# United States Patent

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[54] **DUAL PLATFORM VEHICLE LIFT SYSTEM**
**14 Claims, 9 Drawing Figs.**


[52] U.S. Cl. ..... 182/63, 182/131, 182/141
[51] Int. Cl. ..... E04g 1/22
[50] Field of Search ..... 182/131, 141, 63, 113, 178



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**ABSTRACT:** A vehicle lift system comprises a main platform which is raised to a first height by an elevator system carried by the vehicle, said main platform carrying on its upper surface an auxiliary platform which may be raised from a position substantially flush with said main platform to a level above that of the main platform.

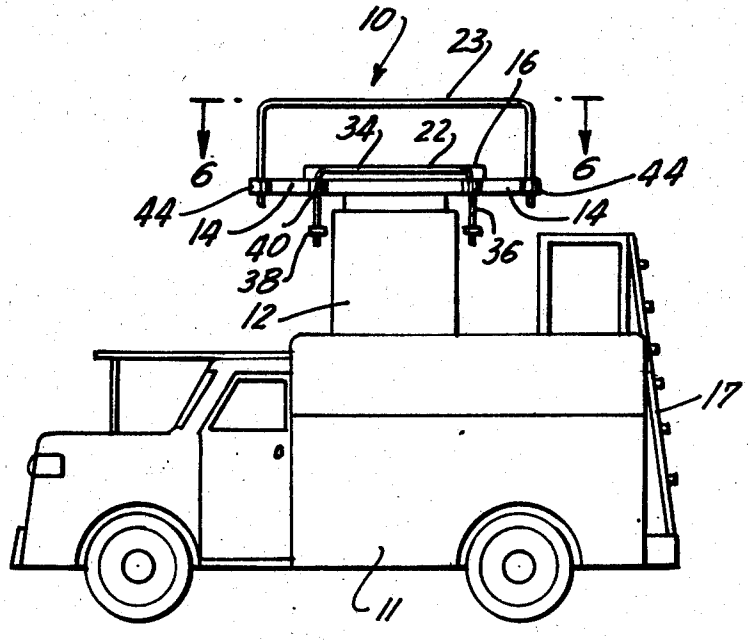
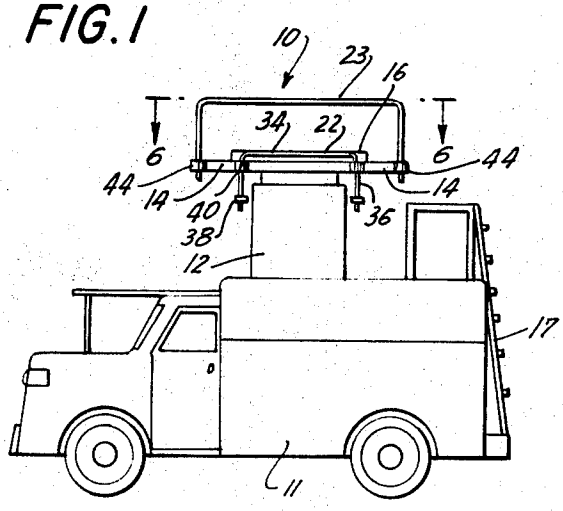



