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Mitchell

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[54] **OVERHEAD SERVICE APPARATUS WITH SWIVEL PLATFORM**

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[52] **U.S. Cl.** **182/62.5,** 182/148

[51] **Int. Cl.** **E04g 1/22**

[58] **Field of Search** 182/63, 66, 67, 65, 141, 148, 182/62.5

[56] **References Cited**

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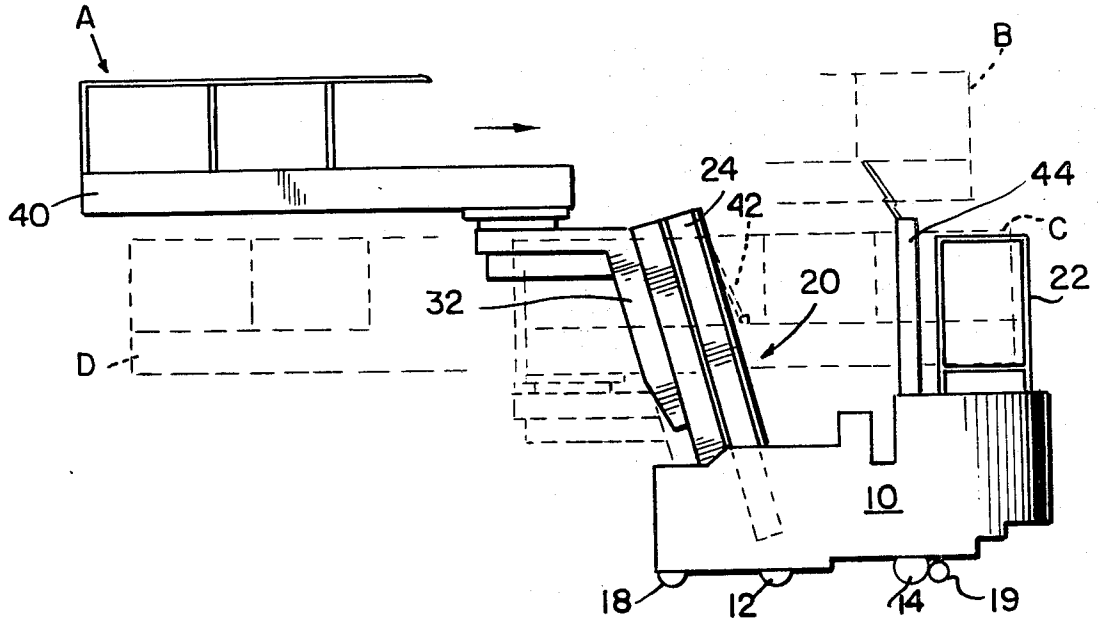
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[57] **ABSTRACT**

Overhead service apparatus having a telescopically extensible inclined mast, mounted on a mobile base which is operable to swivel the mast about a mast-swivel axis, combined with a platform support on the mast and on which a platform is mounted for both traversing movement and swivel movement. The combined swivel and traverse platform movement at the top of an inclined telescopic mast provides unique versatility for positioning a work platform in elevated positions, parallel to the work surface or zones anywhere in an extensive reach space. Mast swivel movement is provided either by driving the mobile base itself about a central mast-swivel axis, or by mounting the mast on a turntable which swivels on the base.

