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[54] **CAN-LIFTING APPARATUS**  
**3 Claims, 6 Drawing Figs.**

[52] U.S. Cl. .... **214/314,**  
**214/146.5, 214/147, 214/302, 214/308**  
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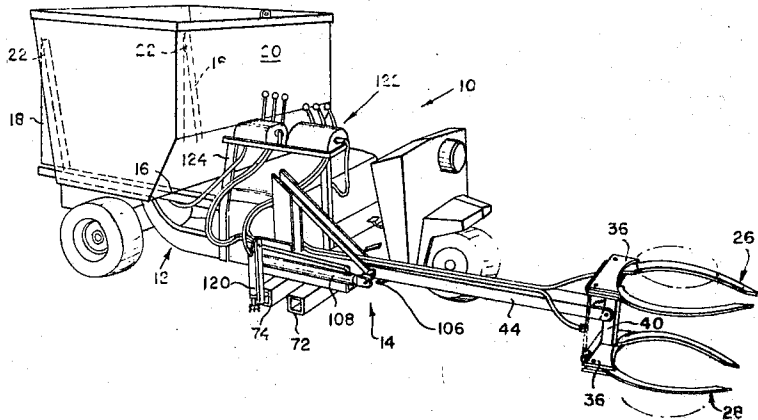
[56] **References Cited**  
**UNITED STATES PATENTS**

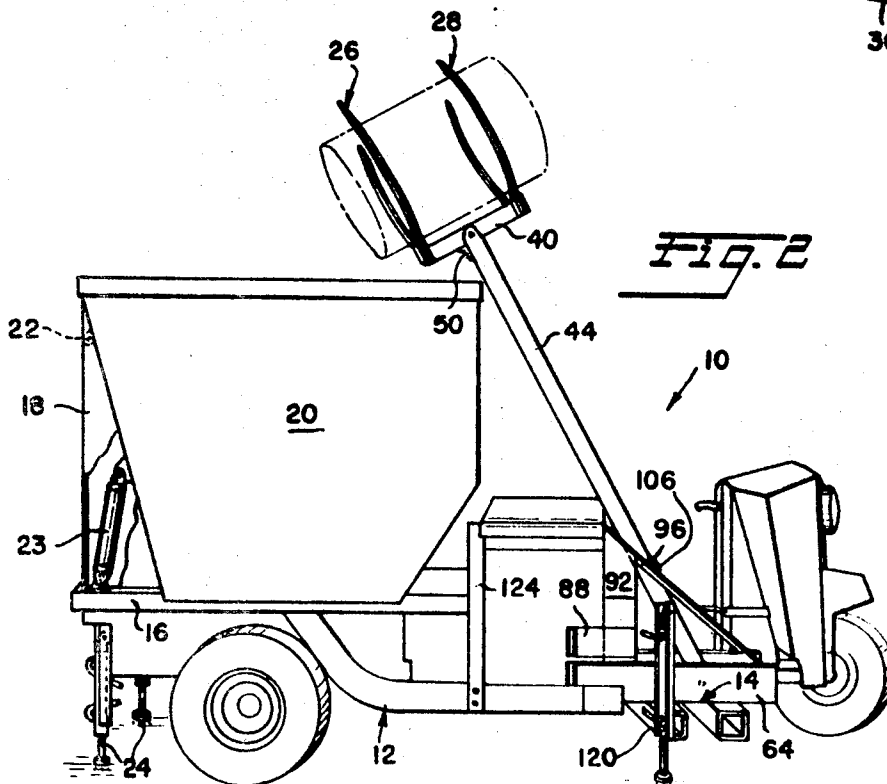
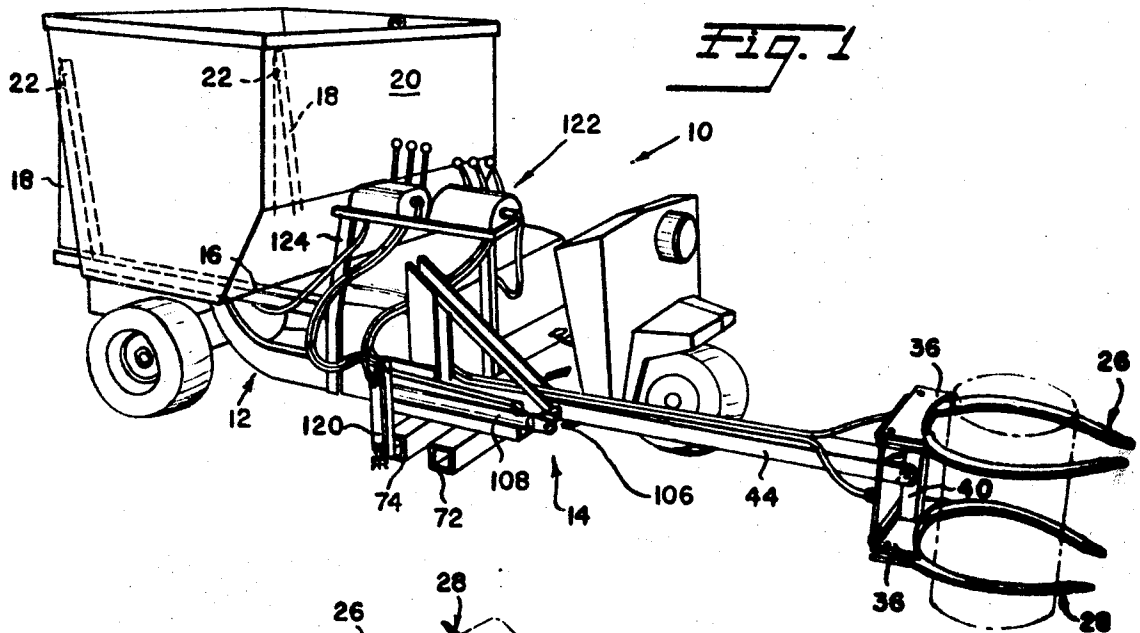
2,831,589 4/1958 Way ..... **214/147**