FIG. 1



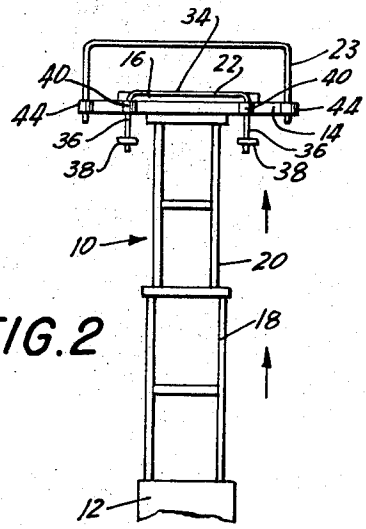




FIG. 2

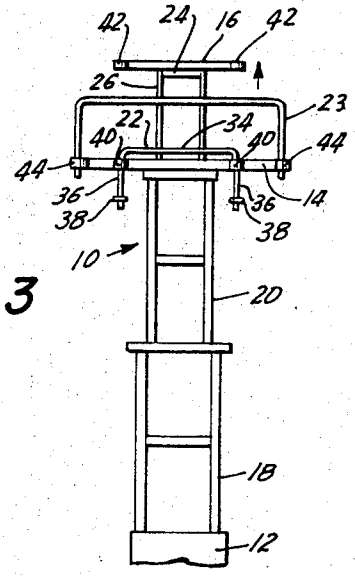



FIG. 3

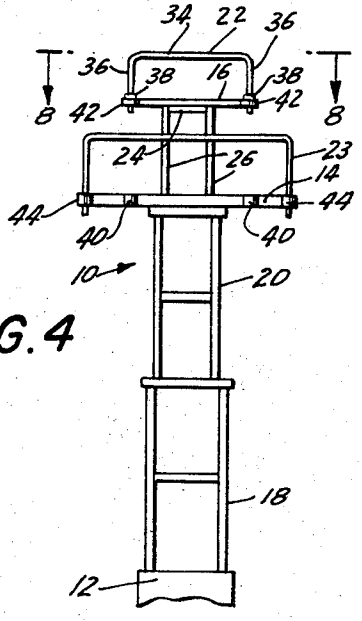



FIG. 4

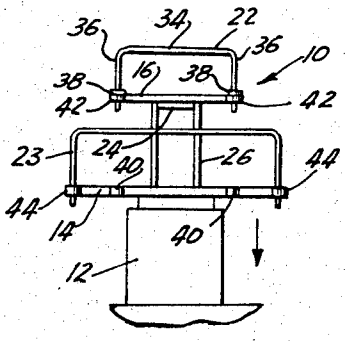
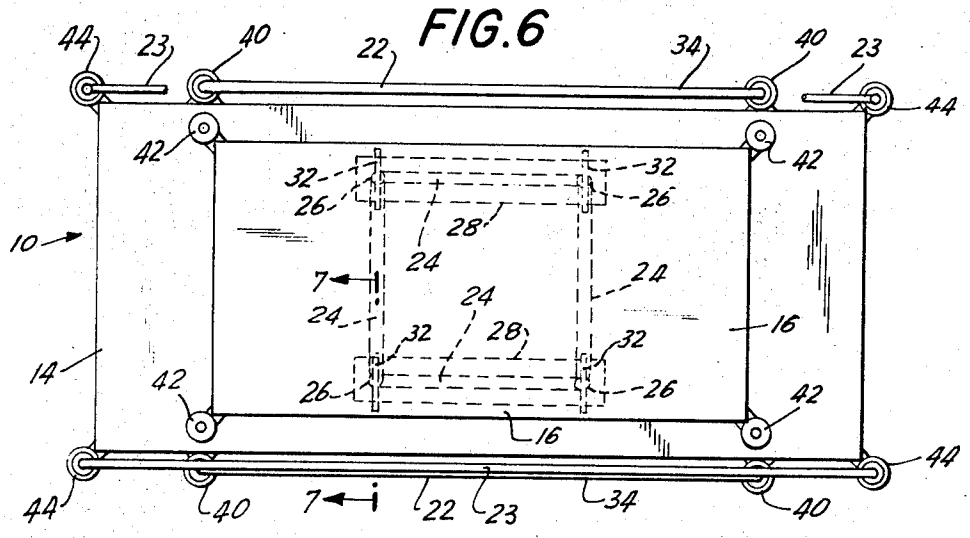