15 Claims, 11 Drawing Figures



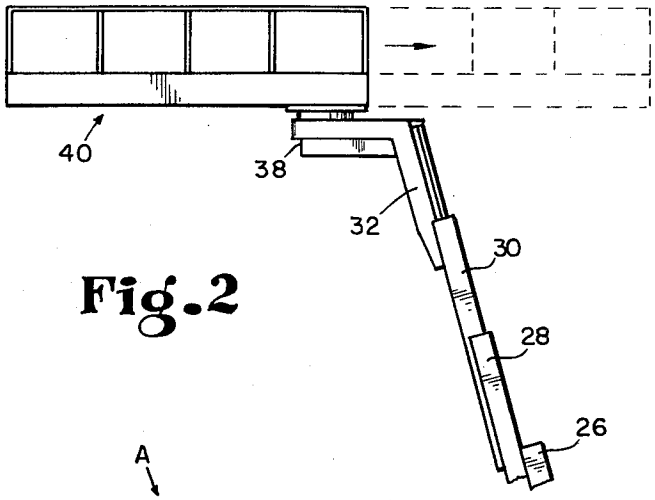


Fig.2

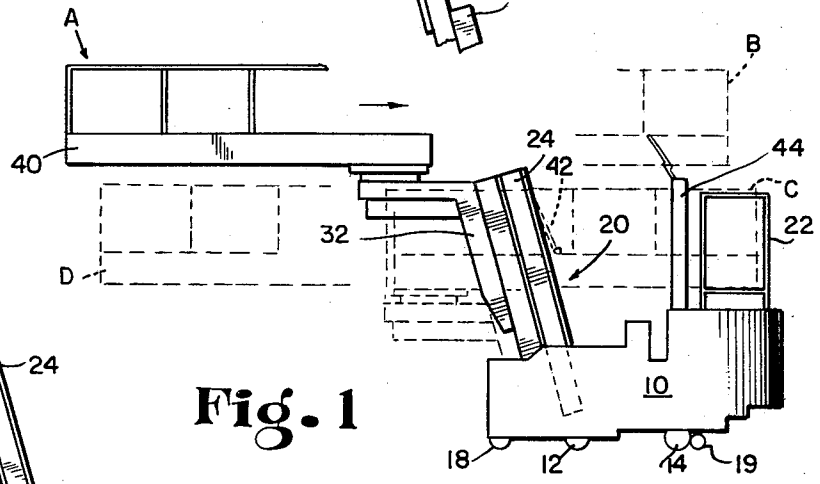


Fig.1

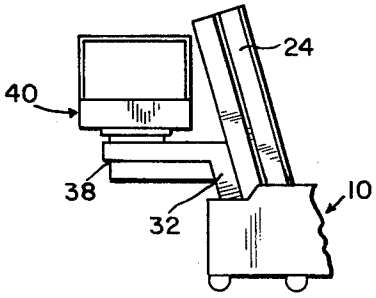


Fig.4

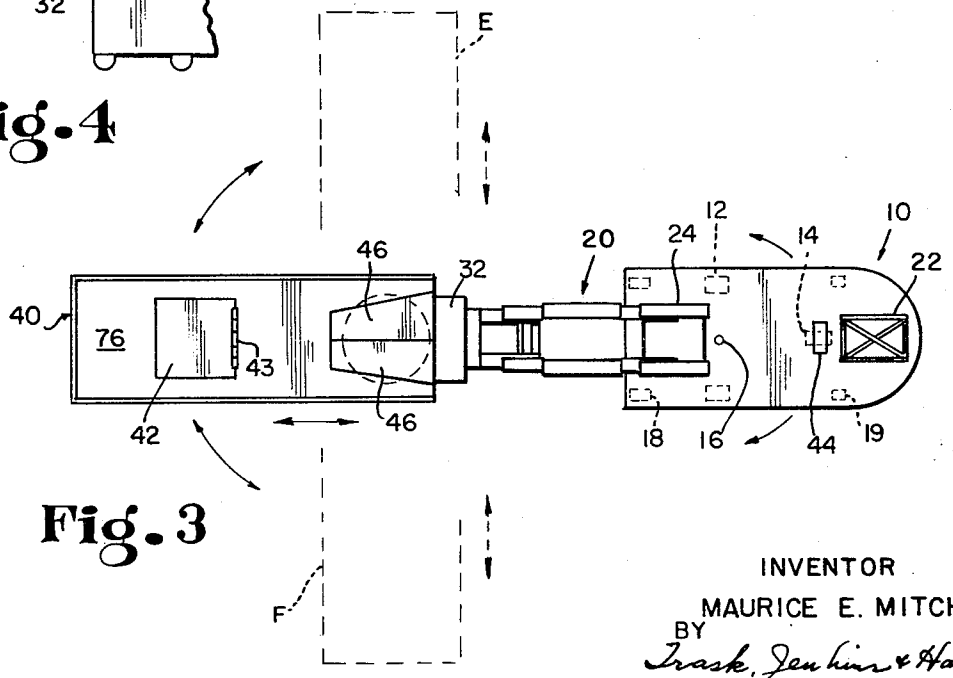


Fig.3

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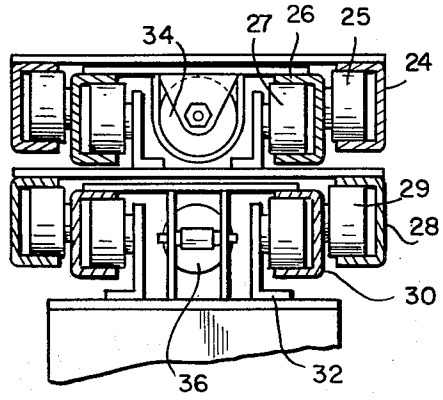


