side door of a box car and moving towards either end of the box car after entering the box car. Details of the hydraulic steering piston and cylinder are not herein fully disclosed as there are many such devices available for the purpose.

The steering wheel post is mounted upon the upper edge of the partition 11 which defines the forward wall of a machinery compartment and the rear wall of the lift containing well. A suitable internal combustion engine 40 is mounted in the machinery compartment, the cylinders thereof occupying the space at the right side of the center line of the vehicle, and the gear shift transmission extending at a lower level toward the left side of the machine beneath the floor of a driver's cab within which the steering wheel 39 is mounted (Figs. 2, 4 and 6). The conventional gear shift lever 41 extends upward beneath the steering wheel as seen in Figs. 6 and 12. Room is provided above the transmission housing and to the rear of the gear shift lever for a driver's seat 42 including a back rest 43. The partition 11 is recessed forwardly of the driver's seat to provide room for the clutch pedal 44, accelerator 45 and brake pedal 46. The space above the foot pedal compartment within the left fender provides room for a gasoline tank 47 which may be filled through an opening 48 (Fig. 3). The driver's compartment is provided with an instrument panel 50 at the right of the driver's seat upon which are mounted the usual control instruments for an automotive engine as indicated in Fig. 12.

The right side wall of the vehicle is provided with a louver 51 adjacent which is mounted a radiator 52 which may be filled through an opening 53 (Figs. 1 and 12). A propeller fan or the like may be provided adjacent the radiator and driven by the automotive engine (not herein shown).

The engine is provided with a multiple sheave pulley on the forwardly extending shaft thereof about which are placed a plurality of belts 55 (Figs. 2, 4 and 5) passing around a pulley 56 mounted on a shaft journaled in a support 57, the opposite end of which drives a shaft extension 58 having universal joint connections at each end, the far end connection being to the shaft of fluid pump mounted in a housing 60. An extra sheave on pulley 56 drives a belt 61 which passes about a pulley on the shaft of a smaller fluid pump 62. The pump 62 is connected to the hydraulic steering mechanism through the flexible tube 35. The larger pump within housing 60 is adapted to drive the hydraulic lift. A control lever 66 (Figs. 7 and 12) operates a suitable valve

(not herein detailed) to connect the outlet side of the pump in housing 60 to the interior of a telescoping hydraulic jack comprising a plurality of sections 67, the largest and outermost of which is mounted upon the floor board 17 adjacent the front edge of the vehicle slightly forwardly of the axis line of the front wheels. Shifting the control lever to another position may trap the fluid admitted into the telescoping lift so as to maintain the lift at any elevation desired, and further shifting to a draining position permits the lowering of the lift at any desired speed. When the control lever is shifted to draining position the output from the pump and the liquid flowing from the interior of the lift are returned to a tank mounted above the right front wheel 13 which may be filled through a filling opening 68 (Fig. 3). Any type of fluid control valve, of which there are many known to the art, may be utilized to effect control of the hydraulic lift. The connection of the pump in housing 60 to the control valve and to the lift cylinder are not herein illustrated as such details may assume many different forms.

In order to propel the vehicle the left end of the engine shaft beneath the driver's seat is provided with a sprocket gear 70 about which passes a chain 71 to a sprocket gear 72 on the end of a shaft 73 leading to a gear box 74 (Figs. 2 and 4). From the gear box a shaft 75 extends into a differential gear housing 76 from which extend lateral axle housings 77. Suitable axles mounted in the housings 77 drive a pair of forwardly extending sprocket chains 78 which pass about sprocket gears on the shafts of the forward wheels 13. Suitable brake drum assemblies 79 are preferably provided and controlled through the usual connections with the brake pedal 46 and a brake pedal lock 80 in the driver's compartment.

The driver's compartment is preferably enclosed by a small cab 81 having a windshield 82, side windows 83, or side windows 84 and rear top window 85 so that the driver may have unobstructed view in all directions. The left side of the cab is preferably provided with a door 86 in which the left side window 83 is mounted, the door being of sufficient size to permit access by the driver.

