Dec. 16, 1969 W. E. THORNTON-TRUMP 3,483,948

ELEVATOR-BOOM STRUCTURE

Filed Nov. 3, 1967 5 Sheets-Sheet 1

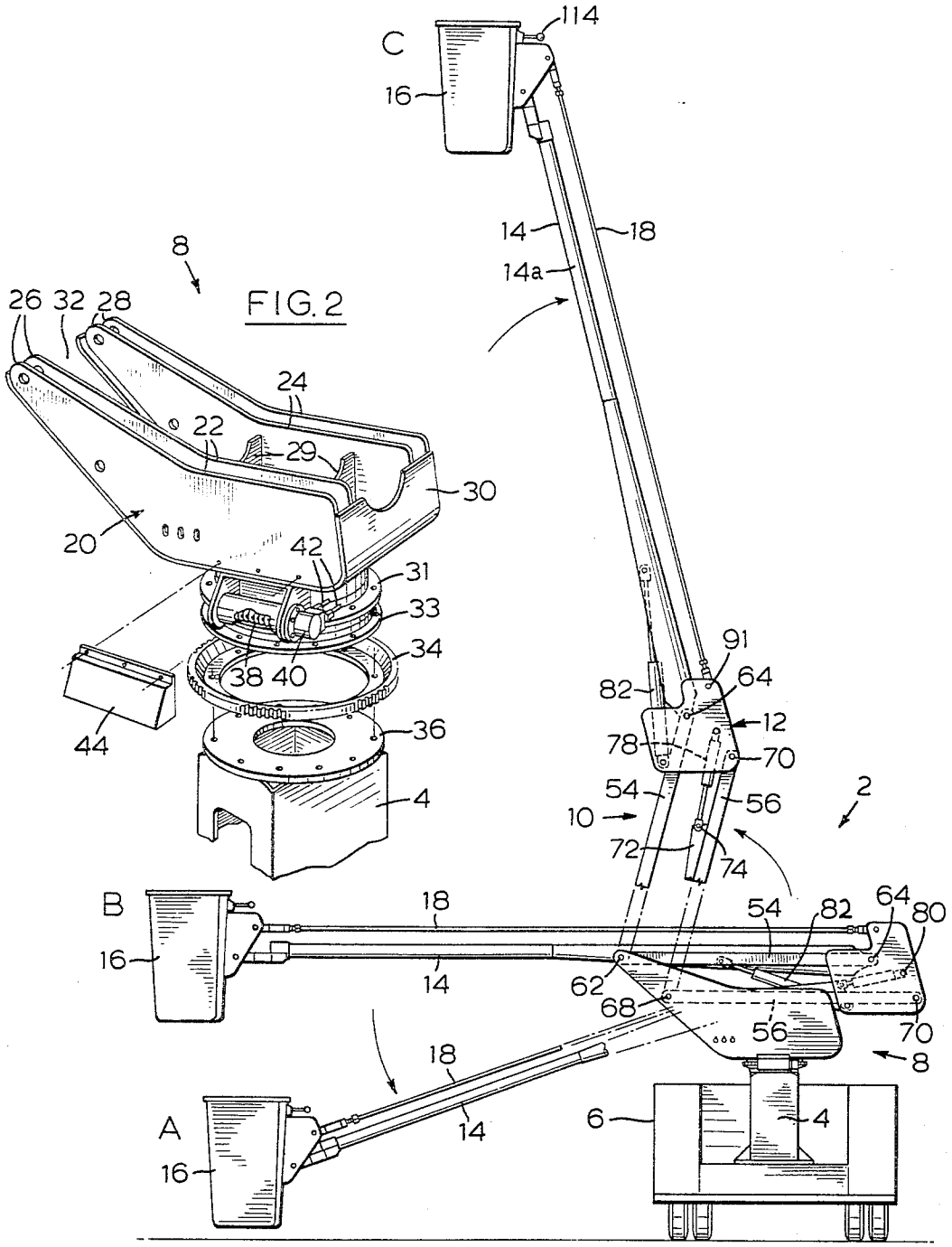



FIG. 2

FIG. 1

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ELEVATOR-BOOM STRUCTURE

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FIG. 3

