Oct. 16, 1962 J. T. KILEY 3,058,607

LADDER RACKS

Filed March 11, 1960 4 Sheets-Sheet 1

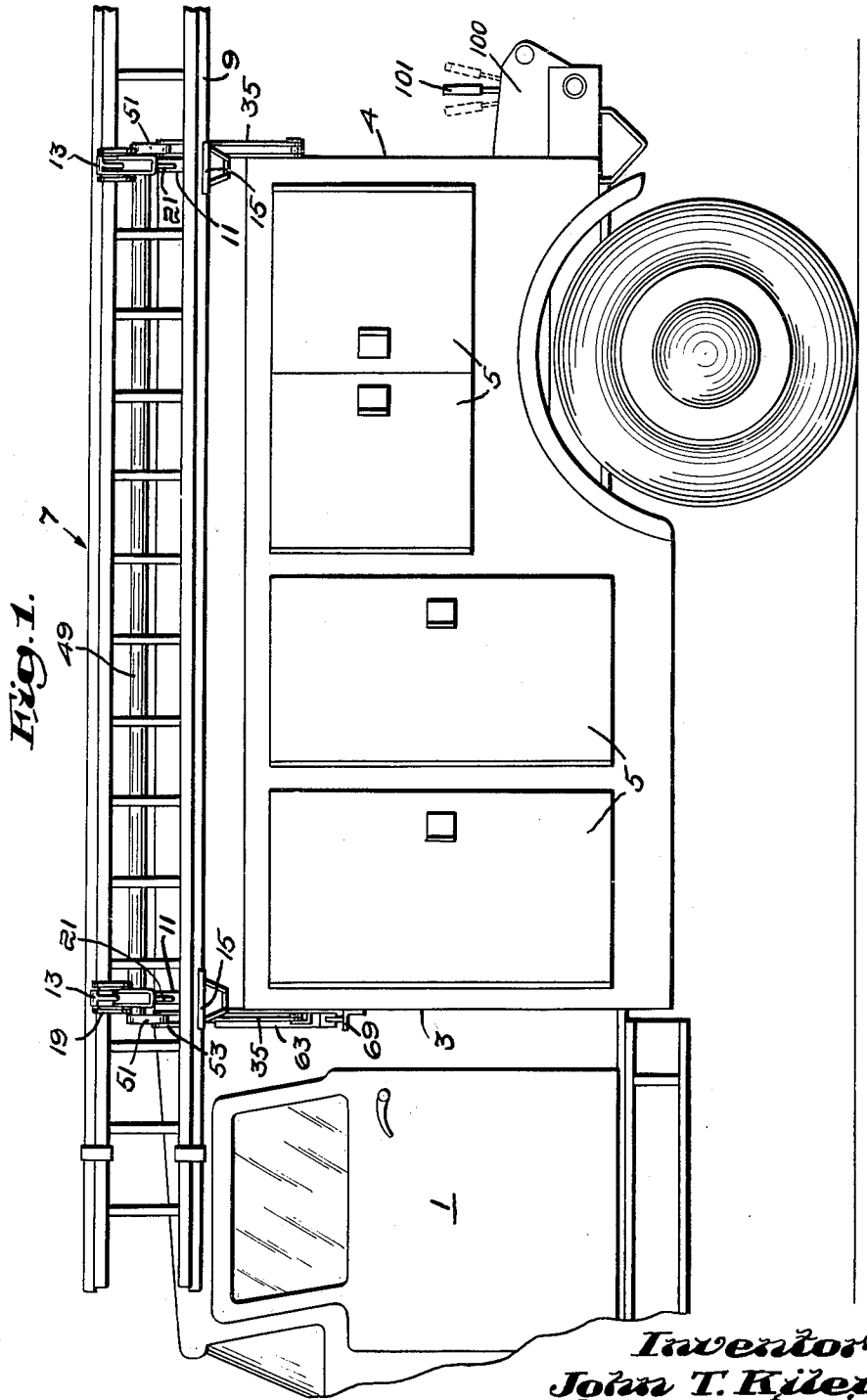

Fig. 1.