Fig. 5

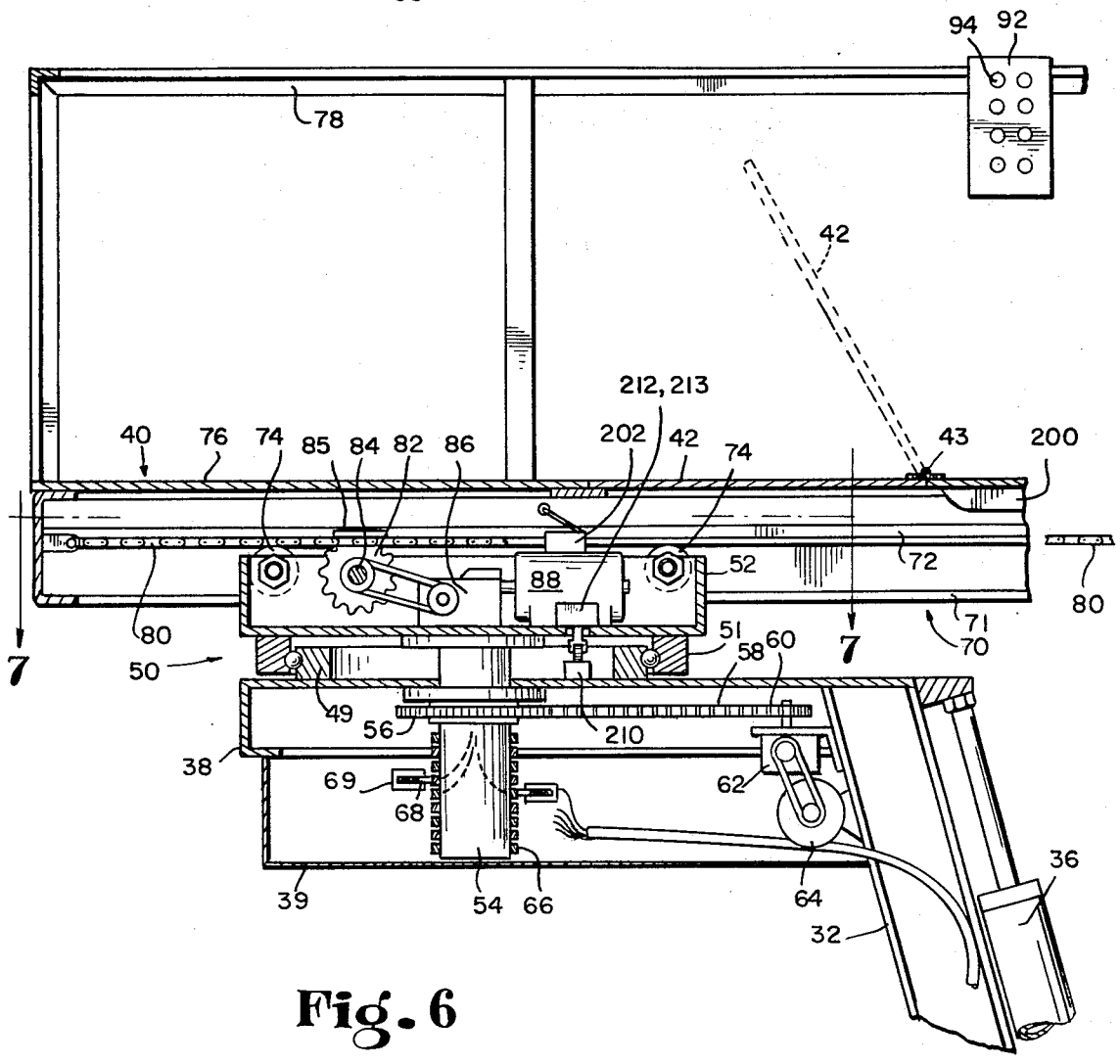


Fig. 6

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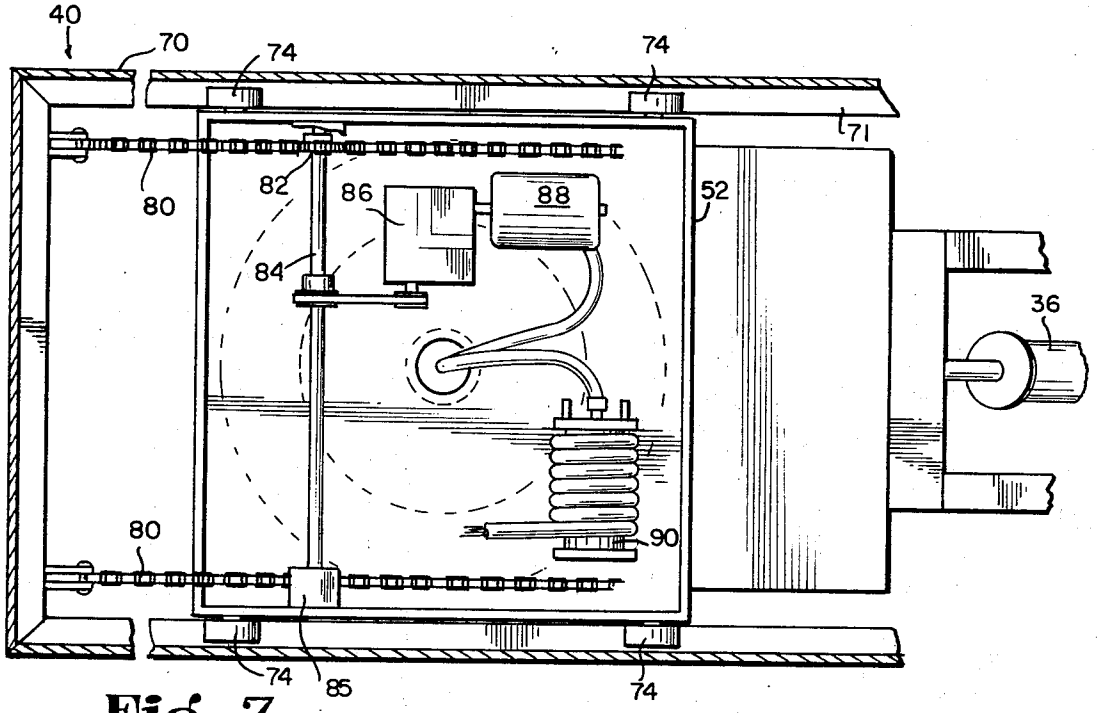


