

[54] **VEHICLE LIFT**

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[51] Int. Cl. **B66f 7/00**

[58] Field of Search **187/8.61, 8.62**

[56] **References Cited**

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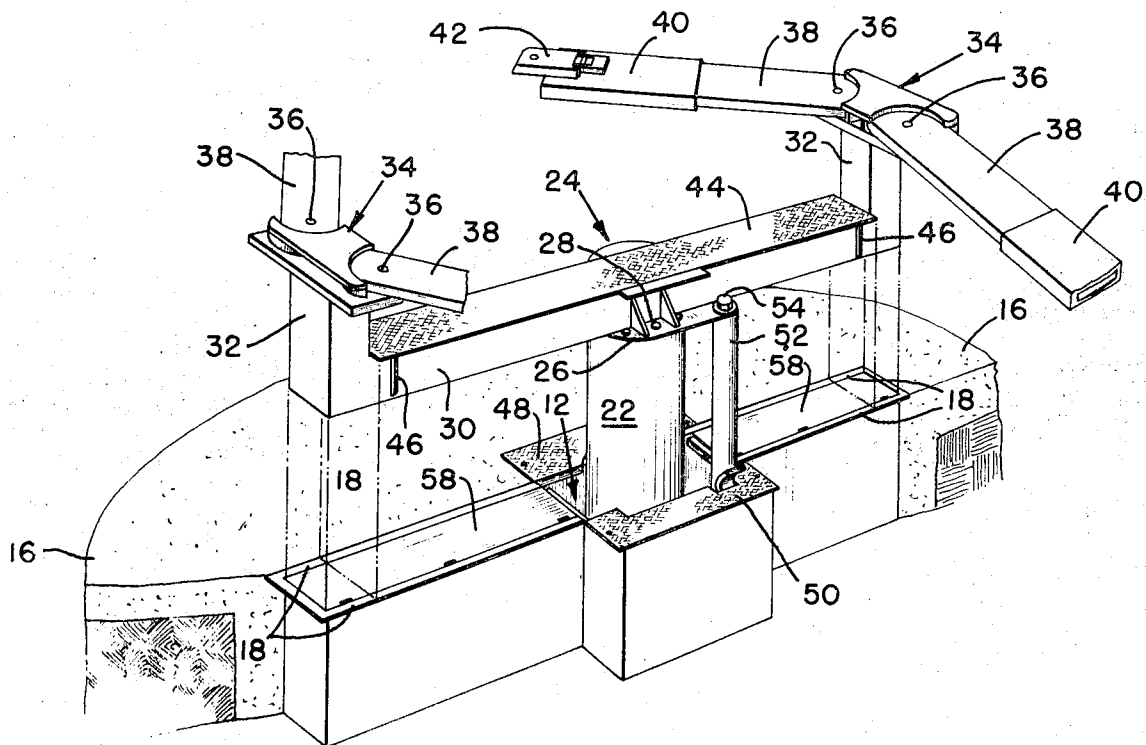
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[57] **ABSTRACT**

A lift for elevating vehicles above a floor surface includes a trench or box-like enclosure located below the floor surface and closure means for closing the enclosure when the lift is in the raised and lowered positions. A first cover means is normally positioned to close the enclosure when the lift is in the lowered position and is displaced by the lift superstructure when the lift is in the raised position. Second cover means, pivotally mounted within the box-like enclosure, are displaceable to an operative position wherein the enclosure is enclosed, by a series of displaceable arm members and the piston anti-rotation means upon raising of the lift.