FIG. 5

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FIG.6



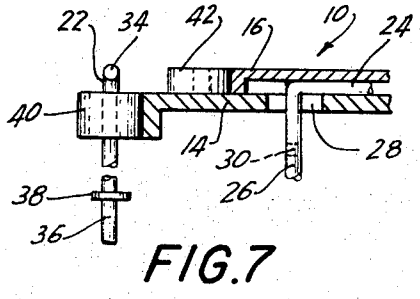




FIG.7

FIG.9

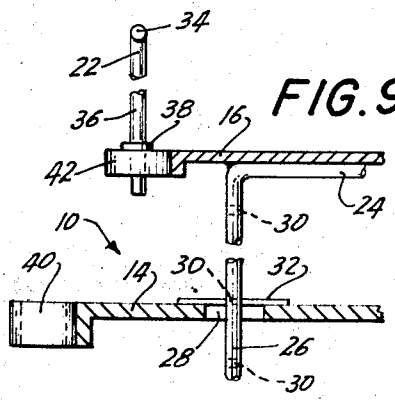
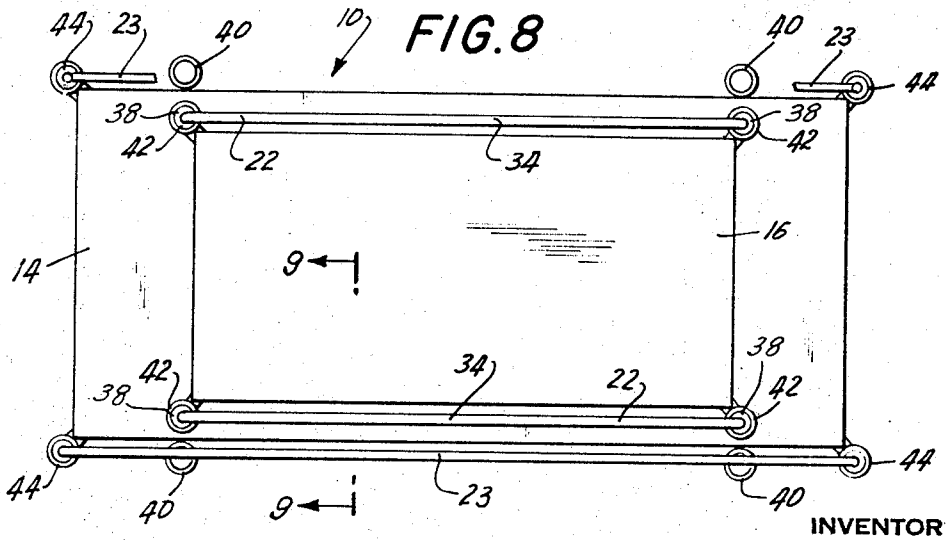



FIG.8




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# DUAL PLATFORM VEHICLE LIFT SYSTEM

The present invention relates to a lift system and particularly to a lift system carried on a vehicle.

Vehicles, and particularly those used in the performance of maintenance work, such as on overhead transmission lines, the ceiling and walls of subway tunnels, and the like, are frequently provided with a lift system by means of which the maintenance worker can be elevated to a raised level at which the maintenance work is to be performed. The known lift systems generally include a platform which is carried and raised by a mechanical elevator lift apparatus which may be hydraulically or electrically operated.

The maximum elevation to which the platform may be raised is determined by the size of the elevator system. The greater the extent of this elevation the greater the complexity, size and power requirements of the elevator. Hence, as a matter of simple economics it would be very desirable if the elevator system for a given vehicle could be designed only with normal elevating requirements in mind, and if some other and considerably less costly means were provided to take care of extraordinary lifting requirements.

In many maintenance operations, the location of a particular difficulty may be at a level higher than that normally encountered, and hence too high for the normal elevator system carried by the maintenance vehicle. In the past when this has occurred, a special maintenance vehicle having an elevator system capable of raising its associated support platform to the required height had to be obtained or else special rigging was required. Either alternative was costly in and of itself, and quite time-consuming, this giving rise to very costly secondary effects.