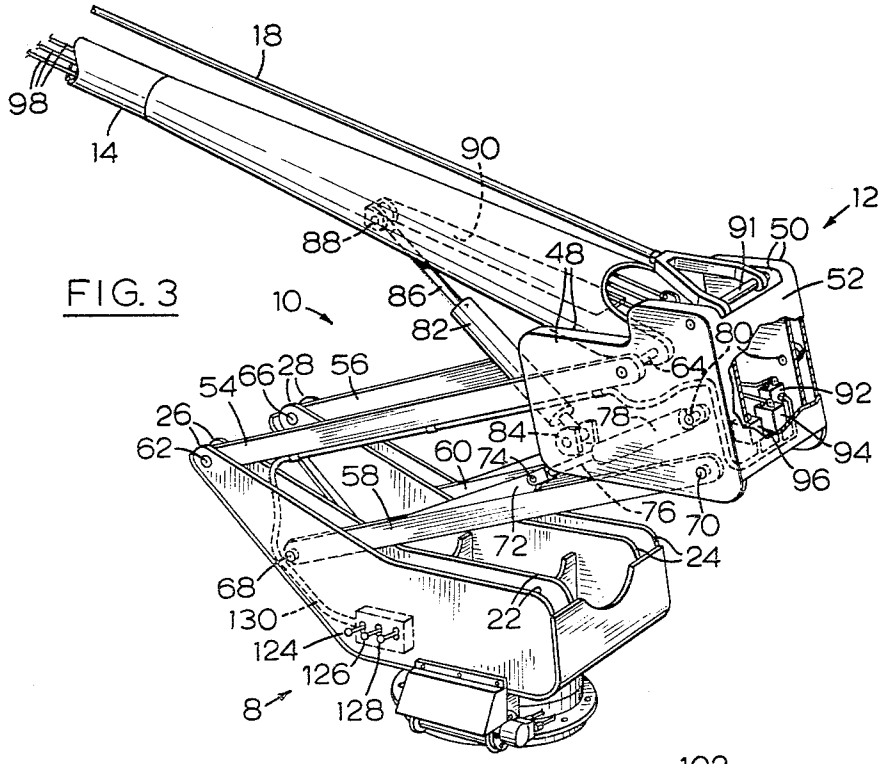
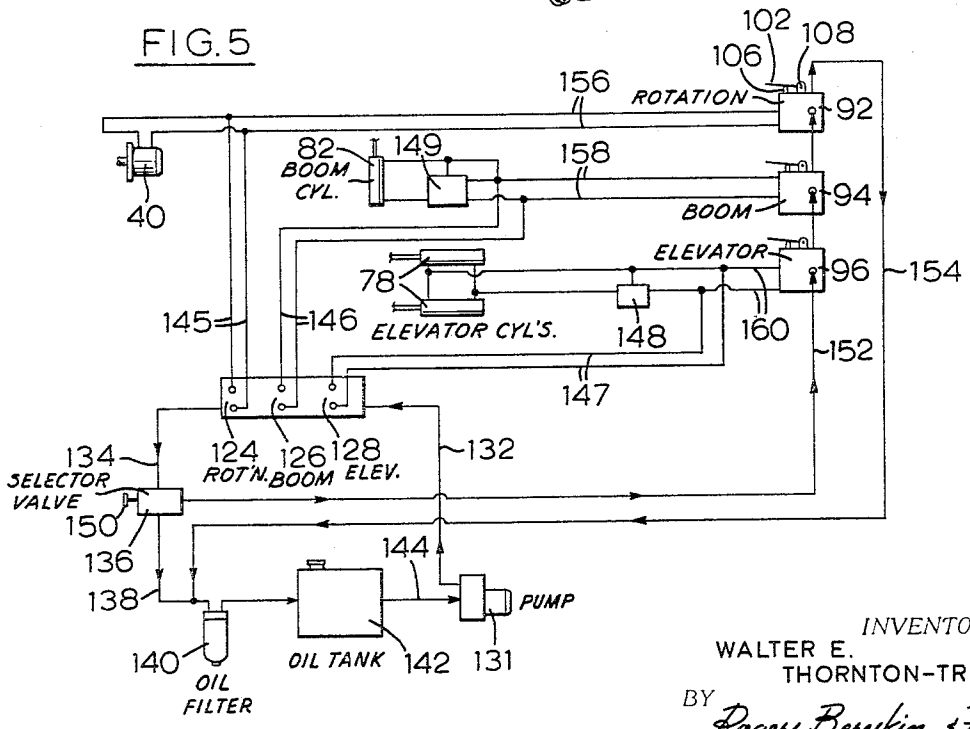



FIG. 5




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ELEVATOR-BOOM STRUCTURE

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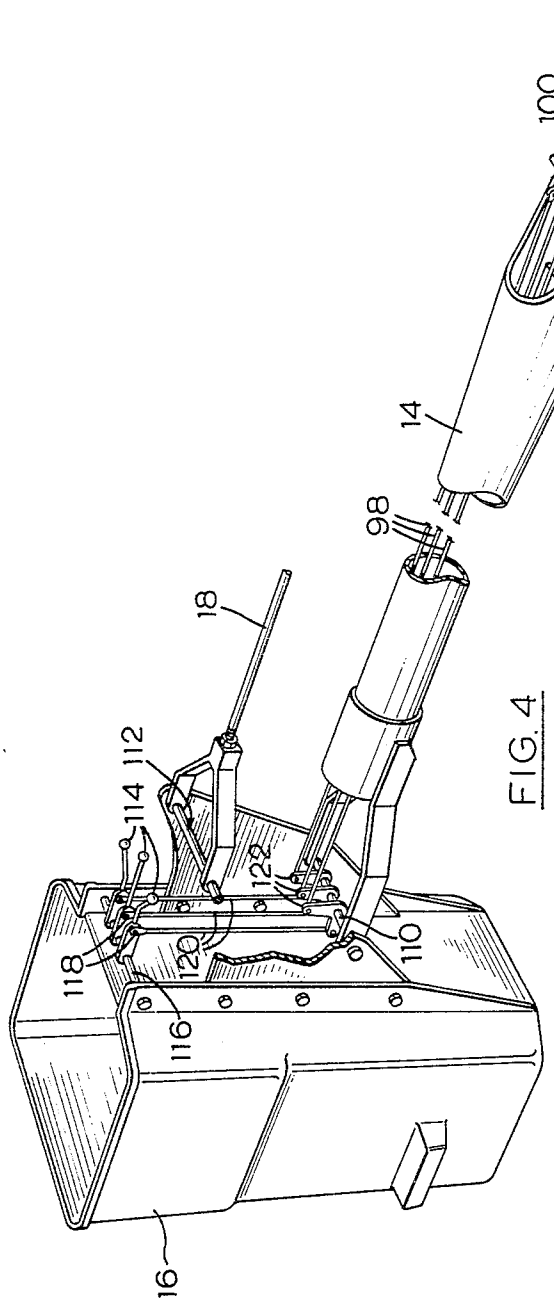



