

Sept. 1, 1964

G. H. ECKELS
BOOM EXTENSION

3,146,853

Filed Dec. 29, 1961

3 Sheets-Sheet 1

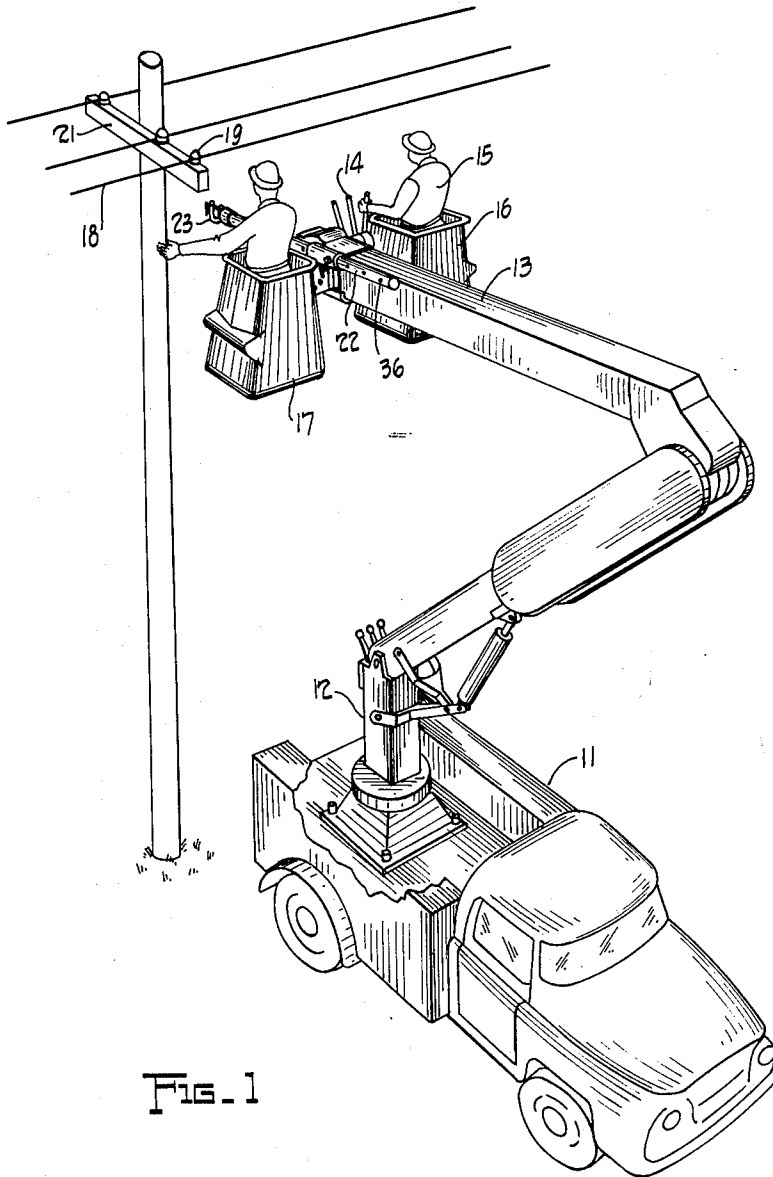


FIG. 1

INVENTOR.
GEORGE H. ECKELS

BY

Schramm, Kramer & Sturges
ATTORNEYS.