Fig. 7

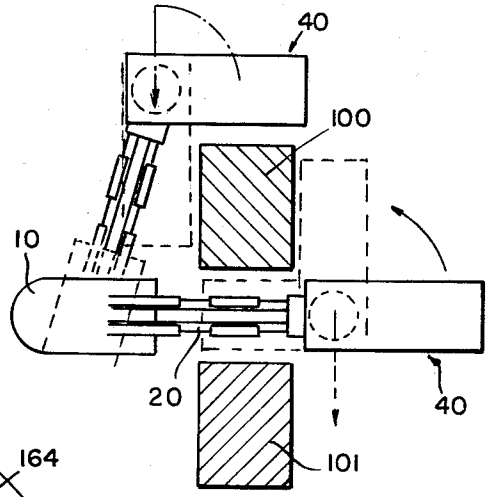


Fig. 8

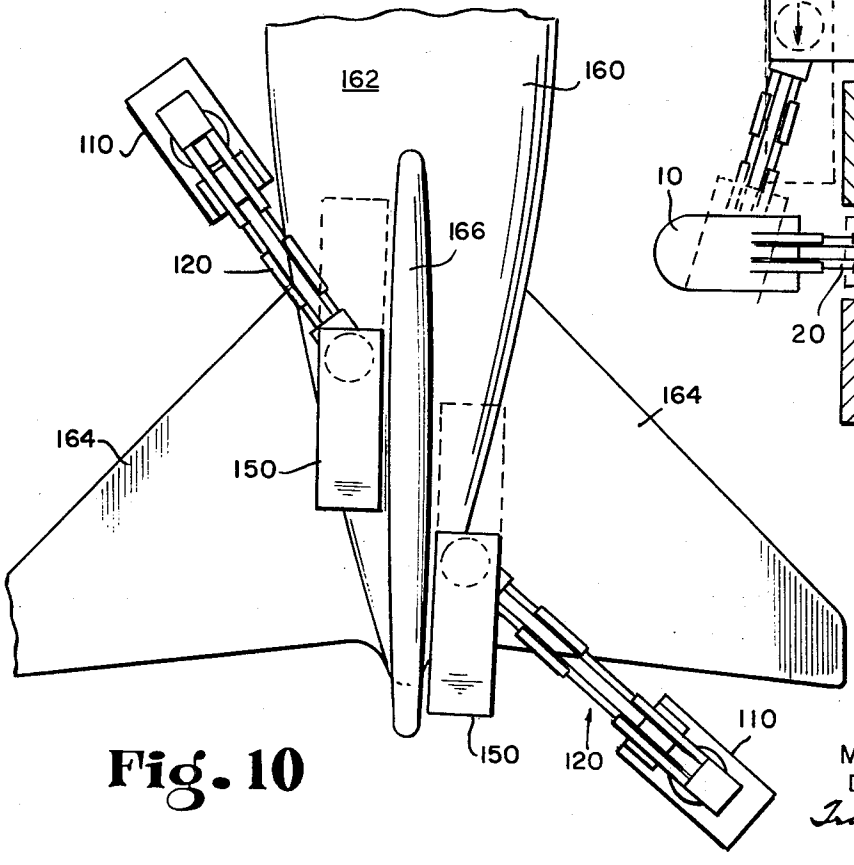


Fig. 10

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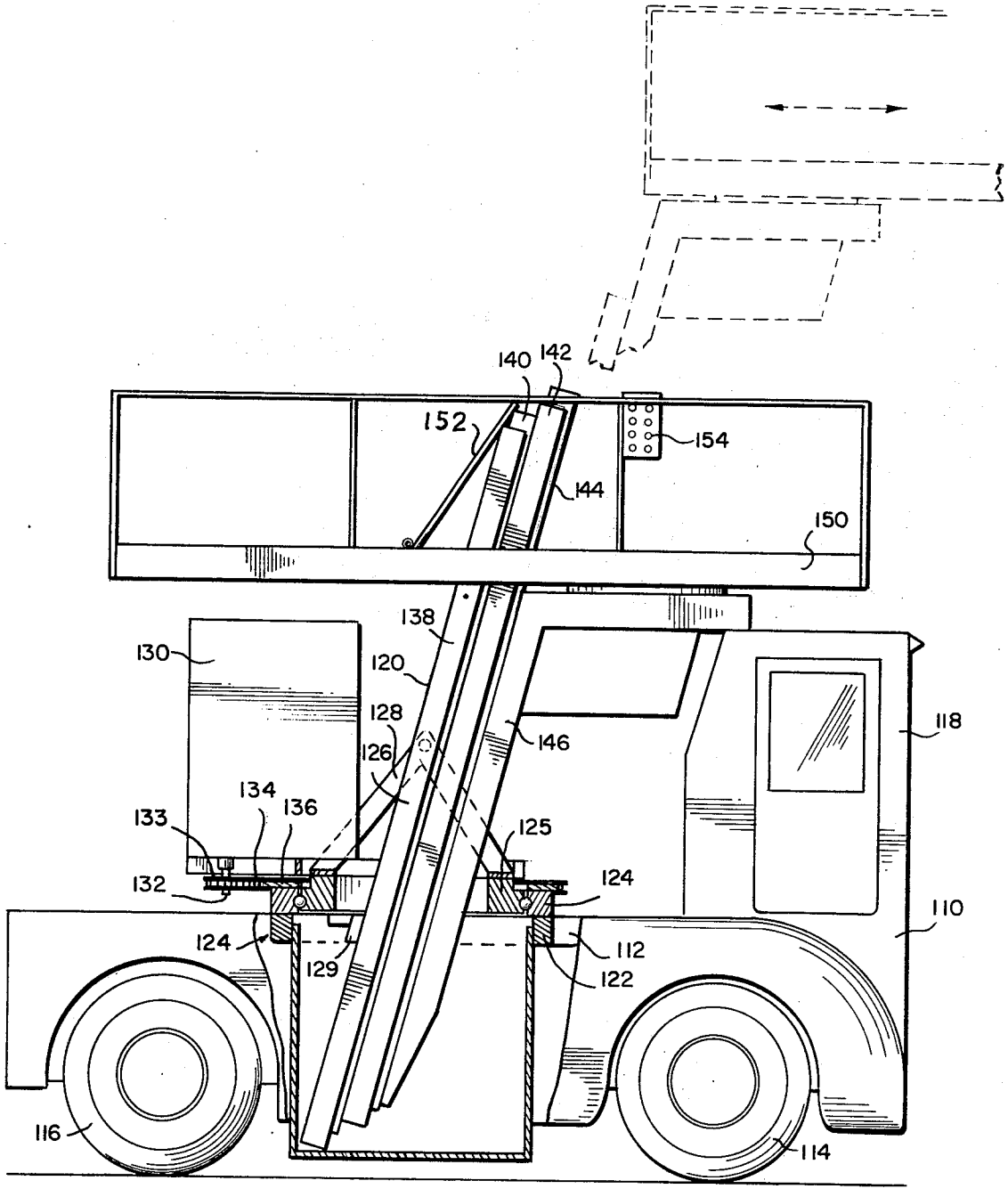


Fig. 9

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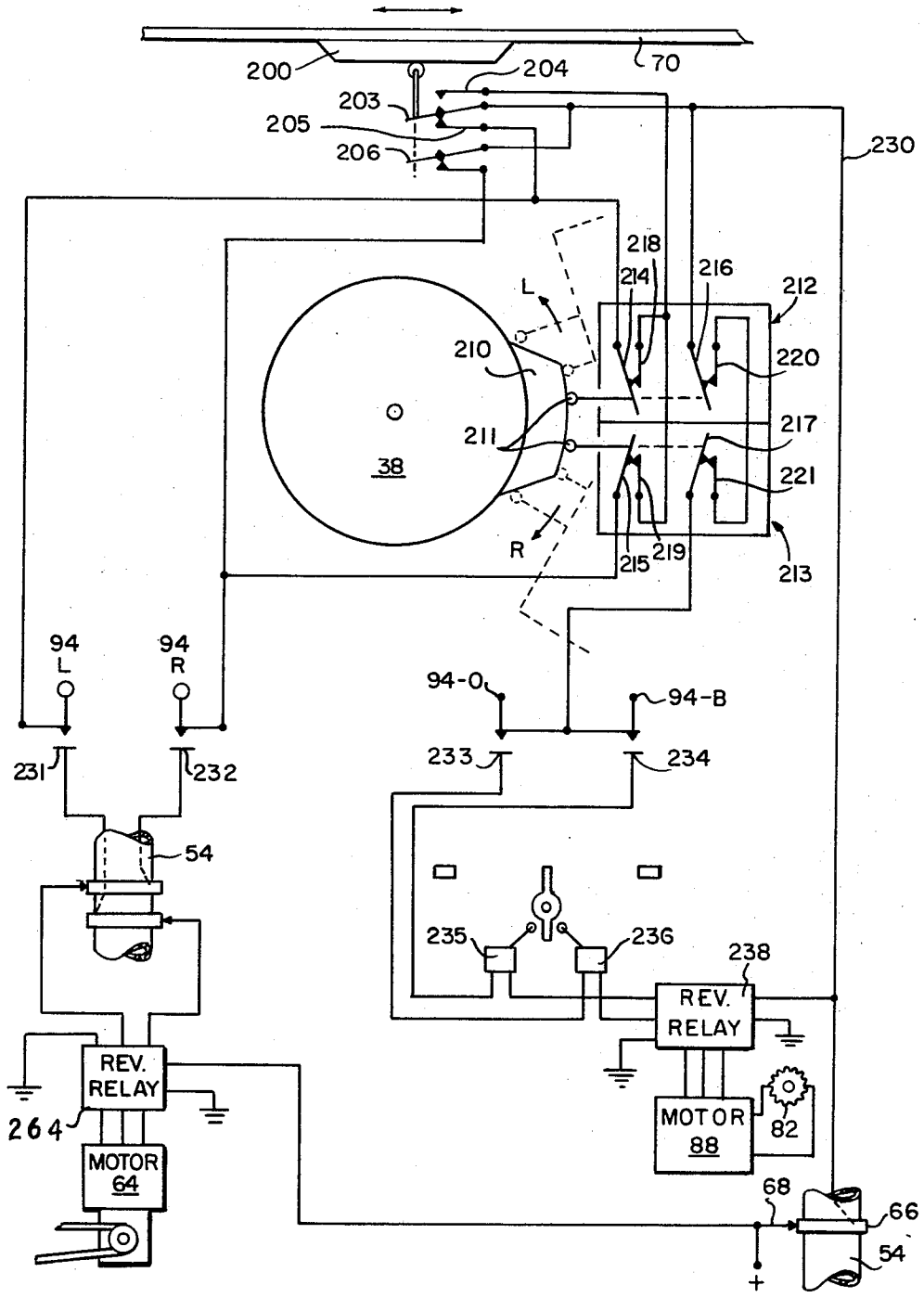


Fig. 11

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OVERHEAD SERVICE APPARATUS WITH SWIVEL PLATFORM

BACKGROUND OF THE INVENTION

This invention relates to apparatus for supporting one or more workmen and their equipment in position to perform overhead service work, including a mobile base, preferably self-propelled, and an extensible mast mounted on the base and supporting the platform.