FIG. 4

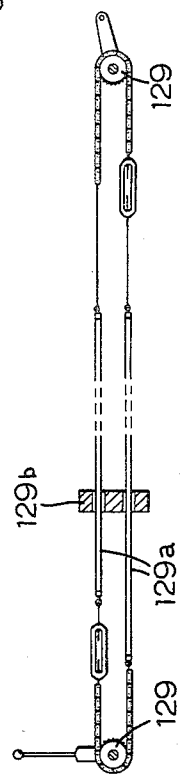



FIG. 4a

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ELEVATOR-BOOM STRUCTURE

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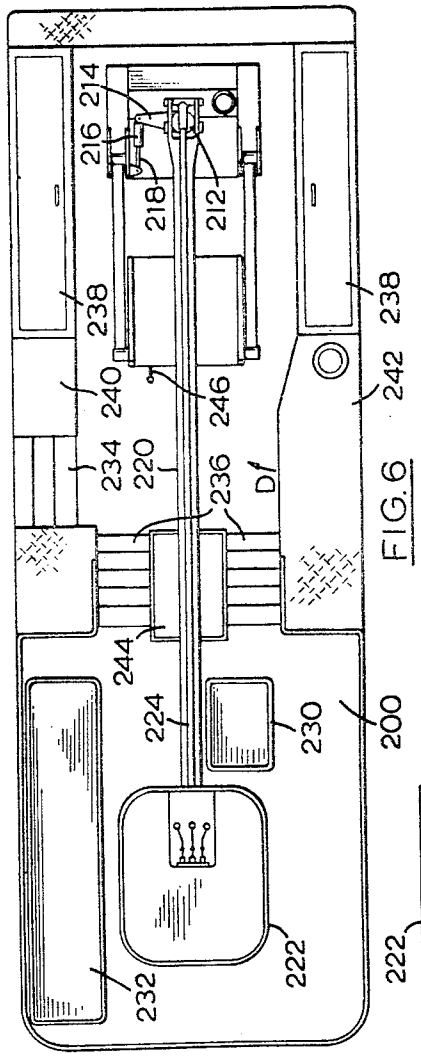



FIG. 6

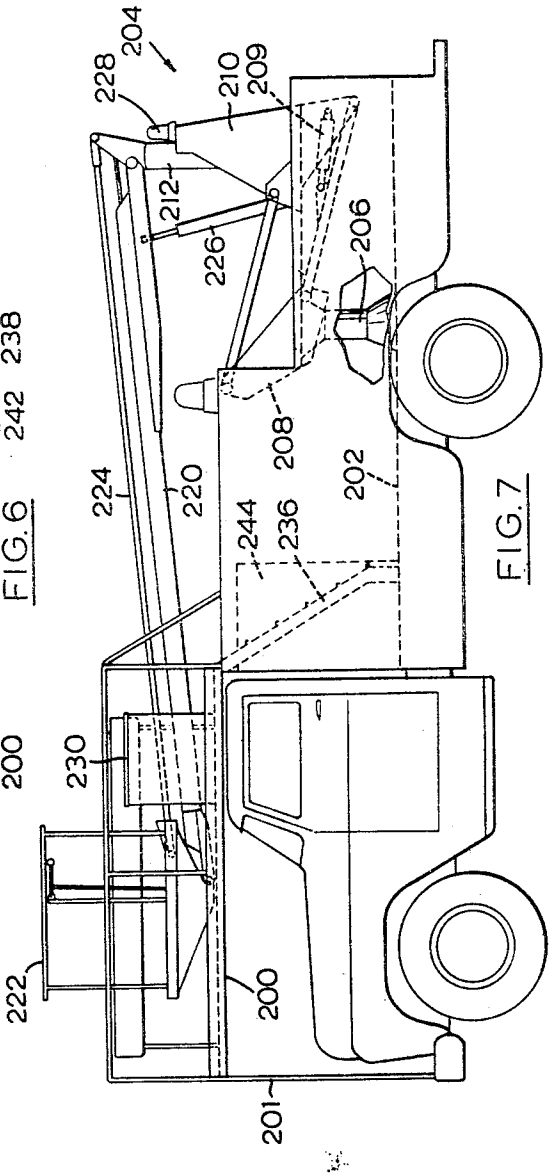



FIG. 7

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ELEVATOR-BOOM STRUCTURE

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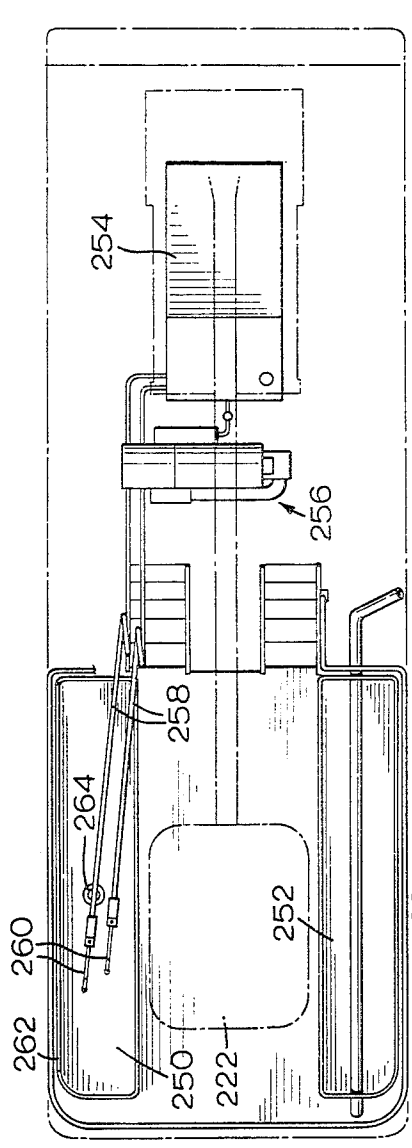