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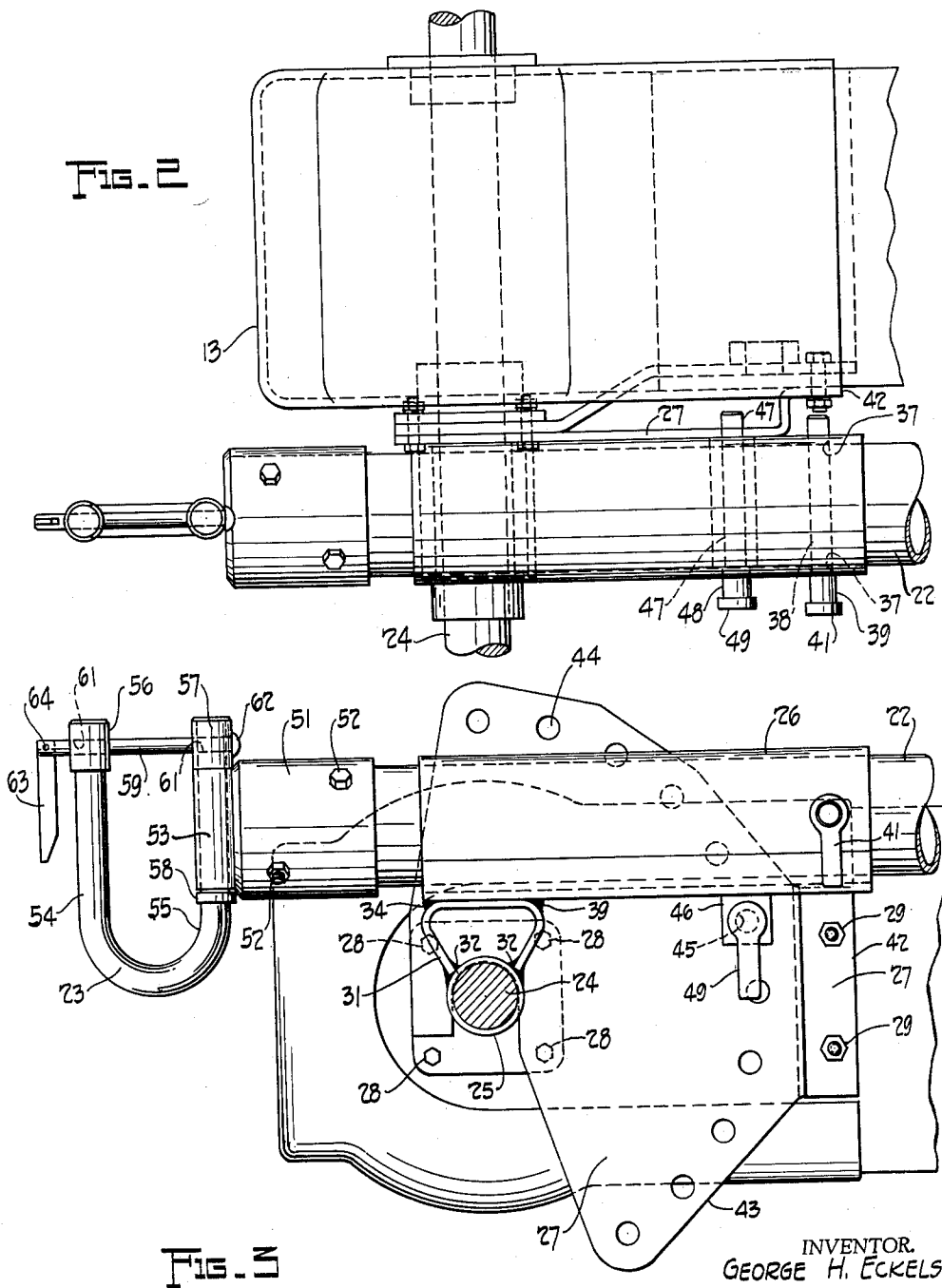


FIG. 3

INVENTOR.
GEORGE H. ECKELS

BY
Schramm, Kramer & Sturges
ATTORNEYS.

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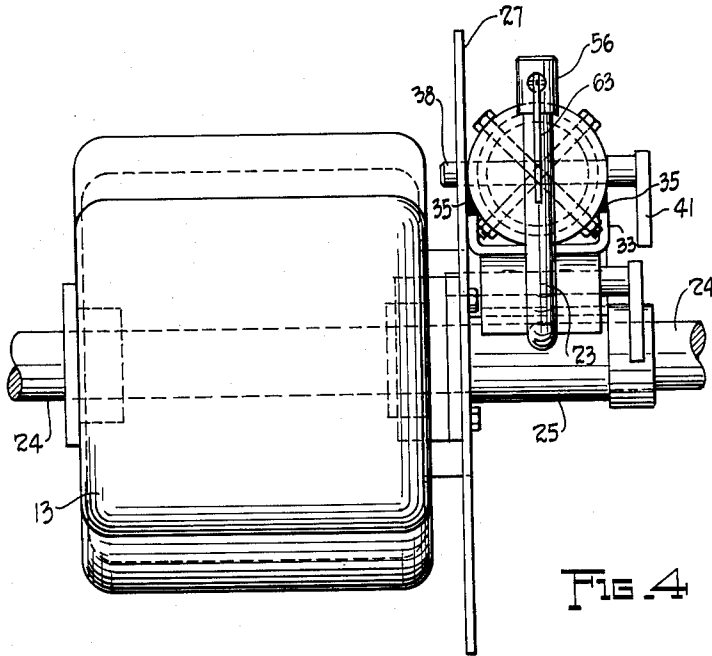


