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(54) Personnel access lift boom

(57) A boom for a personnel access lift comprises at least two boom sections (9, 10), namely a first boom section (9), pivotally supported at a first pivot point (14) in the region of a first end thereof, and a second boom section (10) pivoted at a second pivot point (15) spaced from an end of said second boom section (10) upon a pivot in the region of the other end of said first boom section (9). A link (16) pivotally connects a first link point in the region of said end of the second boom section and a second link point (17) fixed relative to but spaced from the first pivot point (14), such that the link (16) extends at an angle across the length of the first boom section (9). Hydraulic means (19) are provided for moving the first boom section (9) about the first pivot point (14).

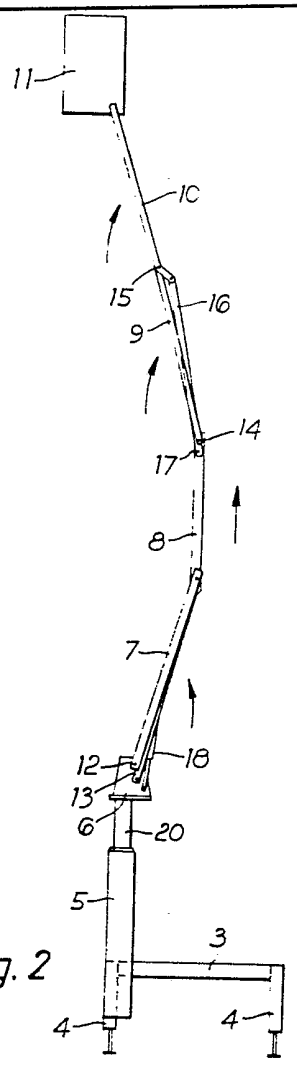

Fig. 2

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The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

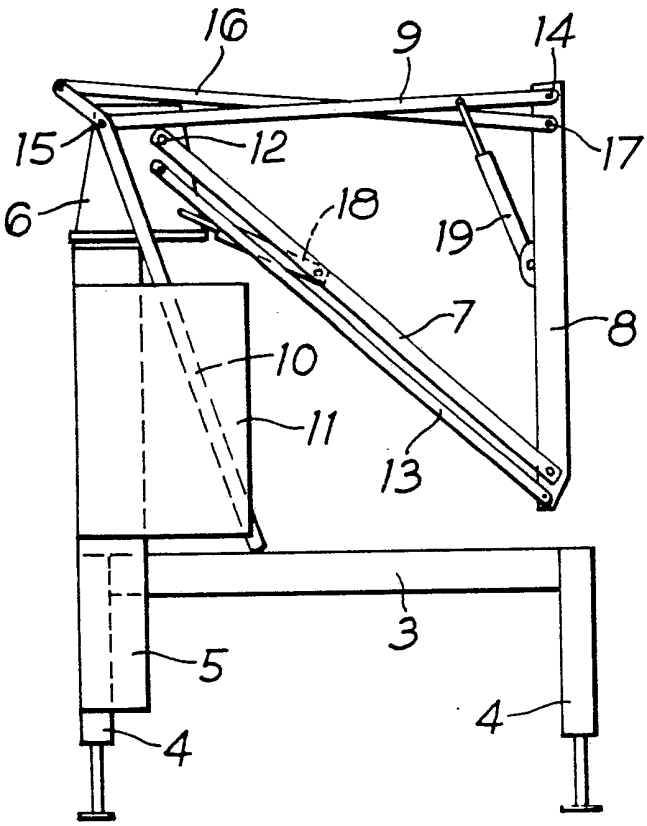
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Fig. 1

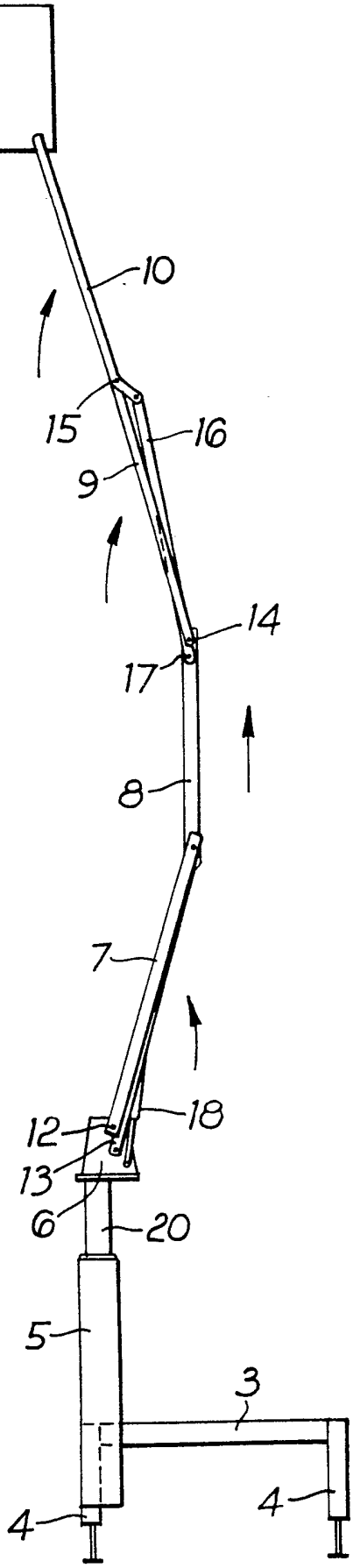
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Fig. 2

Personnel Access Lift Boom

The present invention is concerned with personnel access lifts, that is lifts of the type used to enable an operator to gain access to an elevated location to perform some task at that location. The invention is an improved boom for that purpose.