9 Claims, 6 Drawing Figures



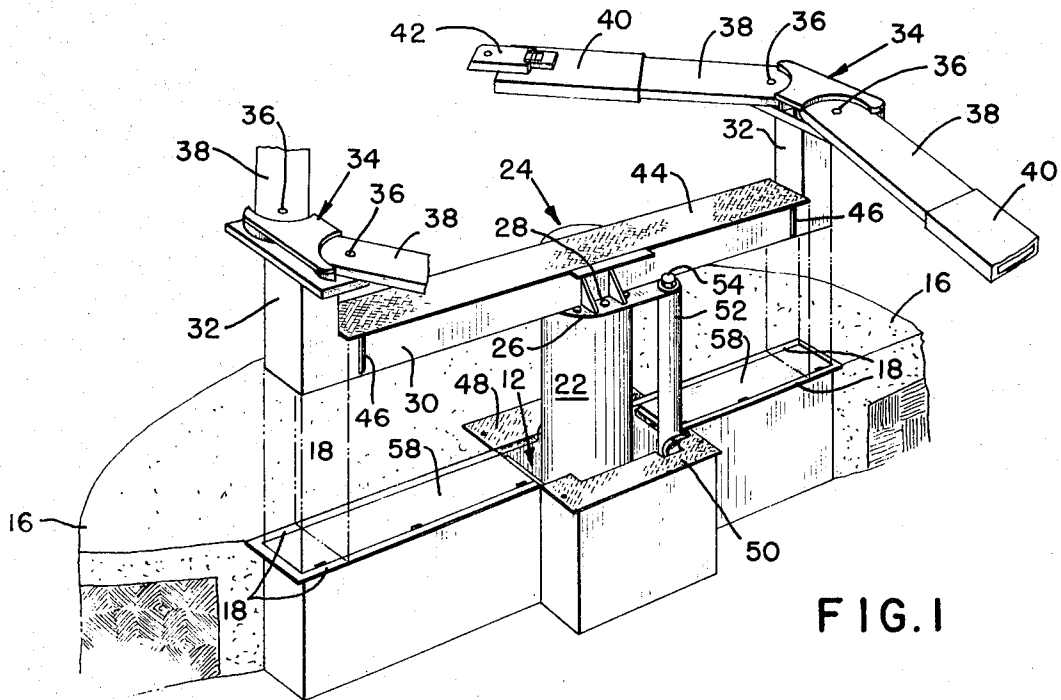


FIG. 1

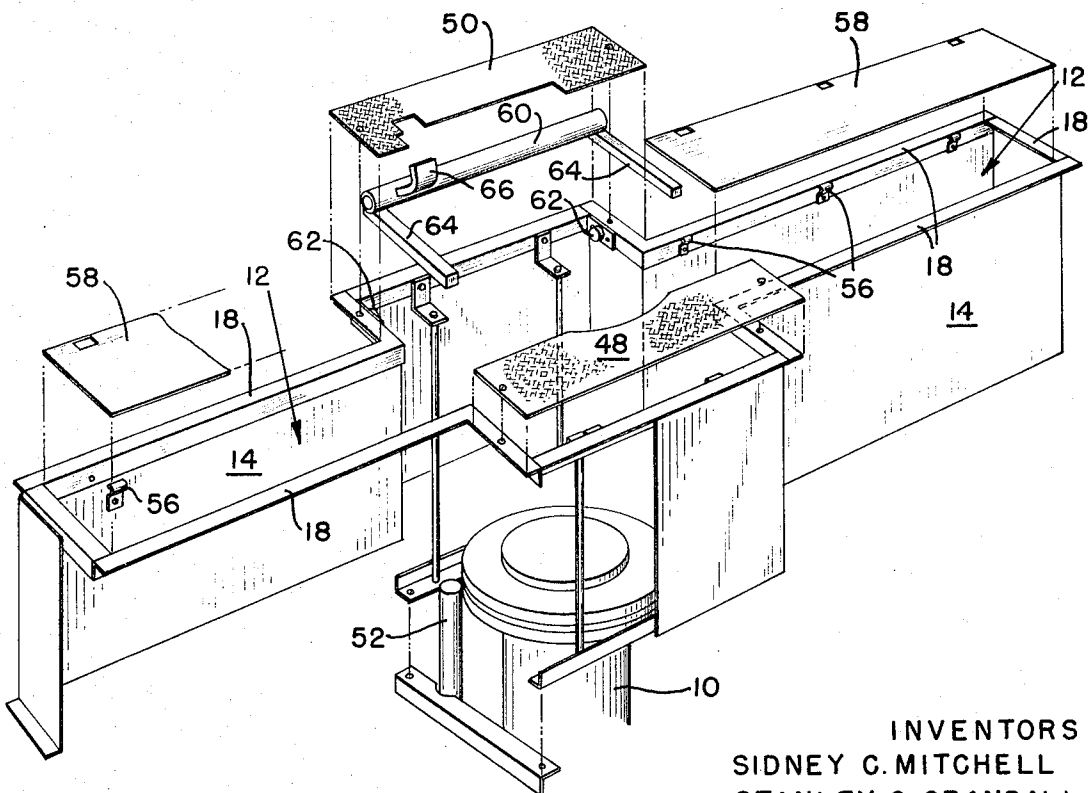
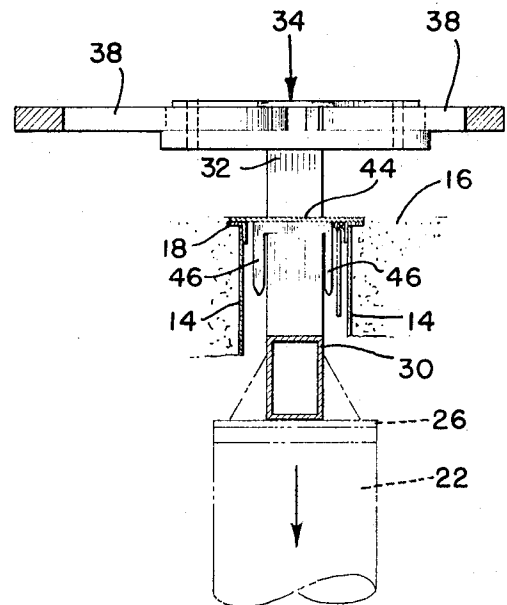
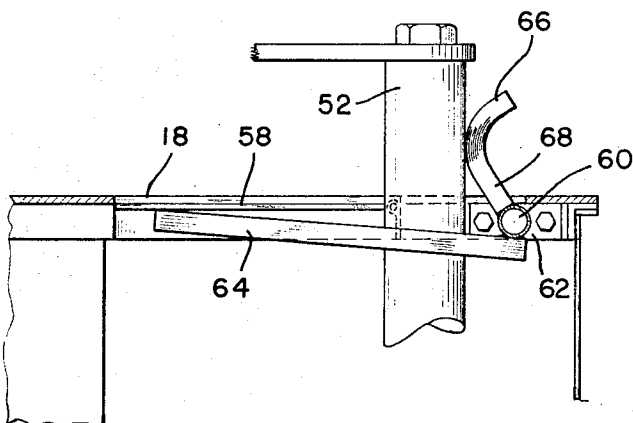
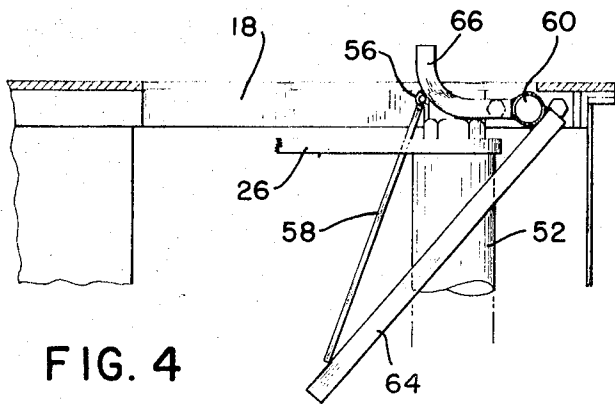
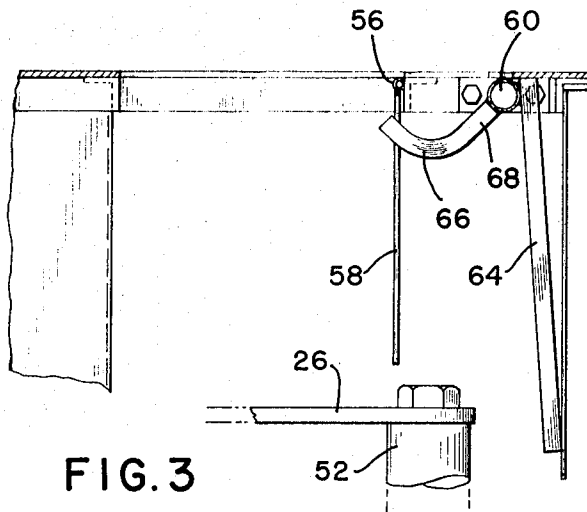


FIG. 2

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VEHICLE LIFT

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

This invention relates generally to vehicle lifts and more particularly to a mechanism for opening and closing an internal door of a trench box such that the trench or enclosure is covered when the lift is raised. The lift includes a cylinder secured within the trench, a piston movable vertically with respect to the cylinder, a cross beam secured to the upper end of the piston and vehicle supporting assemblies attached to the outer ends of the beam. With the lift in the lowered position, the piston and cross beam are received within the trench and the upper part of the trench is covered by a primary door or closure means. When the lift is raised, the primary door is carried upwardly by the cross beam leaving the trench open. However, the trench box opening is closed by one or more secondary doors or closure means which are pivotably mounted internally of the trench box. The secondary doors are pivoted from an inoperative position to an operative position by means of a pivot shaft which has a series of arms secured thereto. A single driving arm is activated upon displacement of a telescopic anti-rotation post or safety device which is displaceable with the lift piston. A plurality of arms aligned with each other and angularly disposed with respect to the driving arm are adapted to pivot upon rotation of the pivot shaft to urge the secondary doors from a vertically hanging position to a horizontally disposed position when they are substantially flush with the floor surface. In this position, the secondary doors are supported by their hinges and by the aligned arms. As the lift is lowered, the anti-rotation post moves downwardly along with the piston permitting the pivot shaft and arms to rotate downwardly allowing the internal doors to collapse against the side of the trench box thus opening the trench. Continued downward movement of the lift lowers the primary door to cover the trench box opening.