FIG. 4

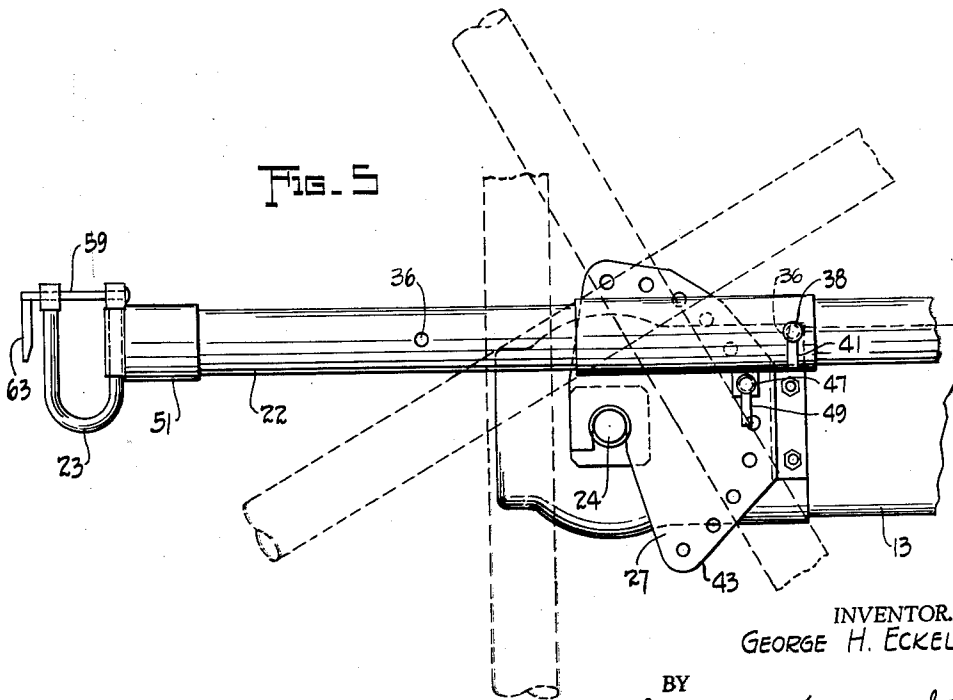


FIG. 5

INVENTOR.
GEORGE H. ECKELS

BY
Schramm, Kramer & Stunges
ATTORNEYS.

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3,146,853

BOOM EXTENSION

George H. Eckels, Lakewood, Ohio, assignor, by mesne assignments, to The Ohio Brass Company, Mansfield, Ohio, a corporation of New Jersey
 Filed Dec. 29, 1961, Ser. No. 163,279
 17 Claims. (Cl. 182-46)

This invention relates to energized line working and concerns particularly arrangements for carrying the line conductors.

In the working of high tension energized lines with the personnel at the potential of the lines, it has been proposed to support the personnel in buckets or Faraday cages carried by arms capable of being elevated. It is desirable, however, to provide means for supporting the high tension line while the personnel is working upon it and also to be able to use the same elevating mechanism for the personnel carrier and for picking up, holding and lifting the work safely.

It is, accordingly, an object of the invention to enable heavy high-tension line conductors to be carried and handled safely.

A more specific object is to provide angularly and axially adjustable means supported by the personnel lift for handling the work and bringing it into the desired working position without first being required to bring the personnel to the potential of the high tension line conductors being worked upon.

Other and further objects, features and advantages will become apparent as the description proceeds.