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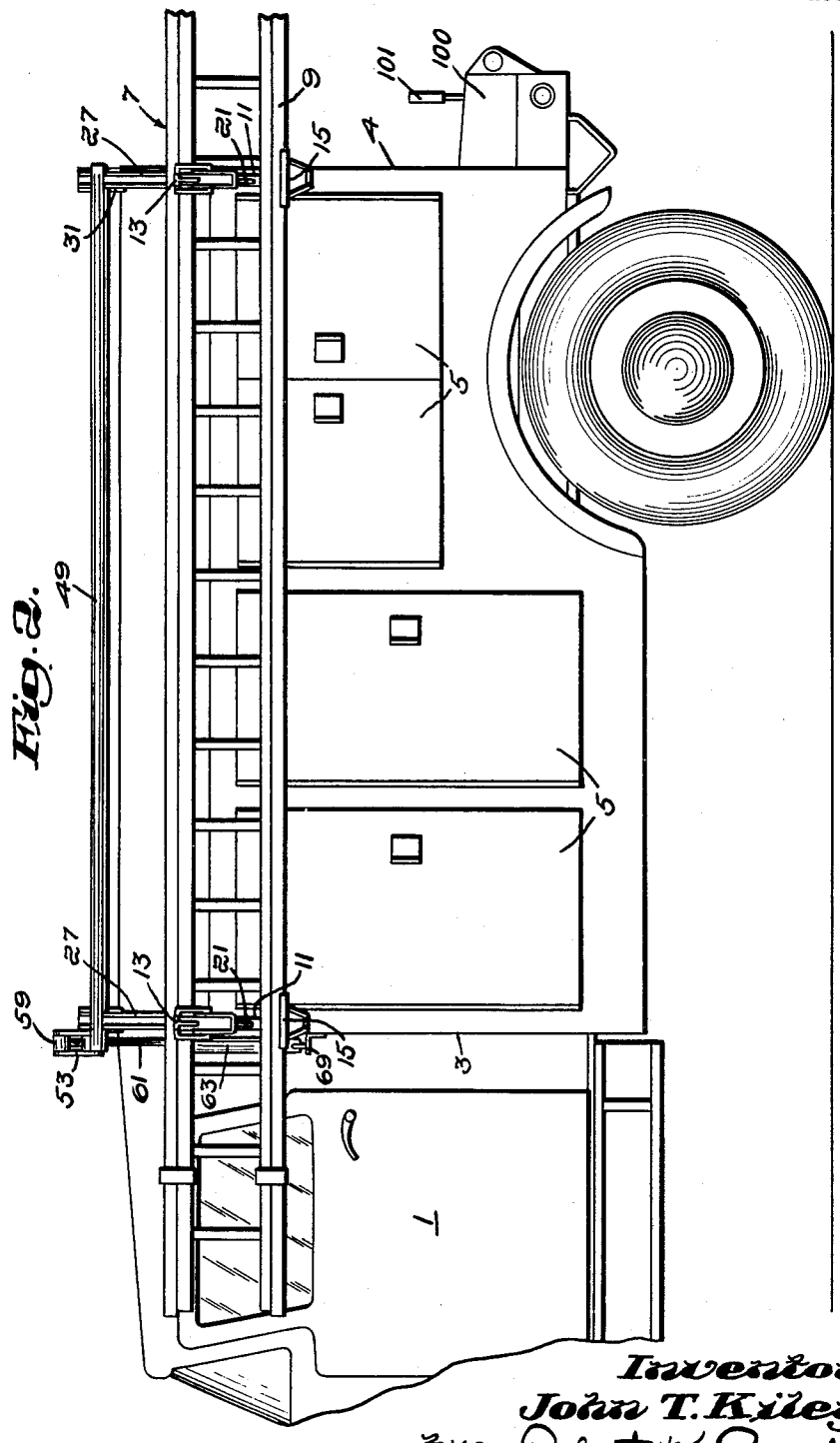

Fig. 2.

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Fig. 5.

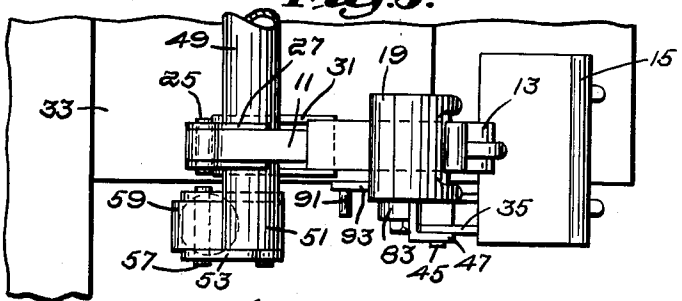

Fig. 3.