The present invention is an improvement of the apparatus of applicant's prior U.S. Pat. No. 2,787,278 and may embody features from his U.S. Pat. Nos. 3,095,945 and 3,509,965 The invention provides much greater usefulness and versatility than the apparatus of U.S. Pat. No. 2,787,278, especially in positioning its work platform in useful positions at any point within a large reach space, and particularly in positioning the platform parallel to elongated work surfaces or work zones within such space, and hence provides greater access and convenience for the workman to do the desired work along such work surfaces or zones.

SUMMARY OF THE INVENTION

In accordance with the invention, a work platform is supported for both traversing movement and swivel movement at the top of a telescopically extensible mast mounted on a mobile base. The mast is preferably mounted on a base which itself provides for swivel movement of the mast about a mast swivel axis, as by utilizing a mobile base which is capable of being driven in swivel movement on its own wheels, or by mounting the mast on a turnable support on the mobile base. The mast is desirably inclined away from the mast swivel axis, and the swivel support for the platform positioned outward of the mast from such mast swivel axis; which extends the reach and versatility of the platform. By a "telescopically extensible mast," I mean one which extends in a straight line, whether or not its sections are telescopically received within each other, as distinguished from an elbow-type arm lift in which one or more pivotally interconnected arms swing in a vertical plane to lift a workman-supporting bucket to an elevated position.

In a preferred embodiment, the platform lowers to a travel position from which drive controls can be operated, and the platform carries operating controls for the mast and the platform. If desired or necessary for safety in particular embodiments, the platform swivel and traverse drives have limiting devices which limit traverse movement in certain swivel positions and/or limit swivel movement in certain traverse positions.

This combination of a platform which both swivels and traverses at the top of a telescopically-extensible inclined mast provides unique versatility and reach for enabling a workman to perform a wide range of work operations at any point in a large reach space, and particularly to position the work platform in desirable oriented positions at an angle to the position of the base and the mast. For example, by this combination, from a single location of the mobile base adjacent to a rectangular column, the platform may be positioned in elevated positions parallel to all four sides of such column by suitable traversing and swivelling movement of the platform and by a limited amount of swivelling movement of the base.

BRIEF DESCRIPTION OF THE DRAWING

The accompanying drawings illustrate the invention and show two preferred embodiments thereof. In such drawing:

FIG. **1** is a side elevation of an apparatus embodying the invention and showing different positions of the platform with the mast in collapsed condition;

FIG. **2** is a side elevation related to that of FIG. **1**, showing the mast in extended position and indicating some of the range of movement of the platform at the top of the extended mast;

FIG. **3** is a plan view of the apparatus of FIGS. **1** and **2**, showing the platform in elevated position as in FIG. **2** and indicating further the range of movement of the platform and of the mobile base;

FIG. **4** is a fragmental side elevation similar to FIG. **2**, showing a transverse lowered position of the platform.

FIG. **5** is a somewhat idealized section transversely of the mast to show the relationship of its several sections;

FIG. **6** is a sectional view showing the mounting of the platform for swivel and traversing movement at the top of the mast;

FIG. **7** is a horizontal sectional view taken substantially on the line **7—7** of FIG. **6** and providing a further showing of the traversing mechanism;

FIG. **8** is a diagrammatic plan view showing how the embodiment of FIGS. **1–6** may be used to locate its platform on all four sides of a column;

FIG. **9** is a side elevation showing a modified embodiment of the invention in which the mast is mounted for swivel movement in turnable carrier on a mobile base and projects below the frame of the base to increase the extensible height of the mast;

FIG. **10** is a plan view showing how the invention may be utilized to locate a platform parallel to a work surface such as the tail surfaces of an aircraft; and

FIG. **11** is an electrical diagram of optional limiting mechanism to limit swivel movement in some traverse positions, and vice versa.

DESCRIPTION OF THE FIRST PREFERRED EMBODIMENT

The embodiment shown in FIG. **1** comprises a mobile base **10** in the form of a vehicle similar to that of an industrial lift truck. This has main supporting wheels **12** at its sides intermediate its ends and a single main drive wheel **14** which is motor driven to drive the truck and is rotatable to steer the vehicle through at least 180°. By turning the drive wheel crosswise, its drive operation will turn the vehicle in a swivel movement about a central mast swivel axis **16**. The base also has supplementary supporting caster wheels **18** at the rear and **19** at the front. The front of the vehicle, to the right in FIG. **1**, houses the motor which drives the wheel **14** and may carry counter weight masses and/or ballast tanks. The vehicle carries a housing **22** for a battery which supplies power to operate the unit. A control column **44** stands close behind the battery housing **22**. At the rear portion the mobile base supports a mast **20** having a fixed mast section **24** and three telescopically movable mast sections **26, 28,** and **30**. The mast section **30** supports a slidable "7-section" **32** on which the platform is mounted for swivel and traversing movement as described below.

As shown in FIG. 5, the fixed mast section 24 comprises a pair of spaced, inwardly-open channels which form guides for rollers 25 on and supporting the first extensible section 26. Such section 26 is likewise formed of a pair of spaced, inwardly-open channels which form guides for rollers 27 supporting the next extensible section 28. The first extensible section 26 is nested within the fixed section 24, and the next extensible section 28 is positioned in face to face relation with the fixed section 24 and connected by brackets to its supporting rollers 27. The section 28 also comprises a pair of spaced, inwardly-open channels which form guides for rollers 29 on the top extensible section 30. The top extensible section 30 is also formed of a pair of inwardly-open spaced channels which form guides for rollers 31 supporting the 7-section 32. Extension of the mast is effected by a hydraulic cylinder 34. This acts between the fixed section 24 and the first extensible section 26, and the several sections are interconnected by chains and sprockets in such a manner that as the hydraulic cylinder 34 raises the first extensible section 26, the other extensible sections 28 and 30 are raised simultaneously and with respect to the section 26 and to each other. This arrangement is known, and is shown and described, for example, in applicant's U.S. Pat. No. 3,509,965.

Elevation of the 7-section 32 with respect to the top extensible section 30 is effected by a separate hydraulic cylinder 36, and the lift controls are so arranged that such hydraulic cylinder 36 is actuated before the mast cylinder 34 so that it lifts the 7-section to the top of the mast before the mast is extended by the cylinder 34.