In carrying out the invention in accordance with a preferred form thereof, a boom extension is provided which is secured to the same bucket support shaft which supports the personnel carrier and which is angularly and axially adjustable with respect thereto with a swivel hook at the end for supporting an energized line conductor.

A better understanding of the invention will be afforded by the following detailed description considered in conjunction with the accompanying drawings, in which:

FIG. 1 is a view in perspective of a personnel lift for energized line working, embodying the invention;

FIG. 2 is a fragmentary top view of the apparatus of FIG. 1 showing the end of the main boom or upper arm of the personnel lift and fragmentarily illustrating the extension boom;

FIG. 3 is a side elevation of the portion of the apparatus illustrated in FIG. 2;

FIG. 4 is an end elevation of the apparatus of FIGS. 2 and 3; and

FIG. 5 is a side elevation of the apparatus of FIG. 3 drawn to a smaller scale and showing different positions of the extension boom for illustrating the manner of angular adjustment.

Like reference characters are utilized throughout the drawing to designate like parts.

For energized working of high tension transmission lines personnel lifts have been proposed comprising jointed arms supported by mobile means such as a motor truck. An example is illustrated in FIG. 1 wherein the truck 11 is shown having a post 12 mounted thereon supporting an elevator including an insulated upper arm 13, the height of which may be controlled by suitable levers 14 manipulated by an operator 15 in one of two buckets or Faraday cages 16 and 17 mounted at the end of the arm 13 so as to be insulated from the ground and the motor truck 11. Such buckets or Faraday cages 16 and 17 are composed of or covered by electrically conducting material, such as metal, which is electrically connected by means (not shown) to a high tension line conductor 18 upon which work is to be done. In this

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manner the personnel are raised to the electrical potential of the conductor 18 and surrounded by an electrostatic field at the same potential so that they may safely work upon or handle the conductor 18 without utilizing insulated tools or gloves in handling or working upon the conductor 18.

In accordance with the present invention, easily adjustable means are provided for carrying or supporting the conductor 18 while the personnel are working upon it. This problem may arise, for example, in repositioning energized high tension conductors upon cross-arms of a pole line or tower line. For instance, if it should become necessary to replace a high tension insulator 19 or its supporting pin (not visible in the drawing) which may have become defective, it becomes necessary to lift the line 18 from the cross-arm 21. With long spans of heavy gage cable or conductors which are tightly strung, this involves too much force for accomplishment by the operator unaided by mechanical means. Accordingly, the arm 13 is provided with an insulated extension boom 22 having a swivel hook 23 at the end thereof for handling or carrying the energized high tension conductor 18.

As more clearly shown in FIGS. 2 and 3, the end of the arm 13 carries a transversely extending bucket support shaft 24 to which the buckets 16 and 17 are secured in a conventional manner not constituting a part of the present invention.

For enabling the extension boom 22 to be supported adjustably, a hub 25 carrying a support sleeve 26 is rotatably mounted upon the bucket support shaft 24 and a support plate 27 is fixed to the upper arm 13. Bolts 28 and 29 secure the support plate 27 to the upper arm 13. The support sleeve 26 is secured to the hub 25 by means of an ear member 31 which is welded to the hub 25 at weld lines 32 and to a channel 33 at weld lines 34. As shown more clearly in FIG. 4, the channel 33 in turn is welded to the support sleeve 26 at weld lines 35.

In the embodiment of the invention illustrated, the extension boom 22 comprises a fiber glass tube 22. The dimensions of the fiber glass tube 22 and the support sleeve 26 are such as to provide an easy slip fit enabling the tube or rod 22 to be axially moveable within the support sleeve 26. For fixing the axial position of the tube 22 in the sleeve 26, the tube 22 is provided with a plurality of transverse openings 36 spaced axially along the tube 22 and the sleeve 26 is also provided with a pair of transverse openings 37. A securing pin 38 having a head 39 for limiting movement and a handle 41 is provided, the pin 38 being adapted to pass through the openings 37 in the sleeve 26 and one of the set of openings 36 in the tube 22.