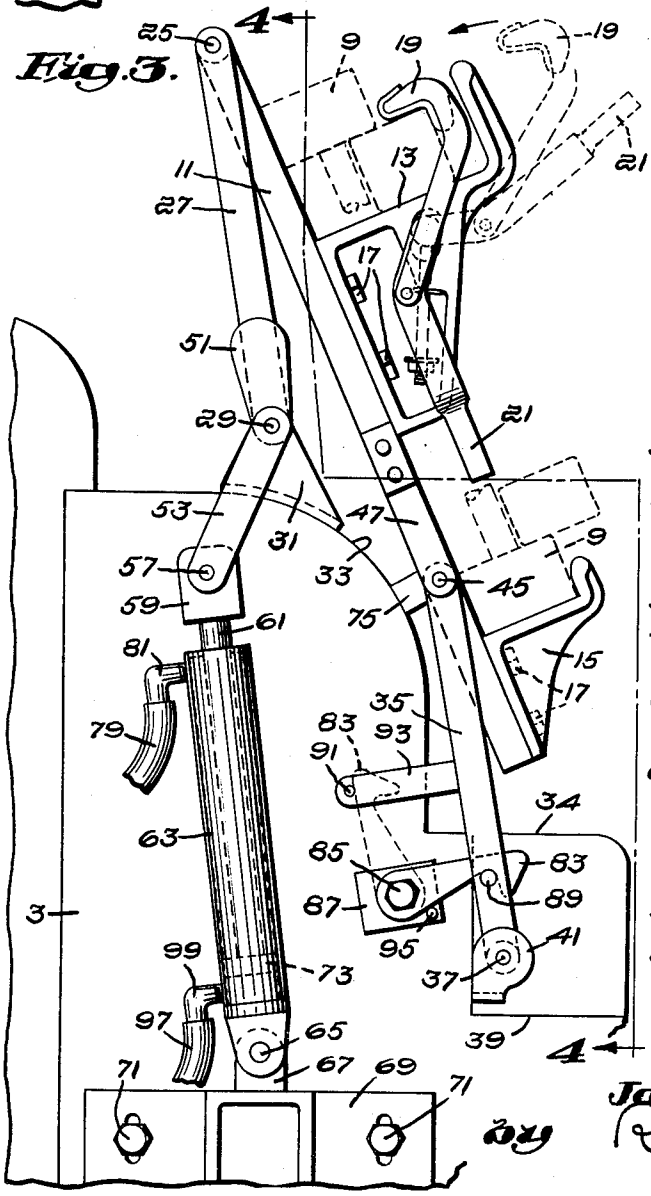

Fig. 4.

