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## (54) Vehicle-mountable access lift.

(57) A personnel access lift for mounting upon a vehicle (9, 10) comprises an access platform or cage (21) carried upon a lift assembly which comprises at least two articulated booms (13, 15, 17, 18) and is adapted to be so mounted upon a vehicle (9, 10) that said two articulated booms (13, 15, 17, 18) are stowable together transverse to the length of the vehicle.

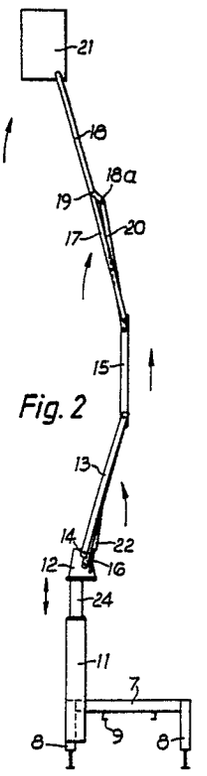


Fig. 2

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# Vehicle-mountable Access Lift.

The present invention is a lift of the type used to enable an operator to gain access to an elevated location and is mountable upon a vehicle.

Vehicle-mounted personnel access lifts currently available occupy a substantial proportion of the normal load-carrying area of the vehicle or entail structural features which impede normal use of the load-carrying area. Thus one existing form of such a lift comprises a combination of lifting booms which are disposed along the centre line of a lorry chassis and lie parallel to the length of the vehicle; thus little if any of the lorry remains available for carrying goods or personnel.

An alternative available vehicle-mounted personnel lift is based upon a closed van. Again the lifting booms are disposed lengthwise of the vehicle but usually above the roof of a conventional van body and usually extending to at least a small extent rearward of the body. The boom assembly is mounted upon the top of a vertical column, which in turn is mounted upon the vehicle chassis and extends upwardly through the body interior. Thus use of the van interior in a conventional way is impeded and significantly restricted.

It is an object of the present invention to provide a vehicle-mountable personnel access lift wherein the use of the load-carrying area of the vehicle for stowing and/or supporting the lift is minimised.

According to the present invention, the access lift comprises an access platform or cage carried upon a lift assembly which comprises at least two articulated booms and is adapted to be so mounted upon a vehicle that said two articulated booms are stowable together transverse to the length of the vehicle. In this way, the lift assembly may be stowed, when not in use, in a transverse position immediately behind the driving cab for the vehicle or, less desirably, at the rear of the load-carrying surface. Thus the remaining load-carrying area is unimpeded or is impeded to a minimum extent.

As one feature of the present invention, it is desirable for the boom assembly upon which the lift is based to be made as compact as possible and to that end it is desirable that none of the booms be longer than can be accommodated within the width of the vehicle. This does not necessarily mean that each boom must be shorter than the vehicle width, since a longer boom may be accommodated by inclining it relative to the horizontal in its stowed position. It is particularly preferred, and also advantageous, for the lowermost boom (and thereby the whole boom assembly) to be pivotally mounted at a point lying above one side of the vehicle chassis, either at the level of the load-carrying surface or at a level elevated above that surface. Maximum lift elevation is achievable with a minimum of total boom length if the lift assembly is pivotally mounted at such a point above the load-carrying surface, for example at the upper end of a vertical column fixed to the vehicle chassis. Advantageously, such a vertical column may be telescopically extensible.

An advantage of mounting the boom assembly at the top of a telescopic vertical column is that the operating height of the lift may be increased by extending the column. However, an important further advantage is that, by extending the column telescopically as the first step in using the access lift, the boom assembly may be raised to a level at which it can be operated freely without any risk of impeding adjacent pedestrians or road traffic. A further advantage of a telescopic column is that, by extending the column, the point of attachment of the boom assembly to the vehicle may be raised to above the height of the vehicle cab, thereby permitting, if desired, rotation of the assembly about a vertical axis to enable the lift to extend in directions other than across the length of the vehicle.

When the point of attachment of the boom assembly is at a level significantly higher than the load-carrying area, it is preferred that the lowermost boom in the assembly be so pivoted about a horizontal pivot at the point of attachment that said lowermost boom may adopt a downwardly-inclined position, for example extending at an angle of the order of fortyfive degrees downwardly across the width of the vehicle towards the chassis. In this way, a particularly compact orientation of the assembly may be achieved when the latter is stowed.