One of the primary objects of the invention is the provision of a vehicle lift which when in a raised or lowered position leaves the floor surface free of floor openings or hazardous obstructions.

Another object of the invention is the provision of door members, mounted within a trench box, adapted to be pivoted upwardly substantially flush with the floor surface upon raising of the vehicle lift.

Other objects and advantages of the invention will become apparent to those skilled in the art in the course of the following detailed description.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a perspective view of the vehicle lift with the cross beam and vehicle supporting members in a partially raised position, and with the primary door supported upon the cross beam and the secondary doors pivoted to an operative position wherein they are substantially flush with the floor surface;

FIG. 2 is an enlarged, exploded perspective view of the lift assembly illustrating the trench box, the fixed and displaceable secondary cover plates, the cylinder assembly, and the mechanism for displacing the secondary cover plates between operative and inoperative positions;

FIG. 3 is a fragmentary, end elevational view of the lift illustrating the secondary inner door in a vertically

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disposed position and the telescoping post out of engagement with the driving arm;

FIG. 4 is a fragmentary, side elevational view of the secondary door elevating means with the drive arm being displaced upwardly by the telescoping, anti-rotational post;

FIG. 5 is a view of the secondary door displacing means with a drive arm being urged outwardly by the telescoping post to lift the door arms and swing the secondary doors to a horizontal position substantially flush with the floor surface; and

FIG. 6 is a fragmentary, end elevational view of the lift with the primary door resting upon the cross beam and being flush with the floor surface.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing and particularly to FIGS. 1 and 2, there is shown a cylinder 10 partially contained within a trench or enclosure 12 formed by a trench box 14 located below the floor surface 16 such that the top edge 18 of the trench box is substantially flush with the floor surface 16. It is to be noted that the cylinder 10 and a piston 22 movable therein are disposed centrally of the trench box 14.

A vehicle frame engaging and supporting structure, commonly referred to as a superstructure, generally indicated at 24 and mounted on the upper end of the piston 22, includes a bolting plate 26 secured by fasteners 28 to the piston, a cross beam 30, and vertical support members 32 fixed at the ends of the cross beam 30. Secured to the upper end of each of the vertical support members is an anchor assembly 34 which pivotably supports by pivot means 36 the swing arm 38. Slidably positioned on each swing arm 38 is a slidable sleeve 40 having a vehicle frame engaging pad 42 on the outer end thereof. Therefore, the pads 42 may be adjusted angularly and lengthwise to appropriately position the pads 42 beneath the frame of the vehicle.

The vehicle superstructure 24 may be raised and lowered by actuating the piston and cylinder arrangement 22 and 10 by means which have not been illustrated but which are well known by those skilled in the art.

In order to cover the trench 12, when the engaging and supporting structure 24 is in a lowered position, there is provided a primary cover plate 44. The cover plate 44 is generally rectangular and extends approximately the length of the cross beam 30 intermediate the vertical support members 32. The width of the primary cover plate 44 generally corresponds to the width of the trench box 14. The cover plate 44 is retained on the cross beam 30 by means of generally U-shaped spaced guide members 46 secured to the plate 44 and extending downwardly at opposite sides of the cross beam 30. Thus when the lift is in its lowered position with the cross beam and vertical support members 32 within the trench 12, the primary cover plate 44 is resting upon the top edge 18 of the trench box 14 and in covering relation to the trench box, as most clearly shown by FIG. 6. Filler plates 48 and 50 may be provided on either side of the piston 22, as shown in FIG. 1, to substantially cover the trench box opening around the piston. When the lift is raised, the primary cover plate 44 is raised by the cross beam 30, as shown by FIG. 1.

Located within the trench in spaced, parallel relation with the piston 22 and cylinder 12 is an anti-rotation means 52 including a telescopic post. The upper end of

the anti-rotation means 52 is secured to the bolting plate 26 by fastener 54.

Pivotably mounted within the trench 12 by means of hinges 56 are inner, secondary closure means consisting of plates 58. A plate 58 is hinged, adjacent the top edge 18 of the trench box 14, on each side of the piston 22. Normally with the lift in a lowered position, the secondary plates 58 hang downwardly, in approximately a vertical plane as shown by FIG. 3. However, as the superstructure 24 is raised, the secondary plates 58 may be displaced to the position of FIGS. 1 and 5 wherein the secondary plates are horizontally disposed to cover the trench opening.