The lift preferably comprises a hood 90 having side walls including stiffener channels 91, the side walls being spaced so as to permit reception of the hood between the panels 16 of the vehicle frame. The forward edge of the hood is turned downward and braced by downwardly extending portions of the side walls. The lower tips of the side walls provide means to journal a pivot rod 92 upon which may be mounted a lift fork comprising forwardly extending arms 93 and vertical arms 94. Brackets 95 are mounted on the upper ends of the vertical arms 94 and provide means pivotally to connect thereto the forward extremities of tilt control arms 96 extending back into the hood adjacent the side walls thereof. The arms 96 (Fig. 11) are pivotally connected at their rear ends to a cross head 97 fastened to the rear end of a piston rod 98 extending from a piston within a hydraulic cylinder 99 mounted beneath the top portion of the hood. A tube 100 leads to a second fluid control lever 101 within the driver's cab by means of which the outlet side of the pump in housing 60 may be connected to the interior of the cylinder 99 so as to drive the cross head rearwardly and hold the lift arms 93 in horizontal position. Movement of the control lever

101 to a draining position permits tilting of the lift arms. Details of the control valve and piping connections are not herein illustrated as they may be assembled by anyone skilled in the art. It is apparent that the lift arms may be replaced by any other type of material handling device such as a platform or scoop.

The telescoping sections 67 nest within a housing 105 extending upward from the center of the top wall of the hood 90. In order to brace the telescoping pistons when extended I provide a plurality of lazy tong arms 106. The forward extremities of the lowermost pair of forwardly extending arms are pivoted to the forward extremities of the side wall plates 16 upon studs 107, and the forward extremities of the uppermost pair of forwardly extending arms are pivoted to the side walls of the hood 90 upon studs 108. The opposed pairs of arms are suitably connected by cross members 109. The lower ends of the lowermost pair of rearwardly extending arms 106 are connected by a transverse tube 110 providing journals for a pair of guide wheels 111 rolling upon the floor plate 17 adjacent the side plates 16 and confined by guide tracks 112 (Fig. 7). The uppermost pair of rearwardly extending arms 106 are connected by a cross tube 115 mounting a pair of wheels 116 guided in horizontal channels on the inner surfaces of the side walls of the hood 90 (Fig. 8). The tube 100 is linked to suitable cross members of the lazy tong assembly by connectors 120 which prevent the tube from becoming caught or pinched. By providing the rolling wheels at the rear points of contact of the lazy tong assembly with the body and the hood the forward connectors between the pairs of arms are permitted to move vertically while all foreshortening is accomplished by lateral movement of the intermediate and rear connectors. The hood is also permitted to move vertically upward while being braced against swaying or pivoting about the telescoping pistons.

It will be apparent from inspection of the drawings that the moment arm of the load is relatively short compared to the moment arm of the vehicle including its engine and the driver. The vehicle comprises heavy plates forming the structural members of the chassis which provide counter-balance for the load carried by the lift. Accurate and instantaneous manipulation of the load is provided in a compact mobile structure. and the loading of box cars, or the placing of heavy articles in small spaces may be easily accomplished by the use of the present invention.

The driver's seat is so located that the driver has clear vision in all directions including overhead. When the lift is collapsed clear view is afforded between the plates 16 and over the hood 90, and the lift when extended provides an open framework through which the driver may look.

Having illustrated and described one embodiment which my invention may assume it should be apparent to those skilled in the art that numerous modifications in detail and arrangement thereof are permissible. All such modifications as come within the true spirit and scope of the appended claims are considered to be a part of my invention.

I claim:

1. A mobile lift comprising a material handling device, an automotive wheeled vehicle upon which said material handling device is mounted, a telescoping piston construction mounted vertically upon the vehicle and supporting said material handling device, said telescoping construction being collapsible to an extent such that its minimum height is less than the maximum height of the vehicle and being extensible to permit the lifting of loads to a considerable height above the vehicle, and a lazy tong device surrounding and bracing said telescoping construction and having its lower end mounted on said vehicle and its upper end connected to said material handling device.

2. A mobile lift comprising a material handling device, a wheeled vehicle upon which said material handling device is mounted, a vertically extending, telescoping piston construction mounted at the front of the vehicle and supporting said material handling device, said telescoping construction being collapsible to an extent such that its minimum height is less than the height of standard doors and being extensible to permit the lifting of loads to a considerable height above the vehicle, and a pair of interconnected lazy tong assemblies having their lower ends mounted on the vehicle at the sides of said telescoping construction and their upper ends connected to said material handling device for stabilizing said telescoping construction when extended.