The support plate 27 has an end 42 bent over for securement to the upper arm 13 by the bolts 29, and has an arcuate portion 43. The arcuate portion 43 of the support plate 27 is provided with a series of angularly spaced holes 44 adapted to co-operate with a pair of holes 45 in lugs 46 secured to the support sleeve 26 and adapted to receive a pin 47 having a head 48 and a handle 49.

For pivotally securing the swivel hook 23 to the end of the insulated rod 22 a cylindrical cap or ferrule 51 is provided secured to the end of the rod 22 by angularly displaced bolts 52. Welded to the ferrule or cylindrical cap 51 is a transverse tubular bore member 53. The swivel hook 23 comprises a U-shaped member with parallel arms 54 and 55. The latter is received with a loose fit within the transverse bore member 53 of the ferrule 51. Collars 56 and 57 are provided at the ends of the parallel arms or members 54 and 55, respectively.

An additional collar 58 is provided on the arm 55 for locating the arm 55 within the bore member 53.

In order to permit locking the energized transmission line conductor 18 within the swivel hook 23 when desired, a hook closing pin 59 is provided. The collared ends of the parallel arms 54 and 55 are provided with transverse apertures 61 to receive the pin 59. The pin 59 in turn is arranged to be removably locked within the apertures 61 by providing at one end a head 62 and at the opposite end a hinged locking key 63. It will be understood that the locking key 63 is narrower than the aperture 61. It may be hinged to the end of the pin 59 in any desired manner. For example, the end of the pin 59 may be slotted to receive the locking key 63 and a transverse pivot pin 64 may be provided passing through and secured in suitable transverse openings in the split end of the pin 59 and the locking key 63. A spring loaded latch may be utilized instead of the through pin 59.

In using the extension boom 22, it will be understood that it is fixed by means of the removable pins 33 and 47 in such angular and longitudinal position as may be most convenient for the operation to be performed. When it is desired to lift the energized line 18 out of the position in which it is first found, the aerial lift including the upper arm 13 is manipulated by means of the levers 14 in such a manner as to bring the open end of the swivel hook 23 under the conductor 18, whereupon the lift is raised to cause the hook 23 to engage the energized line conductor 18. A flexible conductor (not shown) connected on one end to the metallic cage 16 or 17, depending on which operator is to perform the work, is then connected to the conductor 18 in order to bring the personnel carrying cage to the potential of the line conductor.

The operator then reaches over and passes the locking key 63 and the hook closing pin 59 through the apertures 61 until the locking key 63 clears the second aperture, whereupon it swings away from axial alignment with the pin 59 so as to prevent accidental retraction of the pin 59 from the aperture 61 in the swivel hook 23. Since the hook 23 swivels, the operation may be performed regardless of the alignment of the motor truck 11 with respect to the direction of the energized line conductor 18.

The conductor 18 is then lifted or lowered or moved transversely as the case may be manipulation of the levers 14 to cause the upper end of the upper arm 13 and the swivel hook 23 to move in the desired position. The strength of the operator is not required for handling the line 18 and his entire attention and both hands are left free to perform whatever work needs to be done upon the conductor 18.

While the invention has been described as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that the invention is not limited thereto, since various modifications will suggest themselves to those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In apparatus including an aerial lift and a personnel carrier for supporting a workman for working an energized line conductor which is supported above the earth in spaced relation thereto, a horizontal support shaft for the personnel carrier, an aerial lift arm carrying the support shaft, a hub adapted to be received over the support shaft, a support plate fixed to the lift arm, a support sleeve carried on the said hub, the hub being pivotal upon the support shaft, means for adjustably fixing the angular relationship between the support sleeve and the support plate, a fiber glass tube extending through the support sleeve, means for positioning the tube adjustably axially with respect to the support sleeve, and a swivel hook attached to the end of the fiber glass tube.

2. In apparatus including an aerial lift and a personnel

carrier for supporting a workman for working an energized line conductor which is supported above the earth in spaced relation thereto, a horizontal support shaft for the personnel carrier, an aerial lift arm carrying the support shaft, a hub adapted to be received over the support shaft, a support plate fixed to the lift arm, a support sleeve carried on the said hub, the hub being pivotal upon the support shaft, means for adjustably fixing the angular relationship between the support sleeve and the support plate, a rod composed of insulating material extending through the support sleeve, means for positioning the rod adjustably axially with respect to the support sleeve, and a swivel hook attached to the end of the rod.