2,840,254 6/1958 Bevan ..... **214/141 X**  
3,010,590 11/1961 Troth ..... **214/77 X**  
3,021,168 2/1962 Bodine ..... **214/147 X**  
3,472,401 10/1969 Scaperotto ..... **214/147**  
3,425,572 2/1969 Brach ..... **214/131**  
3,516,562 6/1970 Knight ..... **214/302**

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**ABSTRACT:** Material handling vehicle for lifting barrels, cans, as such, including a readily detachable lift mechanism unit having a boom and associated lift claws capable of universal movement.



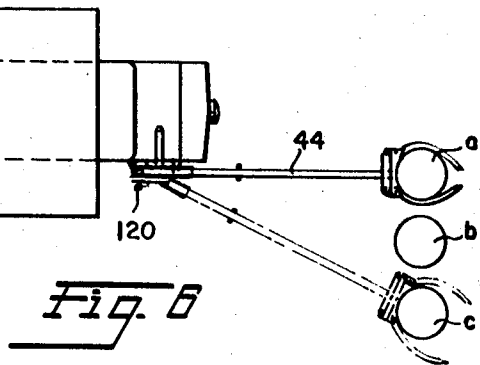
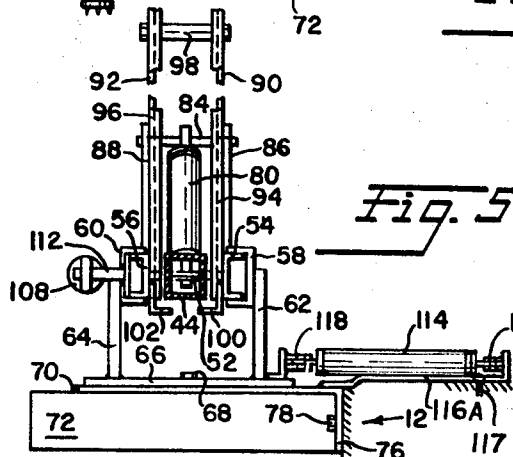
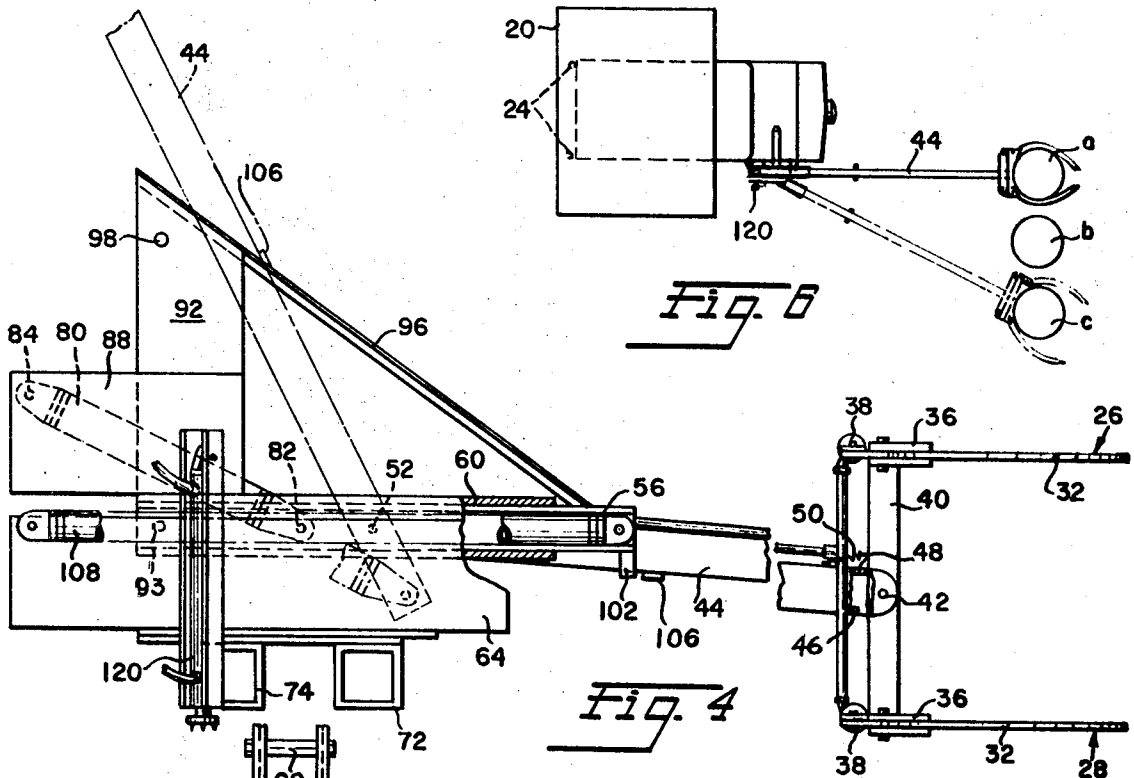
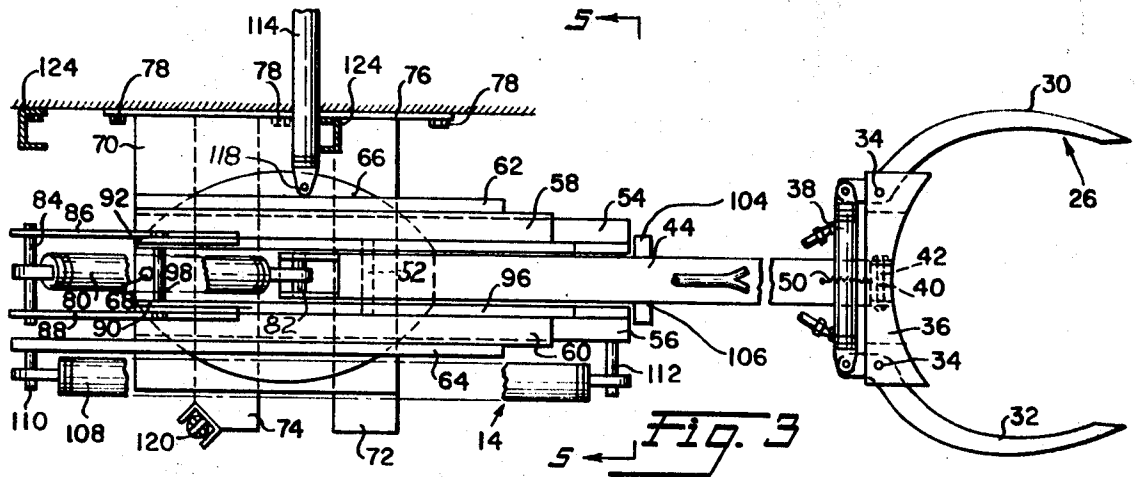


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## CAN-LIFTING APPARATUS

## BACKGROUND OF THE INVENTION

This invention relates generally to material-handling apparatus and more particularly to a compact, versatile, readily maneuverable lift vehicle incorporating a novel power lift attachment mechanism embodying a lift boom having universal movement for lifting and emptying barrels, drums or the like, into a receptacle mounted on the vehicle.