It will, therefore, be readily seen that a lift system which increases the effective maximum elevation of the system without requiring an increase of the size and complexity of the elevator system will provide significant advantages both in operation and economy.

It is, therefore, a prime object of the present invention to provide a lift system in which the maximum effective operating level is increased in a relatively simple and inexpensive manner.

It is a further object of the present invention to provide a lift system of the type carried on a vehicle which extends the potential usefulness of the vehicle by increasing the maximum level to which the system may be raised without increasing the complexity of the elevating system.

It is yet a further object of the present invention to provide a vehicle lift system comprising a power elevator which increases the effective maximum level to which the system may be raised without increasing the size and power requirements of that power elevator.

It is another object of the present invention to provide a vehicle lift system comprising an auxiliary platform which may, when needed, be raised above the main platform.

To these ends, the present invention provides a dual lift system adapted to be carried on a vehicle such as a maintenance truck or train car. The system of this invention comprises a main platform which is carried by a conventional elevator system carried on the vehicle, which, when actuated, raises the main platform above the vehicle.

An auxiliary or insert platform is carried on the upper surface of the main platform, normally substantially flush therewith, and means are provided, when needed, to raise and retain the auxiliary platform at a level above the main platform, thereby to increase the maximum height at which the system may be utilized.

The main platform may be provided with an opening through which a support member carried by the auxiliary platform passes, the means for retaining the auxiliary platform at its raised level, in a preferred embodiment, comprising a pin which operatively engages the support member and the upper surface of the main platform. The main platform further preferably comprises means for stowing guard rails for the auxiliary platform while the system is either at rest or when only the main platform is being utilized. When the auxiliary platform is raised into its operating position its guard rails are removed from stowed position on the main platform and are placed in operative position on the auxiliary platform. The periphery of the auxiliary platform may lie completely within that of the main platform, as may the members provided thereon for supporting its guard rails when these rails are placed into operative position thereon.



To the accomplishment of the above, and to such other objects as may hereinafter appear, the present invention relates to a dual element vehicle lift system as defined in the appended claims and as described in this specification, taken together with the accompanying drawings, in which:

FIG. 1 is a side elevation of a vehicle in which the dual element lift system of the present invention is incorporated the main platform being shown in a lowered position;

FIG. 2 illustrates the lift system of FIG. 1 showing the manner in which the main platform is raised to a working position;

FIG. 3 illustrates the system of the present invention showing the auxiliary platform raised to its working position;

FIG. 4 illustrates the system of the present invention showing the guard rails operatively positioned on the auxiliary platform;

FIG. 5 illustrates the system of the present invention showing the main platform lowered to its inoperative position, the auxiliary platform being shown at its raised level above the main platform;

FIG. 6 is a top plan view taken in the direction of the arrows 6–6 of FIG. 1;

FIG. 7 is a cross-sectional view taken along the line 7–7 of FIG. 6;

FIG. 8 is a top plan view as viewed in the direction of the arrows 8–8 of FIG. 4; and

FIG. 9 is a cross-sectional view taken along the line 9–9 of FIG. 8.

Briefly described, the present invention relates to a lift system generally designated 10, carried on a vehicle such as a maintenance truck 11 as shown in FIG. 1. The rear portion of truck 11 carries an elevator system 12 operatively connected to the underside of a main platform 14, which in turn carries an auxiliary platform 16 on, and preferably substantially flush with, its upper surface. A ladder 17 is carried on the rear of truck 11 to enable the workman to climb onto platform 14 when the latter is in a lowered position as shown in FIG. 1.

The construction and manner of operation of elevator system 12, which may be either electrically or hydraulically operated, is conventional and as specifically shown herein, comprises a pair of telescoping members 18 and 20, the upper member 20 being secured to the underside of main platform 14.