3. Apparatus as in claim 2 wherein the insulating rod has a ferrule secured to the end thereof formed which a transverse bore and the swivel hook comprises a U-member with a pair of arms, one of which is pivotally mounted in said bore.

4. In apparatus for working an energized line conductor which is supported above the earth in spaced relation thereto, a boom and an extension thereof comprising an insulated rod with angularly adjustable means on the boom secured to the rod for supporting it on the boom and means secured to the end of the rod adapted to receive a conductor in supporting relation thereto.

5. In apparatus for working an energized line conductor which is supported above the earth in spaced relation thereto, a boom having an insulated end with a support shaft mounted thereon, a support plate secured to the boom end, a hub rotatably mounted upon the support shaft, the support plate being disposed arcuately with removable means for fixing the angular relation of the hub to the support plate, a support sleeve secured to the hub and an insulated rod received in said sleeve.

6. Apparatus as in claim 5 in which the insulated rod is tubular in form.

7. Apparatus as in claim 6 wherein the support sleeve has a pin receiving transverse aperture and the insulating tube has a series of transverse apertures axially spaced thereon adapted to receive pin means for adjustably fixing the axial position of the insulating tube with respect to the support sleeve.

8. Apparatus as in claim 6 wherein the insulated rod has a swivel hook at the end thereof.

9. In apparatus for working an energized line conductor which is supported above the earth in spaced relation thereto, a boom capable of being elevated having an end insulated from the earth with a support shaft mounted thereon transversely, a support plate secured to the boom end, a hub rotatably mounted upon the support shaft, means for adjustably fixing the angular relation of the hub to the support plate, a rod transversely secured to the hub, and line engaging means at the end of the rod.

10. In combination a personnel lift and an extension boom for working an energized line conductor comprising a rod with angularly adjustable supporting means on the lift for supporting the rod and means for securing the rod thereto axially adjustable and a swivel hook at the end of the rod.

11. Apparatus as in claim 10 wherein the swivel hook comprises a member secured to the end of the boom, said member having an elongated tubular bore, and a U-shaped member with a pair of parallel arms, one of which is received in the bore member and the axis of which forms the swivel axis of the swivel hook.

12. Apparatus as in claim 11 wherein the U-shaped member has transverse openings at the ends of the arms and a removeable pin is adapted to be received in said openings and to extend transversely for closing the U, said pin having a head at one end and a locking key pivotally secured to the opposite end.

13. In apparatus for working an energized line conductor which is supported above the earth in spaced relation thereto, an insulated boom and an extension boom therefor comprising a rod with angularly adjustable means

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for supporting the rod on said first mentioned boom, means for securing the rod thereto axially adjustable, and a swivel hook at the end of the rod.

14. In an aerial lift for working overhead lines, the said lift including an arm arranged for movement at least in part in the vertical direction, means on the arm defining a horizontally extending shaft, hub means carried on the shaft for pivotal movement thereon, an elongate member supported by the hub means and carried thereby for pivotal movement in the vertical plane, and means for fixing the relative angular position of the elongate member with respect to the arm, the elongate member comprising a boom for carrying line apparatus from the lift.

15. An aerial lift in accordance with claim 14, including means pivotally supported at the extremity of the elongate member away from the arm in laterally moveable relation thereto for carrying line apparatus from the lift.

16. An aerial lift in accordance with claim 14 with a personnel carrier on the arm adjacent the extremity thereof, in which the several named means are positioned adjacent the personnel carrier and the last named means comprises a support plate fixedly positioned on the arm and having a series of openings concentric with the said shaft at a common radius therefrom, and locking means on the said hub means for engaging the openings, all for

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adjustment of the relative angular position of the elongate member from the personnel carrier.

17. An aerial lift in accordance with claim 14, in which the elongate member is carried in a tubular sleeve fixed to the hub means, the sleeve and elongate member extending in the longitudinal direction of the arm and the elongate member sliding in the sleeve, the elongate member having a series of openings in the axial direction thereof, and locking means on the said sleeve for engaging the openings, all for adjustment of the extension of the elongate member from the personnel carrier.

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