In the past, various type material handling apparatus including specially designed lift trucks have been employed in industry to lift and transport articles such as barrels or cans. While such lift trucks have been suitably operated for some purposes, they have been limited in usage by their generally excessive weight, size and overall lack of maneuverability.

## SUMMARY OF THE INVENTION

Accordingly, a primary object of the invention resides in the provision of a compact, lightweight, readily maneuverable lift vehicle embodying a novel power lift mechanism having universal movement for lifting and emptying containers such as barrels, drums, cans or the like into a pivotable receptacle mounted on the vehicle.

Another object resides in the provisions of a small, lightweight, maneuverable lift vehicle comprising a novel hydraulic power lift mechanism in which adjustable lift arms or claws are supported on a longitudinally extensible boom which is pivotable in both the horizontal and vertical directions to render the lift mechanism highly versatile and universal in application.

Still another object resides in the provision of a novel compact power lift attachment unit which is readily mounted on a conventional vehicle and has universal operational movement, thereby rendering it highly versatile for general usage.

The novel lift mechanism described in the above objects is of general usefulness and has found particular utility in the trash collection business. For example, the vehicle is operated by a single operator and, because it is compact, lightweight, and readily maneuverable, access is easily gained to trash cans positioned in carports, patios or other isolated areas. The universal movement of the claw-supporting boom enables the operator to bring the vehicle to a single stop position to pick up several trash cans and empty them into the pivotable receptacle mounted on the vehicle without having to maneuver the vehicle during each can lifting operation. When the power operated, pivotable receptacle on the vehicle is filled, the operator then proceeds to dump the contents thereof into the large trash receiving truck following therealong.

Hence, it is apparent that the novel lift vehicle and its associated power lift mechanism reduce overall operating expenditures through a substantial savings in labor costs while at the same time providing more dependable and more efficient material handling service.

Other advantages and objects will become apparent from reading the following detailed description of the invention and the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the novel lift vehicle and power lift mechanism of the invention with the can engaging claws and their support boom in the lower can pickup position;

FIG. 2 is a side elevation of the lift car illustrating the lift boom in its raised dump position in which the contents of the can are emptied into the receptacle mounted on the vehicle;

FIG. 3 is a fragmentary plan view of the novel power lift attachment mechanism of the invention;

FIG. 4 is a partially sectioned, fragmentary side elevation view of the power lift mechanism shown in FIG. 3;

FIG. 5 is a sectional view taken along line 5-5 of FIG. 3; and

FIG. 6 is a schematic illustration of the arcuate swinging movement of the boom and pickup claws to various horizontal positions, thereby enabling several variably positioned cans to be handled while the vehicle itself is stationary.

## DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGS. 1 and 2, the invention is shown incorporated in a compact, three wheel vehicle 10 similar in some respects to conventional powered vehicle commonly used as golf carts.

Vehicle 10 has a main frame 12 to one side of which a hydraulic power lift mechanism 14 is attached. A secondary bedframe 16 is mounted on frame 12 and has a pair of upright posts 18, the inner face of each of which is angled to conform to the inwardly angled rear wall of receptacle 20 resting on bedframe 16.

Receptacle 20 is pivotally connected to posts 18 at high pivots 22 and is pivoted therearound through an angle of at least 90° to a raised dump position (not shown) by hydraulic cylinder 23.

Two hydraulically operated vertical jacks 24 are connected to the rear of frame 12 and are extended to a ground engaging position to stabilize the vehicle when receptacle 20 is raised to dump position.

With reference now to FIGS. 3 to 5, lift mechanism 14 comprises upper and lower can-engaging claw assemblies 26 and 28, each of which includes a pair of arms 30 and 32 each pivoted at a pivot 34 to a cross-connecting plate 36. A hydraulic cylinder 38 connects the end of noncircular, curved arms 30 and 32 and operation of the cylinder suitably pivots the arms to grasp and release a can. The curvature of the arms and the pivoting thereof enable the lift mechanism to firmly grasp cans ranging in diameter from about 11 inches to about 28 inches.