The 7-section 32 has a horizontal leg 38 which forms a platform support on which the platform 40 is mounted for swivel and traversing movement in a manner to be described. As shown in FIG. 1, with the 7-section 32 at the top of the retracted mast 20, the platform 40 has an extended position A shown in full lines, and may be traversed to a retracted position B shown in dotted lines in which it overlies the mast 20 and the control column 44. From that position B the platform can be lowered to a travel position C close above the mobile base 10. To permit such lowering with respect to the mast 20 and the control column 44 and battery housing 22, the floor of the platform 40 is provided with doors which swing open to clear such elements. Thus a trap door 42 swings upward to allow the mast 20 to project through the floor of the platform, as shown in FIG. 1. Doors 46 swing up to clear the control column 44 and battery housing 22. From the extended position A of the platform, it may also be lowered to a lowered extended position D shown in dotted lines in FIG. 1, by lowering the 7-section 32 while the platform is in its extended position A.

As shown in FIG. 2, the mast 20 is extensible to support the platform 40 above its upper end, and the platform is traversable between an extended position shown in full lines and a retracted position shown in dotted lines. As shown in FIG. 3, the platform can also be swivelled clockwise or counter-clockwise from its extended position to the transverse positions E and F shown in dotted lines. As will be explained later, the platform can be swivelled through 360° in either direction by its mounting on the horizontal leg 38 of the 7-section 32 at the top of the mast, and can be traversed in any angular position to which it is swivelled.

Care should be taken to limit the movement of the platform to keep it within the limits of stability of the unit as a whole, and this depends on a number of factors, including the length of the platform and the design and counter balancing of the mobile base 10. It is contemplated that to avoid exceeding the limits of stability of particular units, controls can be provided to limit the permissible swivel movement of the platform while it is in extended position but permitting greater swivelling movement when it is in a centered traverse position over the swivel axis, and vice versa, to limit the traversing movement of the platform when it is in certain angular positions of its swivel movement.

As shown in FIG. 4, the 7-section 32 may be lowered on the mast 20 with the platform 40 swivelled to a transverse position, thereby to present the platform broadside at the outer face of the mast. While FIG. 4 shows this with the mast collapsed, similar positions of the platform with respect to the top section 30 of the mast may be obtained by suitably actuating the hydraulic cylinder 36.

The mounting for the platform 40 is shown in FIGS. 6 and 7. The horizontal leg 38 of the 7-section 32 carries the inner race 49 of a swivel bearing 50, the outer race 51 of which supports a box-shaped platform carrier 52 having a bottom wall 53 mounted on the outer race 51. The bottom wall 53 of such platform carrier 52 carries a depending post 54 which extends through the horizontal leg 38 into a housing 39 supported by such leg. Such post 54 carries a sprocket 56 engaged by a chain 58 driven by a smaller sprocket 60 mounted on the output shaft of a gear reduction 62 driven by a swivel motor 64. The swivel motor 64 is reversible, and will operate to rotate the post 54 in either direction and hence to swivel the platform carrier 52 and the platform 40 in either direction.

The post 54 also carries a plurality of slip rings 66 engaged by sliding contacts 68 mounted in holders 69 carried by the 7-section 32. Electrical connections for power and controls are provided by these slip rings 66 and contacts 68 while permitting the platform to swivel freely through 360° of motion.

The structure of the platform 40 comprises a pair of side rails 70 provided with spaced inwardly directed flanges 71 and 72 forming a trackway for supporting rollers 74 mounted at the sides of the platform carrier 52. The side rails 70 extend upward beyond the flange 72, and support a platform floor 76 and an upstanding guard rail 78. The floor has a trap door opening in which the trap door 42 is mounted by means of a hinge 43. At the front (to the right from FIGS. 6 and 7) the platform frame and floor defines a clearance opening closed by the doors 46 shown in FIG. 3.

The platform 40 is supported for traversing movement on the rollers 74 mounted on the platform carrier 52. To effect and control traversing movement, a pair of chains 80 are stretched between the ends of the platform frame and are engaged within the carrier 52 by a pair of spaced sprockets 82 on a common shaft 84 which is reversibly driven by the output shaft of a gear reduction 86 powered by a motor 88. A retaining shoe 85 desirably overlies the point of engagement between each chain 80 and its sprocket 82 to maintain the chains in certain engagement with the sprockets.

The platform carriage **52** may also contain a reel **90** for an electrical cable by which the slip rings **66** are connected to a control panel **92** mounted on the guard rail **78** of the platform **40**. Such panel **92** desirably contains eight momentary-contact switch buttons **94** respectively for up and down mast movement, right and left swivel movement, out an back traversing movement, and right and left base swivel movement. In the modification of FIGS. **1–7**, the right and left base swivel movement is provided by setting the power wheel **14** in a crosswise position and actuating it in forward or reverse direction to swing the front end of the base unit **10** in a corresponding direction as indicated by the arrows in FIG. **3**, about a "mast swivel axis" at the point **16**.

Operation of the unit of FIGS. **1–7** is as follows. With the platform **40** in travel position C shown in FIG. **1**, a workman on the platform can operate the controls of the column **44** to drive and steer the unit to a desired work location. There, he sets the steering control to hold the drive wheel **14** in a traverse position. Then, by operating the switch buttons **94** of the control panel **92** on the platform, he can raise the platform support to the top of the mast, where the doors **42** and **46** will close to allow full use of the entire platform floor. He can also traverse and/or swivel the platform and extend or lower the mast and operate the drive wheel **14** as needed to locate the platform in any desired position in a large reach space about the mast swivel axis **16** and upward to the full height of the extended mast. Upon completion of work in one platform position he can similarly move the platform to other locations within the reach space, or return the platform to drive position C and proceed to another location.

The telescopic, straight-line extensibility of the mast, in combination with the swivel and traverse capabilities of the platform is especially useful in moving the platform over, through, beneath, and around obstructions such as the columns and beams and equipment of an industrial building.

The versatility of the combination described is illustrated in the diagrammatic plan view of FIG. **8**. Here, it is assumed that access is desired to all four sides of a column like structure **100** which may be located closely adjacent some other similar structure **101** and may support cross beams not shown. With a unit of the type shown in FIGS. **1–7** positioned with its base **10** in the full line position of FIG. **7**, its mast **20** can be extended to carry the platform support to a position behind the columns **100** and **101**, and in such movement, the platform **40** can be traversed backward and forward as may be necessary to clear other adjacent structure. With the platform support behind the columns **100** and **101**, the platform **40** can be swivelled to a position parallel with and adjacent to the back faces of such columns **100** and **101**, and can be traversed to extend across the rear face of either column. Similarly, the platform **40** can be traversed from its extended position shown in full lines, in a rearward direction, to a position between the two columns **100** and **101** so that it lies parallel to their adjacent faces. To reach the other two faces of the column **100**, the platform is retracted and the mast lowered, the base **10** is swivelled to the dotted line position shown in FIG. **7**, and the mast is then again extended to locate the swivel axis of the platform **40** opposite the upper left corner of the column **1** as viewed in FIG. **8**. The platform can then be swivelled to a position parallel with the side face of the column **100** or swivelled and traversed to a position parallel with the front face of the column **100**. Accordingly, with the mobile base **10** in a single location as in the aisle of a factory, the platform **40** can be placed parallel to any of the four sides of an adjacent column-like structure, for example, a machine tool or the like. Variations in the elevation or height of the platform will of course produce horizontal displacement in view of the inclination of the mast, and this can be offset either by traversing adjustment or by moving the base **10** closer or farther away from the column.