In operation, the main platform 14 is first raised to its operating position by the actuation of elevator 12 (FIG. 2). If the maximum elevation to which platform 14 can be raised by the operation of elevator 12 is insufficient to reach the area of interest to the workman, the auxiliary platform 16 is then raised, either manually or by any other suitable means, and it is then retained at that raised position at a level above main platform 14 (FIG. 3). Once auxiliary platform 16 is placed in its operative raised position, a pair of guard rails 22, which during the raising of platforms 14 and 16 by elevator 12 was carried by the main platform 14, is placed in position on auxiliary platform 16 (FIG. 4) to protect the workman while he is standing on auxiliary platform 16. A guard rail 23 may be carried on either side of main platform 14 for the same protective purpose. Once the workman utilizing lift system 10 has completed his work assignment, the action of elevator 12 is reversed and lift system 10 is lowered to its normal or rest position (FIG. 5). The auxiliary platform 16 may be lowered to its original position flush with the main platform 14 at any time, or, if desired, and as illustrated in FIG. 5, it may remain in its elevated position, thus giving the vehicle a simultaneous two-level operation capability for any given level of the main platform 14.

The particular details of the embodiment of this invention disclosed herein are illustrated best in FIGS. 6—9. Auxiliary platform 16 carries on its underside a mounting or support member 24 in the form of a substantially square ring, four legs 26 depending substantially vertically from each corner of the square defined by member 24. The main platform 14 is provided with spaced openings 28 through which the legs 26 pass. As seen best in FIG. 9, each leg 26 is provided with a plurality of vertically spaced openings 30 extending completely through these legs.

When auxiliary platform 16 is raised above main platform 14 it is retained at its desired level by inserting a retaining pin 32 through selected ones of openings 30 of each leg 26. As shown in FIG. 9, pins 32 extend through and beyond openings 30 in legs 26 and engage or rest on the portion of the upper surface of main platform 14 on either side of opening 28. A pin 32 is placed through an opening 30 at each of the four legs 26 so that auxiliary platform 16 is effectively and securely retained in its raised position. The level to which auxiliary platform 16 is positioned above main platform 14 is determined by which of the openings 30, the pins 32 are passed through.

The guard rails 22 for the auxiliary platform 16 are carried preferably in stowed or standby condition, by main platform 14. Guard rails 22 each comprise a transverse member 34 and a pair of substantially vertical depending legs 36. Each leg 36 carries a collar or flange 38 at a position located above the end thereof. Main platform 14 has two pairs of spaced ring members 40 extending from opposite sides thereof, each ring member 40 having an inner diameter exceeding the diameter of flange 38 carried by legs 36. Auxiliary platform 16 has a ring member 42 extending from each corner thereof, the inner diameter of each ring member 42 being less than that of flange 38 although greater than that of legs 36. In this manner when guard rails 22 are carried on main platform 14, legs 36 and flanges 38 pass completely through ring members 40 (see FIG. 7), so that only the transverse leg 34 of guard rail 22 is above the main platform 14, that transverse leg lying substantially even with the upper surface of main platform 14. However, when guard rail 22 is placed into position on auxiliary platform 16, only the lower ends of legs 36 pass through the openings in ring members 42, the flanges 38 being unable to pass through these openings so that flanges 38 rests on the upper surface of ring members 42, thereby positioning transverse leg 34 above auxiliary platform 16, where it is effective to protect the workman standing on the platform. Once the operation at the elevated location has been completed and the lift system 10 has been lowered to its rest position, guard rail 22 may be removed from auxiliary platform 16 and restowed on main platform 14, legs 36 and flanges 38 once again passing through the relatively wide openings in ring members 40.

Main platform 14 is also provided with additional ring members 44 extending from each corner thereof which support guard rails 23. Also, it is preferred that the periphery of auxiliary platform 16 together with its ring members 42 is at all times within the periphery defined by main platform 14.

Thus, the present invention has provided an improved vehicle lift system which enables the use of the system for operations at increased levels without an increase in the size and power requirements of the elevator system conventionally utilized in the known systems. Moreover, for a given power positioning of the main platform a dual-level operating capability is achieved—two men can work simultaneously at different levels, or a man can shift from one level to another without having to operate the power elevator. The lift system of the present invention can be readily incorporated into existing lift systems to increase their usefulness by enabling them to be used at elevations which previously had been unattainable.