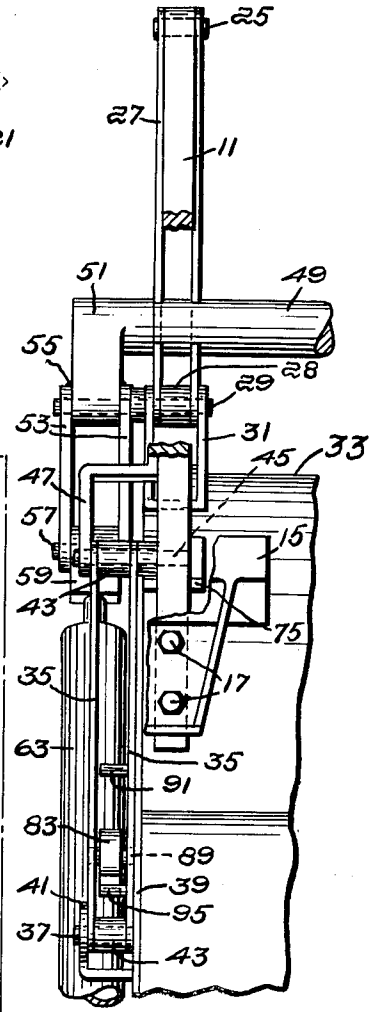

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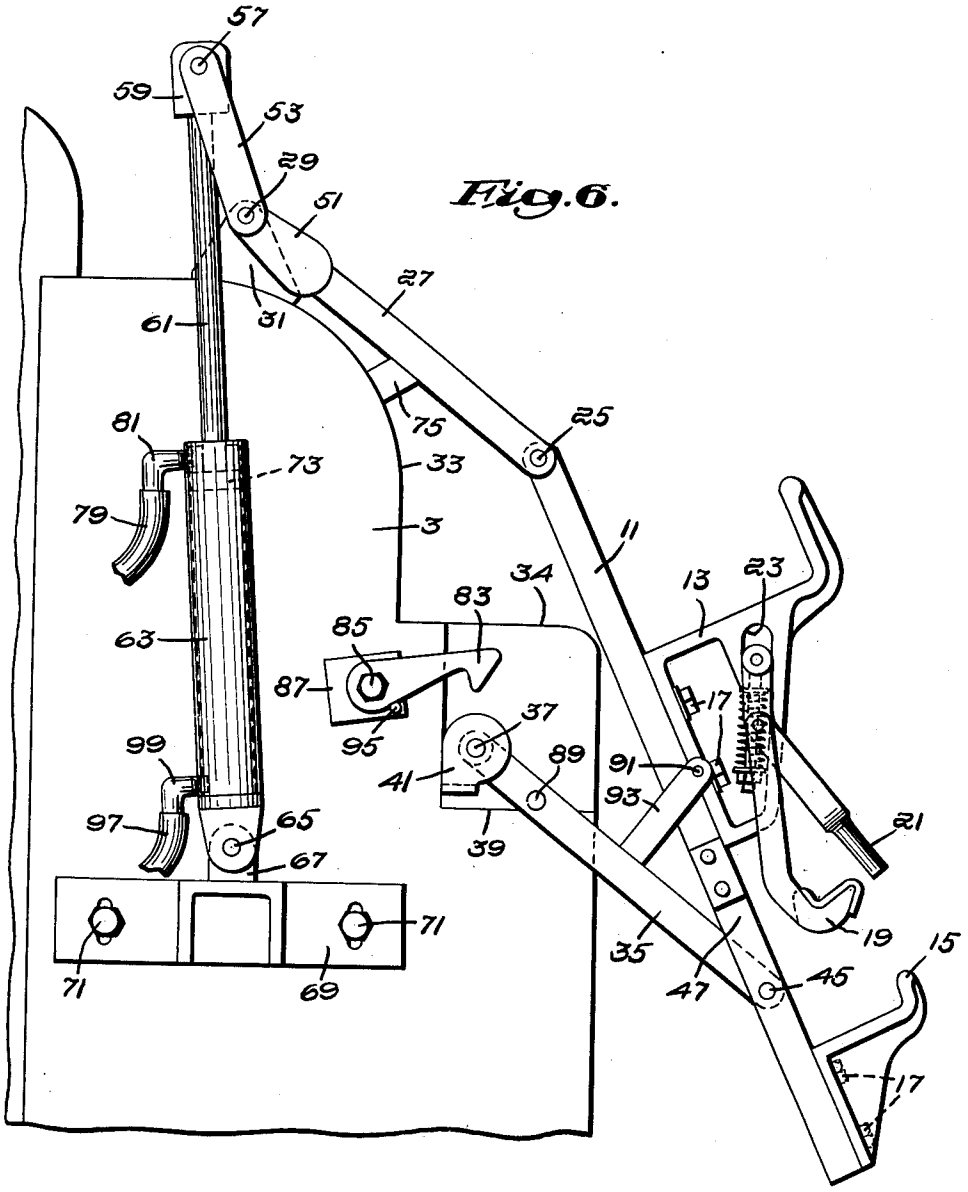
Fig. 6.



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3,058,607

LADDER RACKS

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1 Claim. (Cl. 214—450)

This invention relates to the racks or similar devices for carrying ladders employed on motor-driven service vehicles of the type commonly used by telephone and electric light companies and other public utilities.

It is customary to locate such racks so that the ladders are carried on the side of the vehicle body, thus leaving the areas above the roof of the body available for the erection, mounting and carriage of power-actuated pole handling and setting equipment, hole digging implements, and other facilities thereon, and to leave free access to the interior of the body. But the cabinets for tools and parts which are built into the sides of the vehicle body have become so large that the ladder has to be mounted much higher than previously in order to clear the tops of the doors of the cabinets and the door of the driver's cab as well. Thus it is no longer easy or convenient or entirely safe for men standing on the ground to remove and replace the ladder from a fixed rack which will hold it at this necessary elevation.

The device of the present invention comprises a ladder rack operated by hydraulic power from the engine of the vehicle, which lowers the rack and ladder to a position or height enabling easy unloading of the ladder from the rack by men standing on the ground alongside the vehicle, and which thereafter raises and locks the replaced ladder in elevated position clear of the cabinet and cab doors, for transportation.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which—

FIG. 1 is a side elevation of the main portion of a utility truck or vehicle, from the driver's cab to the rear end, showing the novel ladder rack holding the ladder in raised carrying position.