DESCRIPTION OF SECOND EMBODIMENT

The embodiment shown in FIG. **9** comprises a truck **110** of substantially conventional construction having an elevated frame **112** and mounted on front wheels **114** and rear wheels **116**. A cab **118** houses driving controls and a seat for the driver.

The center section of the frame **112** is formed to define a central opening through which the mast **120** may project. To this end, the frame includes cross members **122** which with its side members support the outer race **123** of a swivel bearing **124**, the inner race of which forms a turntable or swivel ring **125** for supporting the mast. The fixed section **126** of the mast **120** is mounted on such ring **125** by means of braces **128** and **129**. The swivel ring **125** also supports a power unit **130** which may include an electrical battery for powering the mast **120** and the platform. The power unit **130** houses a swivel motor and gear reduction (not shown) having an output shaft **132** which carries a sprocket **133** to drive a swivel chain **134** engaged with a fixed swivel sprocket ring **136** mounted on the outer race **123** of the swivel bearing **124**. Actuation of such swivel motor drives the power unit about the fixed sprocket ring **136** and swivels the mast about the axis of the swivel bearing **124**.

The mast **120** is similar to that of FIGS. **1–7**, but with much longer sections. These include a fixed section **138** and extensible sections **140**, **142**, and **144**, and the top extensible section **144** supports a 7- section **146** which forms a platform support on which a platform **150** is mounted by traversing and swivel mechanism like that of FIGS. **6–7**. The mast contains separate operating cylinders to lift the 7-section and to extend the extensible sections of the mast, in the same manner as in FIGS. **1–7**.

The platform **150** is similar to that of FIGS. **1–7**, and includes a trap door **152** which permits the platform to be lowered below the top of the mast, and hence to a low travel position. The platform also includes control buttons **154** for operating the mast extension and swivel drives and the platform swivel and traverse drives. In this case, the truck is driven from the cab **118** and not from the platform. The controls previously used to drive the drive wheel **14** for mast swivelling movements are connected to control the mast swivel motor.

The mounting of the mast **120** on the swivel bearing **124** supported by the truck frame **112** a substantial distance above ground level, permits the mast sections to extend through the plane of such frame **112** and to be substantially longer than those of the embodiment of

FIGS. 1–7. The longer sections permit greater mast extension to position the traversing and swivelling platform **150** at much greater heights, for example, in excess of **60** feet above ground level.

Operation of this second modification differs from that of the first by reason of the use of an over-the-road type truck rather than an industrial truck. The unit is driven by a driver in the cab **118**, and is spotted in a suitable work location. A workman then mounts the platform and operates the control buttons **154** to move the mast and the platform as necessary to locate the platform in the desired overhead position.

The utility of such an apparatus, and the versatility which results from providing both swivel and traversing movement of a platform on a telescopically extensible mast is illustrated diagrammatically in FIG. **10**. Here, an apparatus like that of FIG. **9** is used to obtain access to the vertical surfaces of the rudder **166** of an aircraft **160**. At the left, a truck unit **110** is spotted in the angle between the fuselage **162** and the left horizontal elevator wing **164** of the tail structure, and the mast **120** is extended and the platform **150** traversed and swivelled to a position closely adjacent to, and parallel with, the left side surface of the rudder. By traversing the platform **150** from its extended position shown in full lines to a retracted position shown in dotted lines, the platform gives access to substantially the entire front two-thirds of the surface of the rudder **166**.

At the right, a truck unit **110** is located between the right elevator fin **164** and the projecting rear edge of the rudder **166**, and the platform **150** is raised and swivelled to a position closely adjacent to and parallel with the right face of the rudder **166**. By traversing the platform **150** in such elevated position, the platform gives access to substantially the entire rear two-thirds of such right face. Again, it will be recognized that differences in elevation along the rudder surfaces can be obtained by locating the base **110** closer or farther away from the aircraft structure and extending the mast **120** more or less as desired.

In high lift-height units, or even with lower lift-height having long platforms, it is in some cases desirable to limit platform traverse extensions in certain swivel positions and/or to limit swivel in certain traverse positions. Means for providing such limiting is shown diagrammatically in FIG. **11**, as applied to the traverse and swivel mechanism of FIGS. **6** and **7**.

For the purpose of sensing the traverse position of the platform **40**, one rail **70** of the platform frame is provided with a cam land **200** in position to actuate a double throw switch **202** when the platform is in or close to a centered position. The switch **202** has a first switch blade **203** normally closed with a contact blade **204** and movable into contact with an opposite contact blade **205**, and has a normally-open second switch blade **206** movable into contact with a fixed contact blade **207**. Operative structural positions of the cam land **200** and the switch **202** are shown diagrammatically in FIG. **6**.

For sensing and controlling swivel movement, the platform support, that is, the horizontal leg **38** of the 7-section in FIG. **6**, is provided with a cam land **210** which, when the platform is within certain swivel angles, acts to engage the actuating elements **211** of, and close, a pair of switches **212** and **213** mounted on the swivelling structure, for example, on the platform carriage **52** as indicated in FIG. **6**. The switch **212** has movable switch arms **214** and **216** which are normally open and move to engage fixed switch blades **218** and **220**. Similarly, the switch **213** has two normally open movable switch blades **215** and **217** which are moved by the actuator **211** into engagement with fixed switch blades **219** and **221**. When the platform is swivelled, the switches are carried to the end of the cam land, and the leading switch is opened.

The movable switch blades **203** and **206** of the traverse-responsive switch **202** are connected to an electrical supply wire **230** which is connected to a source through one of the slip rings **66** and contacts **68** on the swivel post **54**. When the switch **202** is in actuated position as shown in FIG. **11**, such contacts **203** and **206** engage blades **205** and **207** to supply electrical current directly to the manual switches **94–L** and **94–R** controlling left and right swivel movements. These are normally open switches and have fixed contacts **231** and **232** which are respectively connected through slip rings and contacts of the swivel post **54** to control a reversing relay **264** for the swivel motor **64**. Under the conditions shown, that is, with the platform centered and its control land **200** in position to actuate a switch **202**, the swivel switches **94–L** and **94–R** can be actuated at will, without limitation, to swivel the platform through 360° of rotation in either direction.