A particularly preferred form of the personnel access lift according to the invention includes a generally vertical boom, displaced across the width of the vehicle from the point of attachment of the assembly to the vehicle and linked to the vehicle by a parallel-motion linkage, whereby said vertical boom will retain its generally vertical orientation throughout operation of the access lift. For example, when the assembly is pivotally mounted at the upper end of a fixed or telescopic vertical column, the lowermost boom may extend downwardly from the upper end of that column to the lower end of the vertical boom, and a link running parallel to the lowermost boom may ensure that the vertical boom remains parallel to the column at all times. Such a vertical boom may if desired also be telescopically extensible.

The boom assembly may be made particularly compact in its collapsed or stowed condition by arranging that at least one of the booms, for exam-

ple the uppermost boom, is off-set relative to a lower boom or relative to said optional vertical column along the line of mutual pivoting of said upper and lower booms.

In general, the lift may usefully be hydraulically operated. For example, at least one of the pairs of articulated booms and/or the lowermost boom and said optional vertical column may be caused to pivot relative to each other by means of a hydraulic ram extending between them. Advantageously, the hydraulic driving power for operating the lift may be provided by some form of power take-off mechanism from the vehicle engine. However in one form of the invention described in greater detail below with reference to the accompanying drawings, at least one such hydraulic ram is dispensed with by providing a mechanical linkage between, for example, the uppermost pair of booms such that upward pivotting of one of the booms automatically pivots the other boom upwardly about their mutual pivot.

The uppermost boom 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 the level of the vehicle surface.

The access lift according to the present invention may be custom-made for a particular make of lorry or van or may even be built with the vehicle itself. However it is envisaged as being particularly suitable for designing as a conversion or modification unit or kit for addition to a standard vehicle chassis after manufacture of the latter. For example, the whole lift structure, including if desired an aforesaid vertical column, may be built upon one or more cross-members designed to be mounted across an existing vehicle chassis. Preferably such a cross-member or members is provided with a lift-jack at each end, which may be extended downwards into contact with the adjacent ground surface to provide extra stability to the personnel lift when it is to be used. Such a self-contained unit for attachment to a vehicle chassis may be sold or shipped as such, for example overseas, to a factory where vehicles are produced or to a workshop in which vehicle modifications are carried out.

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

Fig. 1 is a view in elevation, from the rear of a vehicle, of one embodiment of the personnel lift according to the invention in a stowed condition;

Fig. 2 is a view corresponding to Fig. 1, showing the lift in an extended condition;

Fig. 3 is a view of the personnel lift of Fig. 1 from the side; and

Figs. 4 to 6 show in outline plan view three ways in which the lift of Figs. 1 to 3 may be located on a van relative to the van body.

Referring firstly to Figs. 1 to 3, the base frame of the personnel access lift comprises two cross-members 7, together carrying a lifting jack 8 at each end and secured across the chassis 9 of a vehicle, immediately behind the driving cab 10. Projecting vertically from the cross-members 7, at the nearside of the vehicle, is a column 11, which is telescopically extensible under hydraulic pressure. The upper end 12 of the column 11 lies, when contracted, somewhat above the height of the top of the cab 10; that upper end 12 carries the boom assembly.

The lowermost boom 13 is pivotted at one end at pivot point 14 on the column end 12 and carries at its other end a vertical boom 15. Parallel to the boom 13 and also linking the column upper end 12 and the boom 15 is a link 16, which holds the boom 15 vertical whatever the position of the boom 13. In the stowed position of the boom assembly, as shown in Fig. 1, the vertical boom 15 is located above the cross-members 7 at the opposite side of the vehicle to the vertical column 11 and the boom 13 lies across the vehicle at an angle of the order of 45° to the horizontal.

Pivoted upon the upper end of the vertical boom 15 is a boom 17, to the upper end of which the uppermost boom 18 is pivoted at 19. A cranked extension 18a of the boom 18 is linked to the vertical boom 15 by a link 20. The effect of the link 20 is that, when the boom 17 pivots clockwise relative to the vertical boom 15, the uppermost boom 18 pivots in the same direction relative to the boom 17. At the upper end of the boom 18 is located a personnel cage 21. A self-levelling mechanism (not shown) is provided to ensure that the cage 21 remains level in all positions of the boom assembly.