FIG. 8

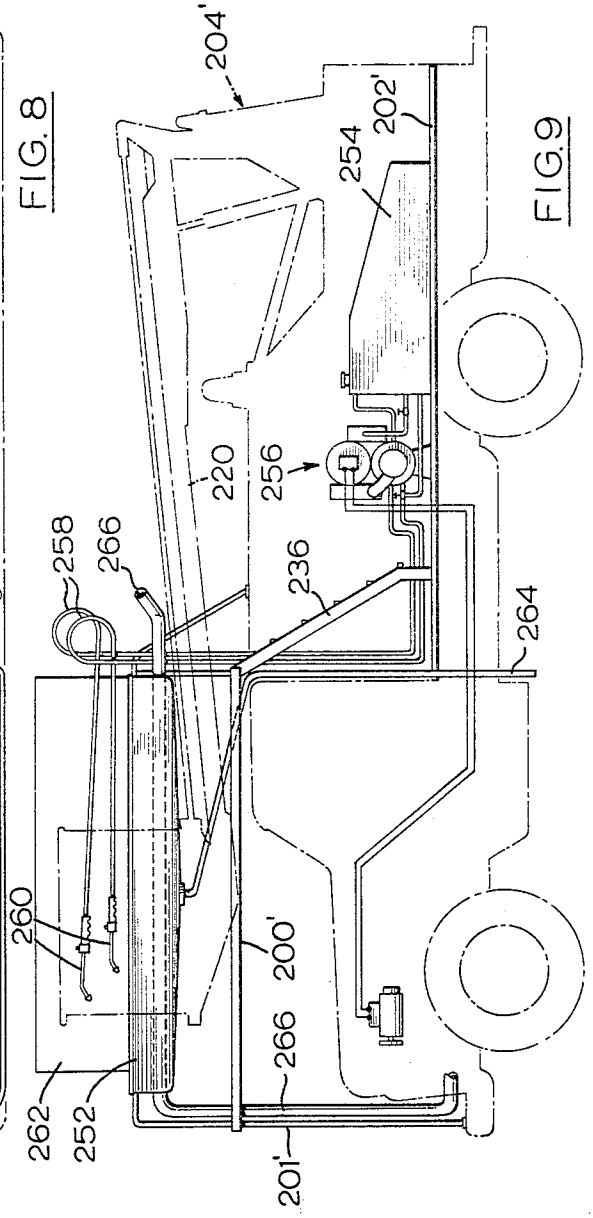



FIG. 9

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United States Patent Office 3,483,948 Patented Dec. 16, 1969



3,483,948

# ELEVATOR-BOOM STRUCTURE

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Filed Nov. 3, 1967, Ser. No. 680,382
Int. Cl. E04g 1/22
U.S. Cl. 182—2 9 Claims

## ABSTRACT OF THE DISCLOSURE

An elevator-boom structure having a support, an elevator having two pairs of parallel legs connected to the support, an elbow frame connected to the elevator legs, a boom connected to the elbow frame, and a basket at the boom end. The elevator is raised by two cylinders connected to the elbow frame and having their piston rods connected to the lower elevator legs. Valves to control boom and elevator motion are mounted in the elbow frame, allowing oil lines between the valves and cylinders to be short and simple in layout.

This structure can be mounted on the lower deck of a truck having an upper deck above its cab. The basket at rest is surrounded by the upper deck, protecting a basket occupant during truck motion.

This invention relates to an elevator-boom structure for industrial, agricultural or fire fighting use.

Multiple boom machines, or elevator-boom machines, of the type having a workman supporting basket on a boom to carry a workman to hard-to-reach locations, are in wide use. Generally these machines, which are hydraulically operated, are extremely complex and expensive, requiring control valves scattered at a number of locations on the machine, and also requiring extended lengths of hosing and manifolds to conduct hydraulic fluids (usually oil) from one part of the machine to the other.

Accordingly, it is an object of the present invention, in one of its aspects, to produce an elevator-boom structure that is relatively simple, does not require as many precisely machined and expensive parts as prior art machines, and which is constructed so that its valves are grouped to reduce the length and complexity of the hose connections needed for the hydraulic system.

In a typical embodiment of the invention, this is achieved by providing a support, an elbow frame, an elevator connected between the support and the elbow frame, and a boom mounted on the elbow frame. Elevator lift cylinders are provided, connected to the elbow frame, with their piston rods connected to the elevator. A boom lift cylinder is also provided, connected to the elbow frame, with its piston rod connected to the boom. The control valves for the elevator and boom lift cylinders are located in the elbow frame, so that they can be controlled by a simple mechanical linkage from a basket at the end of the boom, and so that oil lines between the control valves and the cylinders can be kept short and simple in layout.

Further features of the invention will appear from the following disclosure, taken together with the accompanying drawings, in which:

FIGURE 1 is an elevation looking toward the rear of a truck carrying an elevator-boom structure according to the present invention, and showing the structure in three of its positions;

FIGURE 2 is a perspective view showing a support or turntable assembly for the structure of FIGURE 1;

FIGURE 3 is a perspective view showing the turntable assembly, elevator, elbow frame and part of the boom of the structure of FIGURE 1;



FIGURE 4 is a perspective view, partly broken away, showing the basket and boom assembly, and the control rods, for the structure of FIGURE 1;

FIGURE 4a shows a modification of the control rods of FIGURE 3;

FIGURE 5 is a schematic showing a hydraulic circuit for the structure of FIGURE 1;

FIGURE 6 is a top elevation of a truck on which a modification of the elevator-boom structure is mounted;

FIGURE 7 is a side elevation of the truck and elevator-boom structure of FIGURE 6; and

FIGURES 8 and 9 are top and side elevations respectively showing a modification of the arrangement of FIGURES 6 and 7.

Reference is first made to FIGURE 1, which shows an elevator-boom structure generally indicated at **2**, mounted on a pedestal 4 mounted in turn on a truck **6**. The elevator-boom structure includes a turntable assembly generally indicated at **8** (FIGS. 1 and 2), an elevator generally indicated at **10** (FIGS. 1 and 3), an elbow frame generally indicated at **12** (FIGS. 1 and 3), an upper boom **14**, and a basket **16** (FIGS. 1 and 4) at the free end of the upper boom. A levelling rod **18** is connected between the basket **16** and the elbow frame **12** to maintain the floor of the basket in a fixed horizontal orientation as the basket is raised and lowered. Three positions are shown in FIGURE 1 for the structure, namely a position A, in which the basket is in its lowest position, a position B, in which the boom **14** is horizontal, and a position C, in which the basket is raised to its uppermost position.

Reference is next made to FIGURE 2, which shows the turntable assembly in detail. This assembly includes a support or turntable frame **20** having first and second pairs of spaced parallel side plates **22, 24**, one pair of side plates being spaced from the other by a substantial extent. The plates **22, 24** are generally rectangular at their bases, as shown, but at their left hand or forward ends these plates have tapered upwardly extending portions terminating at tips **26, 28**. The plates **22, 24** serve to mount the four legs of the elevator **10**, as shown in FIGURE 3 and as will be described in more detail presently.