When the platform is moved away from centered position, so that the land **200** no longer actuates the control switch **202**, then the above-described connections through such switch **202** to the swivel switches **94–L** and **94–R** are disconnected, and the switch blade **203** connects the power supply to the fixed contact blade **204** which is connected in common to the switch blades **218** and **219** of the switches **212** and **213** associated with the swivel land **210**. If the platform is in centered swivel position, both switches **212** and **213** are in actuated condition as shown, and their blades **214** and **215** engage the energized blades **218** and **219**. The switch blade **214** is connected to the swivel control switch **94–L** and the switch blade **215** is connected to the swivel control switch **94–R**. Under these conditions, that is, with the platform in a centered swivel position, the control switches **94–L** and **94–R** are energized so that their manual operation will produce swivel movement. As such swivel movement proceeds, in either direction, the switch actuating member **211** of the leading one of the switches **212** and **213** will pass beyond the end of the swivel control land **210** and such leading switch will move to open position. Thus, if swivel movement is to the left, counter clockwise in FIG. **11**, the switch **212** will be opened when its actuating element **211** leaves the counter-clockwise end of the land **210**, and this will open the switch **214–218** and de-energize the swivel control switch **94–L** to prevent further swivel movement in that direction. Likewise, swivel movement to the right will cause the actuating member **212** of the switch **213** to leave the clockwise end of the swivel control land **210** and will open such switch **213** to de-energize the swivel control switch **94–R** to prevent further swivel movement in such clockwise direction.

The other sets of blades of switches **212** and **213** limit traversing movement when the platform is

swivelled beyond a predetermined angle from centered position. The movable contact **216** is connected to the power supply wire **230**, the two fixed contacts **220** and **221** of the two switches are interconnected, and the movable contact **217** is connected to energize the "out" and "back" traversing control switches **94–O** and **94–B** of the control panel **94**. These are normally open switches, and have fixed contacts **233** and **234** which are respectively connected through limit control switches **235** and **236** to a reversing relay **238** which controls the traversing motor **88** which drives the traversing sprockets **82**. When the platform is in centered swivel position, so that the switches **212** and **213** are closed, power is supplied in series through such switches to the traversing control switches **94–O** and **94–B**. If the platform is swivelled in either direction beyond a predetermined angle such that either of the switches **212** and **213** is opened, then the power supply to the traversing switches **94–O** and **94–B** is interrupted by the opening of either the switch blades **216–220** or the switch blades **217–221**, and traversing movement will thus be prevented until the platform is swivelled back within the limits of the predetermined swivel angles.

By such controls, the platform has full traversing movement when its swivel position lies within a predetermined angle in either direction from parallelism with the base unit **10**. Conversely, the platform has full swivel movement through 360° in either direction when it is traversed to a centered or substantially centered position on the carriage **52** where the traversing control land **200** is in position to actuate the switch **202**.

I claim:

1. Overhead service apparatus comprising, in combination,

a mobile base,

an upstanding telescopically extensible mast on said base,

a platform support carried by said mast and having an operative position at the top of the mast and movable in such position to elevated position by extension of the mast,

a platform carrier mounted for swivel movement on said platform support, on an axis offset from the mast,

an elongated platform mounted for traversing movement on said carrier,

and control means to extend and retract said mast, to swivel said carrier on said support, and to traverse said platform on said carrier.

2. Overhead service apparatus according to claim **1** in which said mast is inclined outward from the vertical to carry the swivel axis of the platform carrier outward of the mobile base as the mast is telescopically extended.

3. Overhead service apparatus according to claim **1** in which the mast is inclined outward and the platform support is disposed at the outer side of the inclined mast.

4. Overhead service apparatus according to claim **3**, in which the platform has a retracted position in which the major portion of its length extends inward from the carrier on said platform support and overlies the upper end of the mast, the platform support is movable along the outer face of the mast when the mast is in collapsed condition, and the platform has a door in its floor which opens to permit the mast to project through the plane of the platform.

5. Overhead service apparatus according to claim **1** in which the platform support is disposed at the outer side of the mast, and the platform carrier can be swivelled to a transverse position in which the platform clears the mast, the platform support being movable along the outer face of the mast to position the platform below the top of the mast in a transverse work position.

6. Overhead service apparatus according to claim **1** in which the platform support in said operative position at the top of the mast disposes the platform in a position to clear the mast, and said swivel mounting being operable to swivel the platform through 360° in either direction.

7. Overhead service apparatus according to claim **1** in which the swivel mounting for the platform carrier includes a plurality of slip rings mounted on one of the relatively swivelling parts and contacts for such slip rings mounted on the other of such parts, and electrical circuits for energizing said control means, said circuits including connections through said slip rings and contacts.

8. Overhead service apparatus according to claim **2** with the addition of means associated with said mobile base for swivelling the mast about a vertical axis on the opposite side of the mast from the swivel axis of the platform.

9. Overhead service apparatus according to claim **8** in which said mast swivelling means comprises means to drive the mobile base about a swivel axis disposed centrally within the periphery of the base.

10. Overhead service apparatus according to claim **8** in which the mast is mounted on a swivel carriage and such carriage is mounted for swivel movement on the mobile base.

11. Overhead service apparatus according to claim **10**, in which said mobile base comprises a truck having a frame supported in elevated position above ground level, a swivel ring mounted on said frame about an opening through the frame, said swivel carriage being mounted on said swivel ring, and said mast being mounted on said carriage in position to extend through the opening in the frame, the mast being thereby extended downward through the plane of its swivel support to permit the use of longer mast sections and thereby increase the reach height of the mast.

12. Overhead service apparatus comprising, in combination,

a mobile base in the form of a truck having ground wheels and a frame supported thereon in elevated position above said wheels,

said frame defining a central opening,

an upstanding telescopically extensible mast comprising a base mast section and extensible mast sections,

means to mount said base mast section in a fixed position of inclination extending through said frame opening and upward and downward therefrom, said extensible mast sections being telescopically movable relative to said base mast section and through said opening,

said mast mounting means comprising a swivel support carried by the frame and a swivel carriage on which the base mast section is mounted for movement therewith a mast swivel axis,

and a work platform carried by said extensible mast and movable thereby to elevated work positions.

13. Overhead service apparatus according to claim 12 in which said swivel support comprises a swivel bearing ring mounted on said frame about said opening, and said carriage comprises a swivel ring mounted for swivel movement on said bearing ring.

14. Overhead service apparatus according to claim 12 with the addition that said mast carries a platform support projecting outward from one face of the mast, a platform carriage swivelled on said support for rotation about a vertical axis displaced from the mast swivel axis.

15. Overhead service apparatus according to claim 14 with the addition that the platform is mounted for traversing movement on said platform carriage.

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