FIG. 2 is a view similar to FIG. 1, showing the ladder rack and ladder in lowered loading and unloading position.

FIG. 3 is a front elevation of a portion of the front wall of the vehicle's body, with the ladder rack and the hydraulic cylinder which operates it mounted thereon and on the adjacent parts of the body, the rack being in raised carrying position.

FIG. 4 is a side elevation of certain of the parts of FIG. 3, the remainder being broken away on line 4—4 of FIG. 3.

FIG. 5 is a plan view of the parts of FIG. 3.

FIG. 6 is a front elevation of the parts of FIG. 3 with the ladder rack in lowered loading and unloading position.

The utility vehicle to which the novel ladder rack is shown applied is of conventional type with a driver's cab entered through doors 1 at each side thereof and a body defined by a front wall 3, a rear wall 4, and side walls which are double at each side of the vehicle, where they are spaced widely apart to provide capacious cabinets extending sidewise beyond the wheels and equipped with doors 5 and accessible from beside the vehicle. Tools, parts, and supplies are stored and carried on shelves in these cabinets.

The ladder 7, of conventional extension type, is carried by its rails 9 on two rack members proper 11 of channel iron each having two brackets 13, 15, for engagement with the rails 9 of the ladder, affixed to member 11 by bolts 17 with capacity for adjustment of their spaced relation.

The upper bracket 13 is equipped with a locking clamp of known form comprising a hook 19 engaging with the rail of the extension portion of the ladder and operated by a spring-biased toggle-lever 21 mounted in a slot 23 in bracket 13.

Each rack member 11 is connected at its upper end by pivot 25 to a link or, strictly, a radius arm 27, pivoted at 29 between the two ears of a bracket 31 affixed to the convex surface 33 of the roof over the implement tunnel overlying the cabinets at the extreme front and rear ends of the tunnel. Each link is made of two portions arranged in spaced and parallel relation, with the rack member 11 received between them. A similar link 35, normally of equal length, is pivoted at its lower end at 37 between the face of a plate 39 and a lug 41 welded thereto in spaced and parallel relation. Each plate 39 is affixed respectively to the front wall 3 and the narrow vertical back wall 4 of the body. Tubular spacers 43 hold the two component portions of link 35 in spaced and parallel relation, and a pin 45 fixed in each rack member 11 extends through the two portions of its lower link 35 and the intervening spacer and also through a bracket 47 welded and riveted to the side of member 11, thus pivotally connecting such member to its lower link 35 in offset relation.

To lift and lower the rack and the ladder thereon, the upper links 27 of the two rack members 11 are joined together by a stiff torque tube 49 attached thereto a slight distance from their pivots 29. This is done by slotting the ends of the torque tube 49 to let the two portions of each link 27 extend therethrough, and welding the parts together. A heavy crank arm 51 is then welded to the segmental end portions of the front end of torque tube 49 and to the adjacent areas of link 27. Two extensions 53 are welded to the arm of crank 51 in fixed angular relation thereto as indicated at 55, and pivot 29 extends through these and the arm of crank 51 as well as through link 27, its spacer 28, and bracket 31. The eccentric location of the torque tube simplifies the pivotal mounting of the upper links 27.

The parts 51 and 53 thus comprise a lever rocking on the same center 29 as the links 27, and to the free end of this lever is pivotally connected at 57 the cross-head 59 of the plunger 61 of a hydraulic cylinder 63, pivotally mounted at 65 on a lug 67 of a bracket 69 affixed by bolts 71 to the front wall 3 of the body with capacity for vertical adjustment. Thus arranged, admission of hydraulic fluid under pressure below the piston 73 of cylinder 63 through hose 97 and elbow 99 drives the plunger 61 upward out of the cylinder, imparting clockwise rotation to the composite lever 53, 51 and to all four links 27, 35 which carry the two rack members 11 outward and downward, this parallel linkage system lowering the rack members and the ladder 9 thereon at a substantially constant small angle of inclination to the vertical until as shown in FIG. 6 the links each an angular position of about 45° below the horizontal, where the two upper links engage rubber bumpers 75 fixed on the surface 33 and are arrested thereby. The pressure beneath the piston 73 maintains the parts in this relation. By such movement, the ladder has been swung outward and down over the roof 34 of the cabinets and lowered by a distance of between 1½ and 2 feet, depending on the length chosen for the links, or to substantially shoulder height of the men who are to remove it from the brackets by hand, after releasing the locking clamps 19.