Personnel access lifts are available in many forms and a wide range of sizes, ranging from large commercial units to units which are small enough to be towed behind a car and manoeuvred manually. A major requirement is that all such lifts should be stable in use and in general safe in operation. In such lifts as comprise a boom having two or more sections articulated together, mutual pivoting of adjacent boom sections is usually achieved by means of hydraulically-operated rams. However the use of such rams entails the provision of control equipment, both to ensure that no rams, operated individually or together, can move the boom sections into an unstable configuration and also to insure against the consequences of hydraulic pressure failure. Each ram and associated control equipment adds significantly to both the cost and the weight of the lift overall.

It is an object of the present invention to provide a novel form of boom for a personnel access lift, by means of which at least one operating ram and its associated control equipment may be dispensed with.

The personnel access lift boom according to the present invention comprises a first boom section, pivotally supported at a first pivot point in the region of a first end thereof, a second boom section pivoted at a second pivot point spaced from an end of said second boom section upon a pivot in the region of the other end of said first boom section, a link pivotally connecting a first link point in the region of said end of said second boom section and a second link point fixed relative to but spaced from said first pivot point, such that said link extends at an angle across the length of said first boom section in at least a majority of relative positions of said first and second boom sections, and hydraulic means for moving said first boom section about said first pivot point.

By virtue of the link and in particular the disposition of the two link points between which it extends, pivoting of the first boom section about the first pivot point automatically gives rise to pivoting of the second boom section about the second pivot point in the same rotational direction. Thus the conventional need for hydraulic means to effect relative movement of the first and second boom sections no longer arises.

The personnel access lift boom may comprise more than two sections. Thus, for example, the two boom sections

referred to above may be directly mounted upon a suitable fixed or mobile base or they may comprise the uppermost two sections of a boom consisting of three or four sections. In one preferred form of the invention, the first boom section is pivoted at the upper end of a generally vertical boom section and the second link point is located upon the generally vertical boom section below the first pivot point. The generally vertical boom section may be retained in that orientation by means of a parallel motion linkage to the lift base. As an alternative, the first boom section may be pivoted at the upper end of a support column on the lift base, the second link point being located on the column below the first pivot point. The support column may be extensible vertically, for example telescopically extensible, to give further potential operating height to the access lift.

The first and second boom sections are pivoted together at a point (the second pivot point) spaced from the adjacent end of the second boom section. In a particularly preferred form of the invention, the second boom section extends at an angle to its length (that is, is cranked) beyond the second pivot point, so that the point of connection of the link (the first link point) is somewhat out of line with the length of the second boom section.

Preferably the link, by means of which pivoting of the second boom section is achieved, is a rigid link, for example in the form of a rod or flat bar. However the link may in appropriate forms of the invention be a flexible link such as

a cable. In such latter forms of the invention, it is essential that the second boom section be so pivoted that it is able to return to its inoperative or stowed position by gravity alone.

The hydraulic means for moving the first boom section about the first pivot point may take the form of a hydraulic ram, which extends between the first boom section and a point upon the support for that section. Thus, for example, when the boom comprises only two sections, the ram may operate between the first boom section and either the base of the lift or a column upon which that section is pivoted. When the first and second boom sections are parts of a boom having more than two sections, then the ram may operate between the first boom section and a lower boom section upon which said first section is pivoted. Advantageously, the hydraulic driving power for operating the access lift may be provided by some form of power take-off from an adjacent vehicle, for example a vehicle by means of which a mobile access lift is towed or a vehicle upon which the lift is mounted.

The uppermost boom section will carry at its upper end a platform or cage to carry the operator. It is highly desirable that a self-levelling mechanism be provided to maintain the platform level at all positions of the boom assembly. Such self-levelling mechanisms, for example tie-rods linking the platform to another part of the lift structure, are already known per se.

Operation of the lift is preferably effected from controls located on the platform or cage, so that an operator may enter the cage and elevate the latter and adjust its spatial position from within the cage. As a less preferred alternative which requires a second operator, the movement of the booms and cage may be controlled from a position at the base of the lift.

The invention will now be further described by way of example with reference to the accompanying drawings, wherein:-

Fig. 1 illustrates, in elevation from the rear, one embodiment of personnel access lift incorporating a lift boom according to the present invention, the lift being shown in a stowed condition; and

Fig. 2 illustrates, in elevation from the rear and to a somewhat smaller scale, the lift of Fig. 1 in a fully-extended condition.