The side plates **22, 24** are connected together by braces **29** and by a bottom plate **30**, and are firmly fixed to an upper rotation bearing plate **31**. The bottom plate **30** is open between the tapered portions of the side plates **22, 24**, so that the tapered portions of the side plates define a space **32** into which the boom may swing to place the basket **16** in position A of FIG. 1.

Referring again to FIG. 2, the upper rotation bearing plate **31** rotates within the rim of a lower rotation bearing plate **33**. The lower bearing plate **33** is bolted through holes in a ring gear **34** to a top plate **36** of the pedestal **4**.

Rotation of the support or turntable **8** is effected by a worm gear **38** driven by a hydraulic motor **40** connected directly to the worm gear. The motor **40** is connected to the hydraulic circuit (to be described) through hoses **42** and is relatively slow speed (about 100 r.p.m.), so that no reduction gearing is needed between the motor and the worm gear **38**. The worm gear **38** engages the ring gear **34**, so that when the worm gear turns, the turntable frame is rotated. A cover **44** is provided to protect the worm gear and hydraulic motor assembly.

Reference is next made to FIGURE 3, which shows in more detail the elevator assembly **10** and elbow frame **12**. The elbow frame **12** includes first and second pairs of parallel spaced side plates **48, 50**, the side plates **48** being spaced by a relatively substantial distance from the side plates **50** to define an open space between the pairs of side plates. (The lateral spacing

of the elbow frame side plates is normally the same as that of the support side plates 22, 24.) The elbow frame side plates are connected together by conventional braces (not shown), by pivot rods to be described, and by a rear cover plate 52.

The elevator assembly, which extends between the support or turntable 8 and the elbow frame 12, includes four legs, i.e. two upper legs 54, 56, and two lower legs 58, 60, all of equal length. The first upper leg 54 is pivotally connected at 62 between the support side plates 22 at their tips 26, and extends forwardly to a position between the elbow frame side plates 48, where it is pivotally connected at a pivot rod 64. The second upper leg is correspondingly connected at 66 between the tips of the support side plates, and extends forwardly between the elbow frame side plates 50 to the pivot rod 64.

The first elevator lower leg 58 is pivotally connected at 68 between the side plates 22, at a position spaced rearwardly of and below the pivot point 62. Leg 58 extends forwardly from pivot point 68 between the side plates 48 of the elbow frame and is pivotally connected at 70 near the lower rear corner of the elbow frame. The distance and direction of spacing between pivot points 64, 70 is the same as those between pivot points 62, 68, so that legs 54, 58 form a parallelogram at all times.

The second elevator lower leg 60 is correspondingly connected between the support side plate 24, and between the elbow frame side plates 50, so that it forms another parallelogram with the upper leg 56. The parallelogram arrangement ensures that as the elevator is raised and lowered, the orientation of the elbow frame remains constant.

The means for raising and lowering the elevator are as follows. Each elevator lower leg 58, 60 contains a piston rod mount 72, having a pivotal connection at 74 to a piston rod 76 extending to a piston (not shown) operating inside a cylinder 78. The cylinders 78 (only one is shown) are located between the respective pairs of elbow frame side plates 48, 50 and are pivotally connected to the elbow frame side plates at 80. Pivot point 80 is located outside the parallelogram formed by the elevator legs (see FIG. 1). More specifically, pivot point 80 is located forwardly of pivot point 70, rearwardly of pivot point 64, and between them in height.

The rest and lowermost position for the elevator is position B (or A) of FIG. 1, with the elevator legs horizontal. In this position, piston rods 76 are retracted inside cylinders 78. When oil is pumped into the cylinders 78 to force the piston rods 76 outwardly, this generates forces tending to lengthen the distance between pivot points 74, 80 and thus tending to force the upper and lower elevator legs vertically apart. This causes the elevator to rise, thereby elevating the elbow frame 12.

The base of the boom 14 is connected to the elbow frame 12 between the pairs of side plates 48, 50 (FIG. 3). The boom is conveniently pivoted at the same pivotal rod 64 to which the upper elevator legs 54, 56 are connected. The boom is powered by a cylinder 82 connected to a pair of lugs 84 at the front of the elbow frame, between the side plates 48, 50. The cylinder 82 contains a piston (not shown) connected to a piston rod 86 extending to a recessed pivot point 88 in the boom 14. The boom contains a pocket 90 in its lower surface to accommodate the cylinder 82 when the boom is fully lowered.

The levelling rod 18 is connected to the upper rear corner of the elbow frame by a pivot rod 91.

A set of control valves for the elevator-boom structure is located at the rear of the elbow frame, in the space between the pairs of side plates 48, 50. There are three such control valves (shown in FIGURES 3, 4 and 5), namely a valve 92 which controls the support or turntable rotation (i.e. it controls the flow of oil to the hydraulic motor 40), a valve 94 which controls the elevation of the boom (by controlling the flow of oil to cylinder 82), and a valve 96 which controls the elevation of the elevator (by controlling the flow of oil to cylinders 78). The valve 92 is mounted on the inner surface of the inner one of the plates 50 while the valves 94, 96 are mounted on the inner surface of the rear cover 52.

As shown in FIGURE 4, the valves 92, 94, 96 are controlled by control rods 98 extending through the boom (above the pocket 90 in the boom), between the elbow frame 12 and the basket assembly 16. At the elbow frame end of the boom, each control rod 98 is connected to one arm of an L-shaped control arms 100 pivoted at the same pivot rod 64 as that employed for the base of the boom.

The other arms of the L-shaped control arms 100 are connected to control linkages 102 which, as diagrammatically indicated, operate plungers 106 for the valves, the fulcrums for the linkages 102 being at pivot points 108.

The basket 16 is pivotally connected to the boom at a pivot rod 110, and to the levelling rod 18 at a pivot rod 112 positioned so that the boom and levelling rod form a parallelogram, to keep the basket level. The basket contains three control levers 114, pivotally connected at 116 to the basket and pivotally connected at 118 to link rods 120 which extend down to a further set of L-shaped control arms 122. The control rods 98 through the boom are connected to the arms 122, so that movement of the levers 114 on the basket will operate the valves 92, 94, 96. In this way, the boom structure may be controlled from the basket.