When the ladder is to be again loaded for transportation, it is replaced in the brackets 13, 15 and locked by clamps 19 while the rack is in lowered position. Then fluid under pressure is admitted through hose 79 and elbow 81 above the piston 73, whereupon the plunger 61 is retracted into the cylinder 63 with counterclockwise

movement of lever **51**, **53**, which swings the two pairs of links **27**, **35** counterclockwise, and hoists the ladder to its original position, further rotation being arrested through engagement of the rack members **11** with the rubber bumpers **75**.

To guard against inadvertent lowering of the ladder under power while the doors **1** or **5** are open, as well as against accidental descent of the rack and ladder in transit, a safety hook **83** pivoted at **85** on a bracket **87** welded to the front wall **3** of the body engages with a pin **89** fixed between the two portions of lower link **35** at the front end of the body, as shown in FIG. 3. When thus engaged, the link cannot move to let the ladder down. But when the ladder is to be lowered, the hook is swung by hand counterclockwise clear of the pin, and rests in the dotted-line position shown in FIG. 3, where it is supported by a pin **91** protruding laterally from a lug **93** welded to the rear edge of one portion of the link **35**, in the plane thereof. As the lower link **35** swings away from the body in lowering the rack and ladder, this pin **91** tips over the hook, which swings down until it rests on a pin **95** protruding from the bracket **87**. The hook is thus held in substantially its initial position, and when the rack and ladder are again raised by the hydraulic cylinder the pin **89** between the two members of lower link **35** strikes the oblique end surface of the hook, camming the hook upward and passing under it to enter again the bight of the hook and lock the rack in raised relation again.

The location of the safety hook **83** compels the person who releases it to be where he could not fail to note an open door **1** or **5** that would be damaged by the descending ladder.

The means for supplying and controlling the flow of hydraulic fluid (oil) under pressure alternately to the upper and lower surfaces of the piston **73** are the same which are used for the other hydraulic cylinders operating the derrick and the hole-digging and other implements of the vehicle, and being conventional are not shown herein. They comprise as noted a pump driven by power taken from the vehicle's engine; also a manual control valve **100** operated by a hand lever **101** at the rear of the vehicle and alternatively admitting the fluid above the piston **73** via hose **79** and port **81** and below the piston via hose **97** and port **99**; and a relief valve responding to pressure of excessive intensity by by-passing the flow from the pump back to the reservoir in the event that the manual valve is inadvertently opened to admit fluid below the piston before the safety hook **83** is disengaged. This prevents breakage of parts through otherwise excessive pressure built up beneath the piston. It also includes a pilot check valve which blocks the flow of fluid from above the piston **73** and out of port **81**, except when the motor and pump are running and the hydraulic pressure is applied to the responsive element within the pilot check valve by opening the manual control valve to admit fluid under pressure

below the piston in order to lower the rack and ladder. The reverse flow then permitted from above the piston is by-passed at the manual control valve back into the oil reservoir.

This arrangement of blocking the outflow from above the piston provides an added safety feature through preventing the rack and ladder from being lowered or released from their raised position by unauthorized or inadvertent opening of the manual control valve when the vehicle is unattended. It also prevents the members **11** and the ladder from gyrating about the axis of pivots **45**. The pilot check valve is always open to flow into the cylinder above the piston, as occurs when the manual control valve is opened to hoist the rack.

It is to be noted that the novel ladder rack carries the ladder in an oblique and nearly upright plane, and thus leaves no part of the ladder or rack extending out beyond the sides of the vehicle to demand increased clearance in traffic and in parking. It also avoids encroachment on the roof or over-body areas needed for the derrick, digger and other implements which must occupy this space.

While I have illustrated and described a certain form in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claim. Therefore, I do not wish to be limited to the particular form shown, or to the details of construction thereof, but what I do claim is:

A ladder rack for a vehicle having a body, comprising in combination ladder-holding members, a pair of links pivoted thereto and pivotally attached to the body in coaxial relation to each other at opposite ends of the length of the body, another pair of links pivoted to the members and to the body in coaxial relation to each other at a lower level than the first links, a torque element transmitting a turning force from one link of a pair to the other link of such pair to cause them to swing in unison, an arm pivoted on the axis of such latter pair of links and in fixed connection with the torque element, and a hydraulic cylinder pivotally mounted on the body and having its plunger connected to the arm and adapted to rotate the torque member alternately in opposite directions about the axis of the links that are connected by the torque element.

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