While only a single embodiment of the present invention has been herein specifically disclosed, it will be apparent that many variations may be made thereto without departure from the scope of the invention as described in the following claims.

I claim:

1. A dual element lift system adapted to be carried on a vehicle, said system comprising a vehicle, a first platform, means carried by said vehicle operatively connected to said first platform and effective when actuated to raise said first platform above said vehicle, a second platform supported on said first platform and capable of being raised from a first position in which said second platform rests on said first platform to a second position above said first platform, and means independent of said vehicle-carried means operatively engaging said first and second platforms and effective to retain said second platform in said second position above said first platform when said second platform is raised above said first platform.

2. The lift system of claim 1, in which said first platform is provided with an opening, said second platform comprising a support member passing through said opening, said retaining means comprising pin means effective to operatively engage said support member and said first platform, thereby to retain said second platform in said second position.

3. The lift system of claim 2, in which said support member is provided with a plurality of vertically spaced apertures for receiving said pin means therethrough, thereby to provide means for establishing a plurality of discrete levels of said second platform above said first platform.

4. The lift system of claim 3, comprising a guard rail having a transverse leg and a pair of substantially vertical legs depending therefrom, means on said first platform effective to carry said guard rail thereon, and means on said second platform effective to carry said guard rail thereon with said transverse leg at a position above said second platform.

5. The lift system of claim 4, in which said guard rail comprises a flange of a given diameter operatively connected to each of said depending legs at a position above the ends thereof, said first platform having a pair of spaced openings therethrough of a diameter greater than that of said flange, and said second platform having spaced openings therethrough of a diameter less than that of said flange and greater than that of said legs, thereby constituting said carrying means for said guard rail.

6. The lift system of claim 5, in which the periphery of said second platform lies entirely within the periphery of said first platform.

7. The lift system of claim 6, in which said carrying means provided on said second platform extends beyond the periphery of said second platform and lies within the periphery of said first platform.

8. The lift system of claims 7, in which said carrying means on said first platform extends beyond the periphery thereof.

9. The lift system of claim 1, in which said retaining means comprises a support member operatively connected thereto, said support member having an aperture therethrough, and pin means extending through said aperture and resting on the upper surface of said first platform, thereby to retain said second platform in said second position.

10. The lift system of claim 9, in which said support member is provided with a plurality of vertically spaced apertures for receiving said pin means therethrough, thereby to provide means for establishing a plurality of discrete levels of said second platform above said first platform.

11. A dual element lift system comprising a support, a first platform on said support, means operatively connected to said first platform and effective to retain said first platform above said support, a second platform supported on said first platform and capable of being raised form a first position in which said second platform rests on said first platform, to a second position above said first platform, and means operatively engaging said first and second platforms and effective to retain said second platform in said second position above said first platform when said second platform is raised above said first platform, a guard rail having a transverse leg and a pair of substantially vertical legs depending therefrom, means on said first platform effective to carry said guard rail thereon and means on said second platform effective to carry said guard

rail thereof with said transverse leg at a position above said second platform, said guard rail comprising a flange of a given diameter operatively connected to each of said depending legs at a position above the ends thereof, said first platform having a pair of spaced openings therethrough of a diameter greater than that of said flange, and said second platform having spaced openings therethrough of a diameter less than that of said flange and greater than that of said legs, thereby constituting said carrying means for said guard rail.

12. The lift system of claim 11, in which the periphery of said second platform lies entirely within the periphery of said first platform.

13. The lift system of claim 12, in which said carrying means provided on said second platform extends beyond the periphery of said second platform and lies within the periphery of said first platform.

14. The lift system of claim 13, in which said carrying means on said first platform extends beyond the periphery thereof.