Relative pivotting of the lowermost boom 13 and the vertical column 11 is effected by a hydraulic ram 22 and pivotting of the boom 17 relative to the vertical boom 15 is effected by a hydraulic ram 23 (not visible in Fig. 2). Pivotting of the uppermost boom 18 is effected by the link 20.

In extending the assembly from the stowed position of Fig. 1 to the extended position of Fig. 2, the operator enters the personnel cage 21 at ve-

hicle level and then first extends the column 11 to a desired upward extent until the column head 12 is at least well clear of the cab 10. The head 12 is able to rotate relative to the inner shaft 24 of the column if desired. Next the vertical boom 15 is raised to or towards its intended working height, an operation which entails very little lateral movement of the booms beyond the width of the vehicle. Finally, by means of booms 17 and 18, the cage 21 is moved into its desired working position, slewing the assembly around the column 11 as axis if desired.

Figs. 4 to 6 show an assembly such as described above mounted upon a van. In Figs. 4 and 5, the assembly is located between the cab 10 and van bodies 25 and 26 respectively, body 26 being partially extended forward at 27 to increase its capacity as compared with body 25. In the version shown in Fig. 6, the assembly is located at the rear of the van, behind the body 28.

As is readily apparent, the illustrated embodiment of the invention is a very compact personnel lift, which can be mounted on a vehicle with minimum adaptation of the vehicle and with very little demand on load-carrying capacity, but which can extend to a substantial height relative to the height of the vehicle.

## Claims

1. A personnel access lift for mounting upon a vehicle, comprising an access platform or cage (21) carried upon a lift assembly which comprises at least two articulated booms (13, 15, 17, 18), characterised in that said lift assembly is adapted to be so mounted upon a vehicle (9, 10) that said two articulated booms are stowable together transverse to the length of the vehicle.

2. A personnel access lift according to claim 1, characterised in that said assembly is constructed upon one or more cross-members (7), adapted for attachment across a vehicle and provided with a lift-jack (8) at each end for contact with the adjacent ground surface.

3. A personnel access lift according to claim 1 or 2, characterised in that said lift assembly is mounted upon a vehicle immediately behind the driving cab (10).

4. A personnel access lift according to any of claims 1 to 3, characterised in that the lowermost boom (13) is pivotally mounted, for pivoting about a generally horizontal axis, at a point (14) above one side of the vehicle.

5. A personnel access lift according to claim 4, characterised in that said lowermost boom (13) is pivotally mounted at the upper end of a vertical column (11).

6. A personnel access lift according to claim 5, characterised in that said vertical column (11) is telescopically extensible.

7. A personnel access lift according to claim 6, characterised in that said lowermost boom (13) is mounted for pivoting also about a generally vertical axis.

8. A personnel access lift according to any of claims 4 to 7, characterised in that said lowermost boom (13) is stowable in a downwardly-inclined position.

9. A personnel access lift according to any of the preceding claims, characterised in that it includes a generally vertical boom (15), displaced across the width of the vehicle from the point of attachment of the lift assembly to the vehicle and linked to the vehicle by a parallel-motion linkage (13, 16) to retain said generally vertical orientation.

10. A personnel access lift according to claim 9, characterised in that one end of the lowermost boom (13) is mounted at the upper end of a telescopically extensible vertical column (11) and said generally vertical boom (15) extends upwardly from the other end of said lowermost boom (13).

11. A personnel access lift according to claim 9 or 10, characterised in that said generally vertical boom (15) is telescopically extensible.

12. A personnel access lift according to any of the preceding claims, characterised in that at least one boom (13, 15, 17, 18) is off-set relative to a lower boom (13, 15, 17) or to a said vertical column (11) along their line of mutual pivoting (14, 19).