Upper and lower plates 36 are connected by a bar 40 pivotally secured at 42 to one end of a hollow rectangular boom 44. The end of boom 44 is bifurcated to fit around bar 40 and, as shown in FIG. 4, the bottom wall 46 of the boom is shorter than the top wall 48 to permit limited pivoting of bar 40 about pivot 42. Bar 40 is normally biased into engagement with upper wall 48 by spring 50 connected between bar 40 and boom 44.

Boom 44 is pivotally secured at 52 near its other end to a pair of spaced channel members 54 and 56 slidably supported respectively in oppositely facing channel track guides 58 and 60 which are fixed respectively to sideplates 62 and 64 extending upright from turntable 66. The turntable is pivotally supported at pivot 68 on a horizontal support plate 70 welded on a pair of transverse hollow rectangular beams 72, 74, which in turn are end welded to a vertical sideplate 76 that is removably attached to the main vehicle frame 12 by a series of bolts 78.

Boom 44 is pivoted in a vertical direction through an angle of about 120° by hydraulic cylinder 80, the piston end of which is connected at 82 to the boom while the other end is pivotally connected at 84 between a pair of spaced plates 86 and 88 which are fixed respectively to spaced vertical plates 90, 92 which are welded respectively to the exposed faces of channel members 54, 56 for sliding movement therewith. A spacer bolt 93 extends between members 54 and 56 to maintain them in parallel relationship during sliding movement thereof.

A pair of spaced angle-iron guide members 94, 96 extend respectively between the forward ends of channel members 54 and 56 and the upper angled ends of plates 90 and 92. A spacer bar 98, fixed between plates 90 and 92, maintains the plates and guide members 94 and 96 properly spaced apart to form a guide channel for boom 44 as it is pivoted in the vertical direction about pivot 52 to the dump position of FIG. 4 by actuation and extension of cylinder 80.

A pair of L-shaped stops 100 and 102 are fixed respectively to the forward ends of channel members 54 and 56 and pro-

vide a lower limiting rest support which is engaged by the bottom of boom 44 in its lowermost position.

Boom 44 also has a small metal plate connected to the underside of boom 44, the ends of the plate extending beyond boom 44 and providing a pair of side lugs 104 and 106 which, as shown in FIGS. 2 and 4, engage the guides 94 and 96 to limit the pivotal vertical motion and define the final dump position of the boom.

The boom is also movable in a forward extended direction away from the vehicle because of the reciprocating sliding movement of channel members 54 and 56 to which it is pivotally connected at pivot 52. Reciprocation of members 54 and 56 in their respective channel tracks 58 and 60 is accomplished by hydraulic cylinder 108 pivotally connected at one end 110 to fixed plate 64 and at the other extensible end 112 to member 56.

Actuation and extension of cylinder 108 causes members 54 and 56 to slide forwardly in their respective tracks 58 and 60 and extend boom 44 outwardly of the vehicle. Since the elements numbered evenly from 80 to 102 are connected to and supported on slide channels 54 and 56 are discussed above, they will also be reciprocated as a unit with movement of members 54, 56 and boom 44.

Boom 44 is also pivotable laterally in arcuate path as shown schematically in FIG. 6. To accomplish this, hydraulic cylinder 114 is connected at one end 116 to a flat metal plate 116a welded to plate 70 and bolted by bolt 117 through the vehicle floor and into frame 12 to prevent plate 116a from rising when cylinder 114 is actuated. The other extensible end 118 of cylinder 114 is pivotally connected to turntable 66. Upon actuation and extension of cylinder 114, turntable 66 slidably pivots on fixed plate 70 about pivot 68, thereby arcuately swinging boom 44 to a desired lateral position.

A hydraulic jack 120 is mounted on support beam 74 for extensible vertical movement to a ground-engaging position to stabilize the vehicle 10 when boom 44 is being manipulated, particularly when it is pivoted to the dump position shown in FIG. 2.

A hydraulic fluid control system 122, including the necessary fluid supply source and control valves is suitably mounted on a subframe 124 which is readily removable from vehicle frame 12. Suitable flexible conduits lead to the various hydraulic cylinders for actuation thereof.