The mechanism for automatically displacing the inner closure plates 58 to the closed, FIG. 5 position includes a pivot shaft 60 pivotably mounted in bearing 62 secured to the top edge portion 18 of the trench box. The pivot shaft carries three arms rigidly attached thereto and extended perpendicular thereto, as shown by FIGS. 3-5. Two of the arms 64 are aligned with each other and secured adjacent the ends of the pivot shaft for engaging the inner secondary plates 58. The other arm 66 serves as a driving arm which is adapted to engage the anti-rotation post 52. The arm 66 may have a curved outer end, as shown. That portion 68 of the arm 66 adjacent to pivot shaft 60 is displaced at an angle of approximately 45° - 60° with respect to the arms 64.

Normally with the lift lowered and the trench 12 closed by primary cover plate 44, the lifting arms 64 and the driving arm 66 are in the FIG. 3 positions. As the lift is raised, the support structure 24, the piston 22 and the anti-rotation means 52 move upwardly, the support structure carrying with it the primary closure plate 44. During the upward travel, the anti-rotation means 52 engages the drive arms 66 moving it upwardly as shown in FIG. 4. Movement of arm 66 rotates pivot shaft 60 and arms 64 with the outer ends engaging the secondary closure plates 58. Continued movement of the anti-rotation means 52 moves the drive arm 66 to the FIG. 5 position in which the inner cover plates 58 close the trench box. At this position the closure plates 58 are supported by the hinges 56 and by the aligned arms 64, the aligned arms 64 being supported by the driving arm and the anti-rotation means 52.

When the superstructure 24 is lowered, the anti-rotation means 52 moves down permitting the driving arm 66 to pivot back into the trench 12 which causes the other arms 64 to rotate downwardly also. This allows the internal closure plates 58 to collapse against the side of the trench box 14, temporarily opening the trench until the primary plate 44 is positioned by the cross beam 30.

We claim:

1. A lift for elevating vehicles above the floor surface to provide access to the underside of a vehicle comprising, a box-like enclosure located below the floor surface, a cylinder mounted within said enclosure, a piston mounted within said cylinder and adapted for vertical displacement between upper and lower positions, a vehicle supporting structure, including a beam, secured

to said piston, first closure means mounted within said enclosure, means displaceable upon vertical displacement of said piston for displacing said first closure means between operative and inoperative positions, said first closure means closing said enclosure in said operative position, second closure means releasably positioned upon said beam and substantially flush with the floor surface for covering the top of said enclosure when said beam is positioned within said enclosure, said second closure means being lifted by said beam to expose said enclosure when said piston is displaced to said upper position.

2. A lift as recited in claim 1, wherein said vehicle supporting structure beam is secured to said piston and has first and second ends, said vehicle supporting structure further including supporting assemblies attached to the first and second ends of said beam, said beam being received within said enclosure when said piston is in said lowered position.

3. A lift as recited in claim 1, and further including guide means secured to said second closure means for retaining said second closure means on said beam and securing said second closure means over the trench.

4. A lift as recited in claim 1, said means displaceable upon vertical displacement of said piston for displacing said first closure means between operative and inoperative positions including a piston anti-rotation means mounted for vertical displacement with said piston.

5. A lift as recited in claim 4, said means displaceable upon vertical displacement of said piston for displacing said first closure means between operative and inoperative positions further including a pivot shaft mounted within said enclosure, and a plurality of arms secured to said pivot shaft.

6. A lift as recited in claim 5, wherein said plurality of arms includes a driving arm for engaging said anti-rotation means and aligned lifting arms for engaging said first closure means, said driving arm and lifting arms being pivotable upon raising of said anti-rotation means for displacing said first closure means to said operative position wherein said enclosure is closed by first closure means.

7. A lift as recited in claim 6, wherein said first closure means comprises at least a pair of doors hingedly mounted along one edge portion to said enclosure.

8. A lift as recited in claim 7, wherein said vehicle supporting structure beam is secured to said piston and has first and second ends, said vehicle supporting structure further including supporting assemblies attached to the first and second ends of said beam, said beam being received within said enclosure when said piston is in said lowered position.

9. A lift as recited in claim 8, and further including a second closure means substantially flush with the floor surface for covering the top of said enclosure when said beam is positioned within said enclosure, said second closure means being lifted by said beam to expose said enclosure when said piston is displaced to said upper position.

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