3. A mobile lift comprising a material handling device, a wheeled vehicle upon which said material handling device is mounted, a hydraulically operated, vertically extending, telescoping piston construction supported upon the vehicle and supporting said material handling device, said telescoping construction being collapsible to an extent such that its minimum height is less than the maximum height of the vehicle and being extensible to permit the lifting of loads to a considerable height above the vehicle, and a pair of interconnected lazy tong assemblies mounted on said vehicle and supporting said material handling device, said lazy tong assemblies being at the sides of said telescoping construction and being interconnected in front of and behind said telescoping construction so as to provide a hollow column surrounding said telescoping construction for stabilizing said telescoping construction when extended.

4. A mobile lift comprising a material handling device, a wheeled vehicle upon which said material handling device is mounted, a hydraulically operated, vertically extending, telescoping piston construction supported upon the vehicle and supporting said material handling device, said telescoping construction being collapsible to an extent such that its minimum height is less than the maximum height of the vehicle and being extensible to permit the lifting of loads to a considerable height above the vehicle, and a pair of interconnected lazy tong assemblies mounted on said vehicle and supporting said material handling device for stabilizing said telescoping construction when extended, said lazy tong assemblies being at the sides of said telescoping construction and being interconnected in front of and behind said telescoping construction so as to provide the uppermost and lowermost ends of certain of the lazy tong members being guided for horizontal movement upon the material handling device and the vehicle respectively in order to permit vertical movement of said material handling device.

5. An automotive lift comprising a body including forwardly extending, laterally spaced portions, a pair of wheels mounted on said portions, a transverse partition at the rear of said forwardly extending portions, a driver's cab situated to the rear of said transverse partition

and including a driver's seat so located as to position the driver's head above and to the rear of one of said forwardly extending portions, and a collapsible lift mechanism receivable between said forwardly extending portions and being collapsible to such an extent that the driver may have clear view forwardly between said forwardly extending portions.

6. An automotive lift comprising a body including forwardly extending laterally spaced portions, a driver's cab including a driver's seat so located as to position the driver's head above and to the rear of one of said forwardly extending portions, and a vertically extensible, collapsible lift mechanism receivable between said forwardly extending portions and being collapsible to such an extent that the driver may have clear view forwardly between said forwardly extending portions over the top of said mechanism, said mechanism comprising a hydraulic lift and lift bracing members forming an open structure when extended.

7. In an automotive lift, a vertically extensible, telescoping, hydraulic piston construction, a vehicle mounting said telescoping construction, a material handling device including a hood mounted on said telescoping construction, a lazy tong bracing construction connected to said vehicle and to said hood for bracing said telescoping piston construction when extended, said lazy tong construction being collapsible to a greater extent than said telescoping construction, and said hood having a small, upwardly extending housing thereon for receiving the upper ends of the individual pistons of said telescoping construction whereby to reduce obstruction of the driver's vision by said material handling device when in lowered position.

8. A mobile lift comprising a vertically movable hood, a wheeled vehicle supporting said hood, a hydraulically operated, vertically extending, telescoping construction comprising a plurality of interfitting pistons mounted upon said vehicle and supporting said hood, a material handling device operatively mounted upon said hood, said piston construction being collapsible to an extent such that its minimum height is less than the

maximum height of the vehicle and being extensible to lift said hood to a considerable height above the vehicle, a pair of lazy tong assemblies mounted on said vehicle for stabilizing said piston construction when extended, said lazy tong assemblies each comprising a lower pair of centrally pivoted lazy tong members and an upper pair of centrally pivoted lazy tong members, pivot means connecting the lowermost end of one of each lower pair of lazy tong members to said vehicle, guiding means on said vehicle for guiding the lowermost end of the other of each lower pair of lazy tong members horizontally toward and from said pivot means, second pivot means connecting the uppermost end of one of each upper pair of lazy tong members to said hood, second guiding means on said hood for guiding the uppermost end of the other of each upper pair of lazy tong members for horizontal movement toward and from said second pivot means, and horizontal members interconnecting the opposite joints of said lazy tong assemblies, said first and second pivot means being vertically aligned and said telescoping piston construction being mounted midway between and slightly to the rear of said first pivot means.

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