A typical trash can pickup operation will not be described with particular reference to FIGS. 1, 2 and 6. With vehicle 10 brought to rest, two rear cylinders 24 and side cylinder 120 may be extended to ground-engaging position to stabilize lift mechanism 14. If necessary, boom 44 is moved forwardly by actuation of cylinder 108 and claw assemblies 26 and 28 are adjustable by cylinders 38 to grasp a first trash can "a" as in FIG. 6. Cylinder 80 is then actuated to pivot boom 44 vertically to its dump position shown in full line in FIG. 2 and broken line in FIG. 4 at which time lugs 104 and 106 respectively engage guides 94 and 96 with sufficient impact to jar the contents in can "a" loose, thereby causing them to fall into receptacle 20. Empty can "a" is then returned to its rest position and the claw assemblies released.

Boom 44 is then retracted rearwardly by cylinder 108, pivoted laterally by actuation of cylinder 114, and again extended forwardly to empty can "b" in the same manner as can "a." The procedure is again repeated for can "c."

Hence, it is apparent that, because of the universal movement of boom 44, a number of cans may be emptied into receptacle 20 without having to move or reposition vehicle 10.

When receptacle 20 is filled, the operator need only back vehicle 10 up to the rear of a conventional trash truck and dump the contents of receptacle 20 thereinto by first extending jacks 24 to ground-engaging position and then actuating cylinder 23 to pivot the receptacle about the high pivots 22.

It should also be noted that lift mechanism 14 is readily removable as a unit from vehicle frame 12 simply by removing bolts 78, only three of which are employed in the illustrated

embodiment, and bolt 117.

Thus, the novel lift mechanism and its associated control system may be quickly and easily attached to any conventional vehicle for conversion thereof to a lift vehicle.

It is apparent that the above described invention accomplishes the objects initially set forth by providing a compact lightweight, lift vehicle including a lift mechanism attachment having a boom capable of universal movement, thereby saving time and reducing overall operating costs.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. Material-handling apparatus for lifting barrels, cans, or the like comprising a frame, a power lift mechanism including a boom and can-engaging means connected to one end of said boom, means supporting said boom from said frame for universal directional movement, said support means comprising a support plate fixed to said frame, a turntable pivotally mounted on said plate, guide means comprising spaced tracks mounted on said turntable, extension means comprising spaced members mounted within said tracks for longitudinal movement relative thereto, said boom being pivotally supported between said spaced members, a first hydraulic cylinder having one end connected to said guide means and its other end connected to said extension means for moving said extension means in said guide means, a second hydraulic cylinder connected between said extension means and said boom to pivot said boom vertically, means supporting said second hydraulic cylinder from said spaced members including a pair of upright plates between which said second hydraulic cylinder is positioned, a pair of bars extending from the forward end of said members upwardly to said upright plates, whereby said bars and said upright plates form a guide channel for said boom as it is pivoted vertically upon actuation of said second cylinder, and actuating means connected to said turntable for pivoting said turntable on said plate whereby said boom may be extended and moved vertically and laterally relative to said frame.

2. Material-handling apparatus as defined in claim 1 comprising a pair of lugs mounted on the forward end of said boom, said lugs engaging said guide bars to limit vertical pivotal movement of said boom.

3. Material-handling apparatus for lifting barrels, cans, or the like, comprising a frame, a power lift mechanism including a boom and can-engaging means connected at one end to said boom, means supporting said boom from said frame for universal directional movement, said support means comprising a support plate fixed to said frame, a turntable pivotally mounted on said plate, guide means comprising spaced tracks mounted on said turntable, extension means comprising spaced members mounted within said tracks for longitudinal movement relative thereto, said boom being pivotally supported on said spaced members, a first fluid motor having one end connected to said guide means and its other end connected to said extension means for moving said extension means in said guide means, a second fluid motor connected between said extension means and said boom to pivot said boom vertically, means carried by said spaced members forming an upwardly open narrow guide channel for said boom as it is pivoted vertically upon actuation of said second motor, cooperating means on said boom and said guide channels for limiting pivotal movement of said boom, and actuating means connected to said turntable for pivoting said turntable on said plate whereby said boom may be extended and move vertically and laterally relative to said frame.