The illustrated personnel access lift is designed for mounting upon a vehicle chassis and is formed upon a base frame comprising two cross-members 3, together carrying a lifting jack 4 at each end. The cross-members 3 are intended to be mounted transverse to the length of a vehicle chassis, such that the jacks 4 may be extended downwardly into contact with the ground on opposite sides of the chassis when the lift is to be brought into use. Projecting vertically from the cross-members 3, at one side, preferably the nearside, of the vehicle is a column 5, which is telescopically extensible under hydraulic pressure. The upper end 6 of the column 5 is

at a level, when the column is contracted, which would be a little above the top of a cab of the vehicle. The boom assembly is carried upon that column end 6.

The boom assembly is in four sections 7, 8, 9 and 10 and carries at its uppermost end (when extended) a personnel cage 11. The lowermost boom section 7 is pivoted at one end at a pivot point 12 on the column end 6 and carries at its other end the vertical boom section 8. Parallel to the boom section 7 and also linking the column end 6 and the boom section 8 is a rigid link 13, which holds the boom section 8 vertical whatever the position of the boom section 7. In the stowed position of the boom assembly, as illustrated in Fig. 1, the vertical boom section 8 is located above the cross-members 3 at the opposite end of the cross-members to the column 5 and the lowermost boom section 7 lies across the vehicle at an angle of the order of 45° to the horizontal.

Pivoted at 14 (the "first pivot point" of the foregoing general description) on the upper end of the vertical boom section 8 is the boom section 9 (the "first boom section" of the foregoing general description). On the other end of the boom section 9, the uppermost boom section 10 (the "second boom section") is pivoted at 15 (the "second pivot point"). The pivot 15 is spaced a short distance from the extreme end of the boom section 10, which latter section is bent at a small angle from the straight in the region of the pivot 15. A rigid link 16 connects the end of the boom section 10 to a point 17 on the vertical boom section 8 slightly below the

pivot 14. A self-levelling mechanism (not shown) is provided to ensure that the cage 11 remains level in all positions of the boom assembly.

Pivoting of the boom section 7 about the pivot point 12 is effected by a hydraulic ram 18; pivoting of the boom section 9 about the pivot point 14 is effected by a hydraulic ram 19 (omitted from Fig. 2). As is explained hereinafter, no ram is required to operate the uppermost boom section 10, as this is achieved by means of the link 16.

In extending the assembly from the stowed position of Fig. 1 to the extended position of Fig. 2, the operator enters the personnel cage 11 at vehicle level and then first extends the column 5 to a desired upward extent, for example until the column head 6 is clear of the vehicle cab. The head 6 is able to rotate relative to the inner shaft 20 of the column if desired. Next the ram 18 is operated to swing the boom section 7 upwards and thereby to raise the vertical boom section 8 to a higher operating position. Operation of the ram 19 now swings the boom section 9 upwards. By virtue of the link 16, this action also causes the uppermost boom section 10 to pivot in a clockwise direction as illustrated about the pivot 15, thus raising the personnel cage 11 to its desired operating height.

It will be apparent that the link 16 replaces a hydraulic ram which would otherwise be required to swing the boom section 10 into its upwardly-extending operating position. The opportunity to omit a hydraulic ram and its associated control equipment from the design represents a significant potential saving of weight and of cost as compared with a comparable conventional

personnel access lift.

It is a further advantage of the access lift boom according to the invention that it is possible to achieve an increase in operating height relative to a comparable conventional boom, without any significant increase in the lateral out-reach required to achieve that height.

CLAIMS

1. A boom for a personnel access lift, which boom comprises a first boom section, pivotally supported at a first pivot point in the region of a first end thereof, a second boom section pivoted at a second pivot point spaced from an end of said second boom section upon a pivot in the region of the other end of said first boom section, a link pivotally connecting a first link point in the region of said end of said second boom section and a second link point fixed relative to but spaced from said first pivot point, such that said link extends at an angle across the length of said first boom section in at least a majority of relative positions of said first and second boom sections, and hydraulic means for moving said first boom section about said first pivot point.

2. An access lift boom as claimed in claim 1, comprising only said two boom sections, said first boom section being directly mounted upon a fixed or mobile base.

3. An access lift as claimed in claim 1, comprising only said two boom sections, said first boom section being pivoted at the upper end of a support column on a fixed or mobile base.

4. An access lift boom as claimed in claim 3, wherein said support column is extensible vertically.

5. An access lift boom as claimed in claim 1, comprising three or four boom sections, wherein said first and second boom sections are the uppermost thereof.

6. An access lift boom as claimed in any of the preceding claims, wherein said second boom section extends at an angle to its length beyond the second pivot point.

7. An access lift boom as claimed in any of the preceding claims, wherein said link is a rigid rod or a flat bar.

8. An access lift boom as claimed in any of the preceding claims, wherein said hydraulic means is a hydraulic ram.

9. An access lift boom substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

10. A personnel access lift comprising a boom as claimed in any of the preceding claims.

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