It is customary to provide for control of the boom structure from the support or turntable, in the event that the operator in the basket should be injured. Therefore, a further set of control valves 124, 126, 128 is provided on the support 8 (FIG. 3), corresponding respectively to valves 92, 94, 96. The two sets of control valves are connected together by oil lines indicated at 130 extending through a hole (not shown) in the inner side plate 48 to a location between the side plates 48, and then along the lower surface of elevator leg 54, and then down to the valves 124, 126, 128.

If the elevator-boom structure is to be used for work in electrical equipment, then an end portion 14*a* of the boom 14 (FIG. 1) will be formed from insulating material, as will the control rods 98. If the boom is too long for rigid push-pull control rods, then sprockets may be used in place of the L-shaped control arms, with chains connected to the sprockets and extending through the boom, the mid-sections of the chains being formed from insulating rods. This arrangement is diagrammatically illustrated in FIG. 4*a*, where the sprockets are shown at 129, the insulating rods at 129*a*, and guides for the insulating rods at 129*b*.

The hydraulic system for the elevator-boom structure is shown in FIG. 5. An oil pump 131 pumps oil through a supply line 132 to the turntable valves 124, 126, 128. From these valves (neglecting for the moment the connections from the valves to the cylinders and hydraulic motor 40) the oil flows through a line 134, through a selector valve 136, and then through a return line 138 and an oil filter 140 to an oil tank 142. From the tank 142, a further return line 144 returns the oil to the pump 131. (The oil tank, pump and filter are usually located in the truck body.)

From the valves 124, 126, 128, pairs of oil lines 145, 146, 147 extend to the hydraulic motor 40 to control rotation of the support or turntable 8, to the boom cylinder 82 to control the attitude of the boom, and to the elevator cylinders 78 to control the attitude of the elevator. Lock valves 148, 149 are provided to prevent movement of the elevator and boom cylinders should the oil pressure fail.

The selector valve 136 is provided so that the elevator-boom structure may be controlled from the turntable alone, or from the turntable and from the basket. When an actuator 150 of the valve 136 is operated, oil is di-

verted from return line 138 and instead flows through supply line 152 to the elbow frame valves 92, 94, 96 and then returns through line 154 to the oil filter 140 and tank 142. Further pairs of oil lines 156, 158, 160 extend from the valves 92, 94, 96 to the hydraulic motor, boom cylinder, and elevator cylinders. (Oil lines 146, 147, 152, 154 and 156 are collectively indicated at 130 in FIG. 3.)

In a truck mounted system, outriggers or spring lockouts will usually be provided, actuated by the hydraulic system to stabilize the truck body. However, these accessories are completely standard and therefore will not be described here.

In the structure just described, all the cylinders (i.e. the elevator and boom cylinders) are connected to the elbow frame 12. In addition, the control valves 92, 94, 96, permitting control by a workman in the basket 16, are also located on the elbow frame. This arrangement permits a simple mechanical linkage between the basket control levers 114 and the control valves 92, 94, 96, and at the same time the oil lines from these valves to the cylinders are kept short and simple in layout.

It is not essential that the valves 92, 94, 96 be located in the space between the elbow frame side plate pairs 48, 50. These valves could if desired be mounted in an outboard location, on the outer surface of one of these side plate pairs. However, location of the valves in this space protects the valves, simplifies the control linkages, and is preferred.

It is also not essential that the elevator 10 be formed from four separate leg portions. The two lower legs 58, 60 could for example be joined together by a central web for additional rigidity, with the inner side plates of the support 8 and elbow frame 12 being cut away to an extent sufficient to allow this. The upper legs 54, 56 can be joined by a central web, or by struts if desired. However, if at least the upper legs 54, 56 are discrete, with a lateral space therebetween as shown, then the boom 14 can be lowered between the tips of the support or turntable (to position A in FIG. 1), thus improving the flexibility of the system.

It may also be noted that the elevator piston rods 76 may, if desired, be connected to the upper elevator legs 54, 56 instead of to the lower legs 58, 60. In such an arrangement the piston rods will be extended when the elevator is folded and will be retracted into the cylinders to raise the elevator. In addition, in such an arrangement the pivotal connections 80 of the cylinder 78 to the elbow frame 12 will normally be at a point inside the parallelogram formed by the upper and lower elevator legs, rather than outside this parallelogram as shown in FIGS. 1 and 3.

A minor disadvantage of connecting the piston rods 76 to the upper legs 54, 56 is that less power is available to raise the elevator with a given hydraulic pressure (due to the cross-sectional area of the piston rod). A more important disadvantage is that since the piston rods are extended when at rest, hence they are subject to damage. For this reason, the illustrated embodiment is preferred.

Although the unit shown and described has been illustrated in an upright position, for lifting an operator, the unit may also be used upside down, for lowering an operator e.g. into the hold of a ship

Reference is next made to FIGURES 6 and 7, which show a modification of the elevator-boom structure of FIGURES 1 to 5 as mounted on a special truck chassis, used for operations known as group relamping. In group relamping, street lamps are installed and replaced in groups. Records are kept of the hours of operation of a group of lamps, and when they have operated for a time approaching their lift expectancy, all of the lamps of the group are replaced. This is as opposed to spot relamping, in which lamps are replaced as they burn out.

In group relamp truck units presently available, the operator in the basket, after completing replacement of a lamp, lowers the basket, climbs out, and climbs into the cab of the truck for movement to the next street lamp pole, at which time he climbs out of the cab of the truck, into the basket, and the basket is then raised to the next lamp. The reason for this procedure is that the basket in presently available machines is not usually in a location that would protect the operator if the truck were hit while in movement and with the operator in the basket.

The present invention, in one of its aspects, provides an efficient arrangement in which the operator may remain more safely in the basket at all times, and in which the truck body is built for improved lamp servicing efficiency.

The truck body shown includes an upper deck 200, extending forwardly from the cab of the truck to a location above the front bumper of the truck. A pair of spaced struts 201 (only one strut is shown) support the free end of the upper deck from the front bumper.