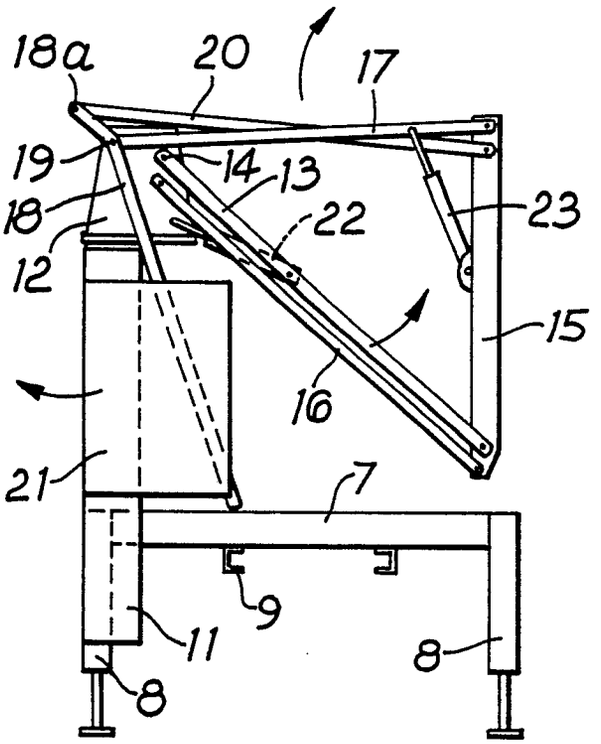


Fig. 1

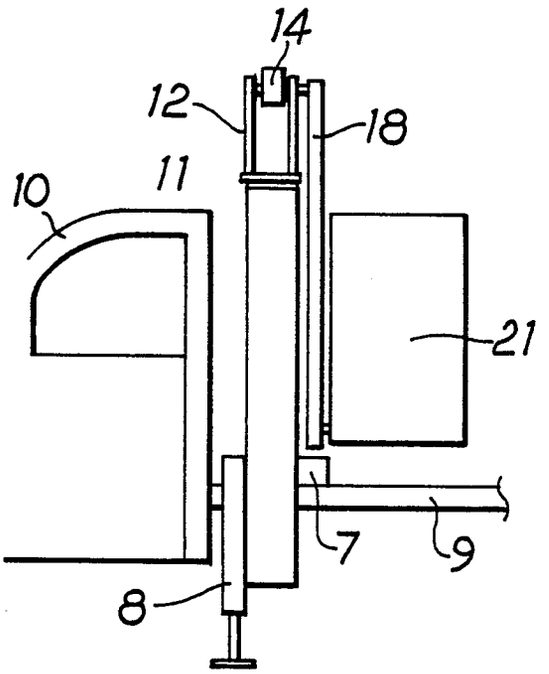


Fig. 3

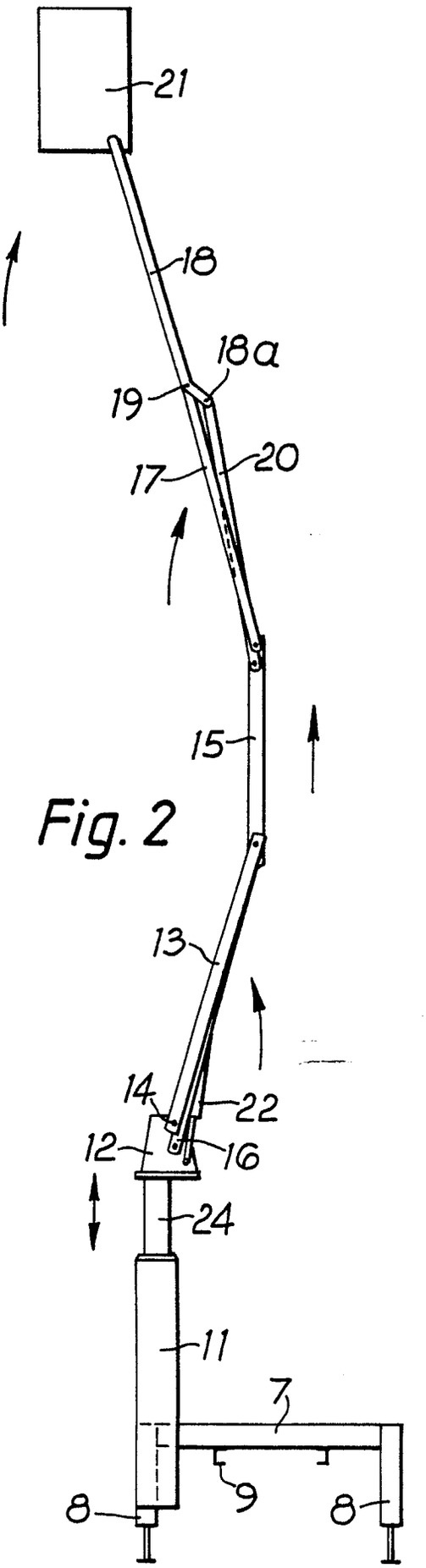


Fig. 2

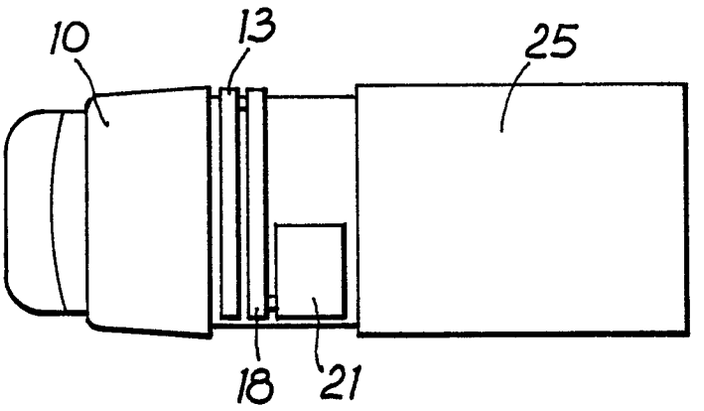


Fig. 4

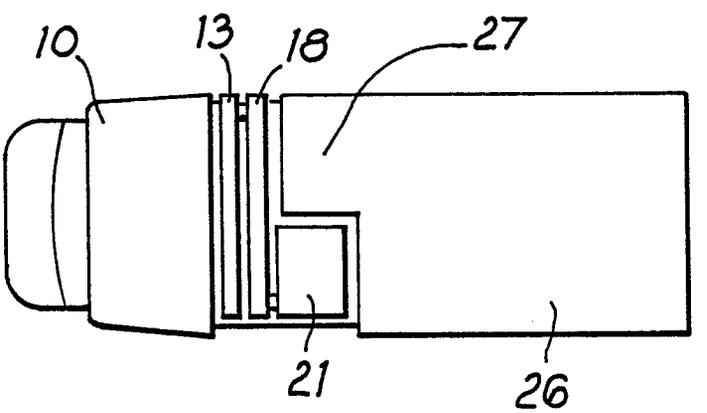


Fig. 5

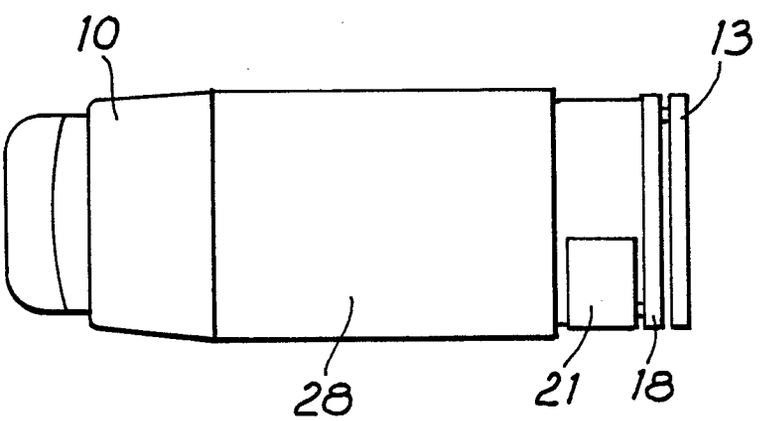


Fig. 6

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# EUROPEAN SEARCH REPORT

Application Number

EP 88 30 2815

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
|---|---|---|---|
| X<br>Y | GB-A-1 325 474 (V.P.T.I.T.M)<br>* Page 2, lines 27-39,95-103 * | 1<br>2,3,4,5,8,9,12 | B 66 F 11/04 |
| Y | GB-A-1 431 980 (MERRICK)<br>* Whole document * | 2,4,5,8,9,12 | |
| Y | US-A-3 132 718 (PIERCE)<br>* Figures 1,2 * | 3 | |
| A | DE-B-1 137 189 (GEORG ROBEL & CO)<br>* Column 2, lines 25-39 * | 5,6,7 | |
| A | FR-A-2 085 928 (TRANCHERO)<br>* Page 2, lines 35-38; page 3, lines 1-13; figure 1 * | 5,7,8,9,11 | |
| A | FR-A-1 440 808 (ORENGE) | | |
| A | DE-A-3 540 630 (SJÖLANDERS SMIDES & MEK VERKSTAD) | | |

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 66 F
E 01 D
B 66 C

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 07-07-1988 | VAN DEN BERGHE E.J.J. |

CATEGORY OF CITED DOCUMENTS

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