The truck body also includes a lower deck 202 on which the elevator-boom structure, generally indicated at 204 is mounted. The elevator-boom structure includes a non-rotatable support 206 mounted on the deck 202, and an elevator 208 mounted on the support 206. The elevator 208 is generally similar to the elevator of FIGURES 1 to 5, except that the elevator legs slant downwardly in the FIGURES 6 and 7 embodiment. The elevator 208 is powered by a pair of pistons and cylinders 209 (only one is shown) similar to those actuating the elevator in the FIGS. 1 to 5 embodiment.

Connected to the elevator 208 is an upstanding elbow frame 210, the elbow frame including a vertical rotatable post 212. A bell-crank 214 is rigidly connected to the post 212, and a cylinder 216 is pivotally connected to the free end of the bell-crank 214, the cylinder containing a piston (not shown) and a piston rod 218. The piston rod 218 is pivotally connected to the elbow frame, so that operation of the piston in the cylinder 216 will rotate post 212 through a limited angle. This supplies horizontal rotation for the boom.

The boom, shown at 220, is connected to the post 212 and contains at its end a basket 222. A levelling rod 224 also extends between the post 212 and the basket. The boom 220 is powered by a piston and cylinder 226 similar to that of the FIGS. 1 to 5 embodiment, except that the base of the boom cylinder is connected to the base of the post 212 (by means not shown) so that it can rotate therewith as the boom rotates. As before, the valves for control of the structure from the basket 222 are mounted in the elbow frame, in a manner similar to that of the embodiment previously described. A flashing warning light 228 is mounted on the elbow frame to warn oncoming traffic of the presence of the unit.

The provision of the upstanding elbow frame and downslanting elevator legs increases slightly the maximum height to which the basket 222 can be raised while reducing slightly the overall height and length of the truck with the basket in retracted position. However, the elevator-boom embodiment shown in FIGS. 1 to 5 may and often will be used in the group relamp unit, instead of the elevator-boom embodiment shown in FIGS. 6 and 7.

Located on the upper deck 200 is a trash basket 230, and a horizontal tray 232 to hold lamps. Located on the curb side of the truck is a stairway 234 leading from the lower deck to the ground. A double stairway 236 connects the upper and lower decks.

The lower deck contains top opening cabinets 238 for fluorescent lights, glass, reflectors, relays, and other supplies. The curb side of the truck includes a side opening cabinet 240, for further storage. Another cabinet 242 contains a side door opening in the direction of arrow D for still further storage. A large trash basket 244 is provided between the halves of the stairway 236 to hold a days supply of trash. A control for a spring lockout (to

lock out the springs of the truck) is indicated at **246** in FIG. 6.

In operation, an operator will step out of the truck cab, up the stairway **234** to the lower deck, where he will engage the spring lockout using control **246**. He will then take his lamps, rags and cleaning solution and go up the stairway **236** to the upper deck where he may commence operation. Short term lamp needs are placed in the tray **232**.

It will be noted that the FIGURES 5 and 6 embodiment provides an upper deck which constitutes a platform over the cab of the truck chassis, the platform completely surrounding the basket **222** when the basket is in folded or retracted position. The operator may therefore stay in the basket while the truck is moving, since he is protected on all sides by the truck. In addition, by operating from the upper deck, the operator is closer to the lamp and therefore has a shorter distance to travel. Further, since trays are provided on the upper deck, adjacent the basket, for short term lamp needs and for trash, the frequency with which the operator must leave the basket is reduced, increasing the efficiency of the arrangement.

If desired, the truck body may be fitted with means to facilitate washing lamps, as shown in FIGS. 8 and 9. FIGS. 8 and 9 are similar to FIGS. 6 and 7, except that the elevator-boom structure has largely been omitted for simplicity. Primed reference numerals indicate parts corresponding to those of FIGS. 6 and 7.

In the FIGS. 8 and 9 arrangement, a pair of elongated trays **250**, **252** are provided, for washing and drying lamps respectively. A water tank **254** (typically of 100 gallon capacity) mounted beneath the elevator holds wash water. The water tank **254** is connected to a pump and heater unit **256**, from which two hoses **258** lead to nozzles **260** on the upper deck. One of the nozzles **260** is used for spraying detergent mixture (for which purpose one of the hoses **258** is connected to a mixing valve, not shown, for mixing detergent into the flowing water), and the other is used for spraying rinse water.

The tray **250** contains a hinged hood **262** which normally covers the tray, but which swings upwardly in use to catch any splash during washing. Used wash water from tray **250** drains through a drain **164** to the street (or, if desired, to a drain tank, not shown). After lamps are washed in tray **250**, they are placed in tray **252** for drying. Usually the lamps will dry themselves, because of the heat imparted to them by the hot detergent mixture and by the hot rinse water. However, additional heat in the drying tray **252** is provided by the truck exhaust **266**, which runs through the bottom of the drying tray.

It will be noted that the wash and dry basins are conveniently located one on each side of the basket **222**, so that an operator may wash lamps and place them in position for drying without stepping out of the basket. The washing will usually be done during travel from one lamp pole to the next, thus utilizing time that would otherwise be wasted.

What I claim as my invention is:

**1.** An elevator-boom structure comprising:

(a) a support,

(b) an elbow frame having a first side, a second side, and means connecting said sides to define a space between said sides,

(c) an elevator comprising

(i) upper leg means having first and second laterally spaced elongated upper legs extending between said support and said elbow frame,

(ii) lower leg means having first and second laterally spaced elongated lower legs extending between said support and said elbow frame,

(d) means pivotally connecting said first upper leg and said first lower leg to said support and to said elbow frame, with said first upper leg above and defining a parallelogram with said first lower leg,

(e) means pivotally connecting said second upper leg and said second lower leg to said support and to said elbow frame, with said second upper leg above and defining a parallelogram with said second lower leg,

(f) first and second elevator cylinders, each containing a piston and a piston rod connected to said piston,

(g) means pivotally connecting said first elevator cylinder to said first side of said elbow frame at a point outside the parallalogram formed by said first upper and first lower legs, and further means connecting the piston rod of said first elevator cylinder to said first lower leg at a point intermediate the ends of such leg,

(h) means pivotally connecting said second elevator cylinder to said second side of said elbow frame at a point outside the parallogram defined by said second upper and second lower legs, and means connecting the piston rod of said second elevator cylinder to said second lower leg at a point intermediate the ends of such leg,

(i) first valve means mounted in said space in said elbow frame and connected to control oil flow to said elevator cylinders,

(j) a boom,

(k) means pivotally mounting said boom on said elbow frame between the sides of said elbow frame with said boom extending forwardly from said elbow frame,

(l) a boom cylinder pivotally connected to said elbow frame between said sides, said boom cylinder containing a piston, and a piston rod connected to said piston and pivotally connected to said boom,

(m) and second valve means mounted in said space in said elbow frame and connected to control oil flow to said boom cylinder.

**2.** Apparatus according to claim **1** including a basket at the end of said boom remote from said elbow frame, control levers in said basket, control arms mounted at the pivotal connection of said boom with said elbow frame, first linkage means operatively connecting said control arms with said valves, and second linkage means operatively connecting said control levers with said control arms for said control levers to operate said valves.

**3.** Apparatus according to claim **2** wherein said support includes a first side section and a second side section, each side section having an upturned tip at the end thereof remote from said elbow frame, means connecting said side sections to define an open space between said tips, said upper legs being connected to said upturned tips, said boom being aligned for movement between said tips into said open space, to permit lowering of said boom and basket below the level of said elbow frame.

**4.** Apparatus according to claim **1** including a pedestal, a ring gear fixed to said pedestal, bearing means mounting said support for rotation on said ring gear and coaxial with the axis of said ring gear, a worm gear, means mounting said worm gear on said support for engagement with said ring gear, and a low speed hydraulic motor mounted on said support and connected directly to said worm gear, for operation of said hydraulic motor to rotate said worm gear against said ring gear hence to rotate said support on said pedestal.

**5.** Apparatus according to claim **1** wherein

(1) said support comprises first and second pairs of parallel support side plates, each support side plate having a generally rectangular base and an upwardly sloping forward portion tapering to a tip, the side plates of each pair being spaced slightly apart, and means connecting said pairs of side plates to space said pairs of side plates apart by a substantial extent and to define an open space between said tips to permit lowering of said boom between said tips,

(2) said means (*d*) connects said first upper leg between said first pair of side plates adjacent the tips thereof and connects said first lower leg between said first pair of side plates at a position located rearwardly of and below such tips,

(3) said means (*e*) connects said second upper leg between said second pair of side plates adjacent the tips thereof and connects said second lower leg between said second pair of side plates at a position located rearwardly of and below such tips,

(4) said first and second sides of said elbow frame respectively comprise first and second pairs of spaced parallel elbow frame side plates,

(5) said means (*d*) connects said first upper leg between said first pair of elbow frame side plates at a first pivotal axis, and connects said first lower leg between said first pair of elbow frame side plates at a second pivotal axis located below and rearwardly of said first pivotal axis,

(6) said means (*e*) connects said second upper and second lower legs between said second pair of elbow frame side plates at said first and second pivotal axes respectively,

(7) said means (*g*) connects said first elevator cylinder between said first pair of elbow frame side plates at a location rearwardly of said first pivotal axis and forwardly of said second pivotal axis, and between said axes in height, and said means (*h*) connects said second elevator cylinder at a corresponding position between said second pair of elbow frame side plates,

(8) and said means (*j*) mounts said boom between said pairs of elbow frame side plates for movement of said boom upwardly and downwardly between said tips of said support frame side plates.

6. Apparatus according to claim 5 including a basket at the end of said boom remote from said elbow frame, control levers mounted on said basket, control rods through said boom, means operatively connecting said control levers to said control rods for movement of said levers to move said rods, a plurality of L-shaped control arms pivotally mounted at the pivotal connection of said boom with said elbow frame, means connecting said control rods with said L-shaped arms, and linkage means connecting said L-shaped arms with said valves, for movement of said control levers to operate said valves.

7. A truck body comprising

(1) a cab for a driver, and a rear portion behind said cab,

(2) an upper deck over said cab and extending forwardly from said cab, and a lower deck over said rear portion,

(3) stairs connecting said upper and lower decks,

(4) a pedestal mounted on said rear deck,

(5) an elevator-boom structure comprising

(a) a support mounted on said pedestal,

(b) an elbow frame,

(c) an elevator comprising upper and lower elongated leg means, each extending between said support and said elbow frame,

(d) means pivotally connecting said upper and lower leg means to said support and to said elbow frame, with said upper leg means above and defining a a parallelogram with said lower leg means,

(e) an elevator cylinder containing a piston, and a piston rod connected to said piston,

(f) means pivotally connecting said elevator cylinder to said elbow frame, and further means pivotally connecting said piston rod to said lower leg means at a point intermediate the ends of said lower leg means,

(g) first valve means mounted on said elbow frame for controlling fluid flow to said elevator cylinder,

(h) a boom pivotally mounted on said elbow frame, having a basket at its end remote from said elbow frame,

(i) a boom cylinder pivotally connected to said elbow frame and containing a piston and a piston rod connected to said piston, said piston rod being pivotally connected to said boom,

(j) second valve means mounted on said elbow frame for controlling fluid flow to said boom cylinder, said boom and elevator cylinders moving said basket between a rest position and an operating position,

(6) said boom extending forwardly over said upper deck when in said rest position, said boom and said upper deck being of a length such that said basket rests on said upper deck entirely surrounded by said upper deck.

8. Apparatus according to claim 7 including at least one workpiece receptacle on said upper deck adjacent said rest position of said basket, so that a workman in said basket may place a workpiece in said receptacle without leaving said basket.

9. Apparatus according to claim 7 including a pair of elongated trays on said upper deck, one of said trays being a wash tray for washing lamps removed from street lights by an operator in said basket and having a drain therein, the other tray being a drying tray for drying said lamps, said trays being located one on each side of said basket when said basket is in rest position and being of a height such that an operator in said basket may place lamps in and remove lamps from said trays without stepping out of said basket.

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