

[54] **SCHOOL BUS INVALID LIFT**

[75] Inventor: **David Henry Ward**, Conway, Ark.

[73] Assignee: **Ward School Bus Mfg., Inc.**,
Conway, Ark.

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[51] Int. Cl.² B60P 1/44

[58] Field of Search 214/75 R, 75 T; 187/9 R,
187/95, 20, 9 E

[56] **References Cited**

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Primary Examiner—Frank E. Werner

Assistant Examiner—Lawrence J. Oresky

Attorney, Agent, or Firm—Victor J. Evans & Co.

[57] **ABSTRACT**

A school bus invalid lift having a generally U-shaped lift member including a lift platform and a pair of up-standing lift frames within which the opposite sides of the lift member are arranged for vertical sliding movement. The lift members in each of the lift frames are interconnected by a chain and shaft system with the shaft mounted on the bottom of the lift member so as to equalize the lifting forces to prevent one side of the lift member from moving at a different speed than the other side and thus jamming the lift member in its frame. The frames are mounted in spaced apart relation in the side of a school bus with the lift member arranged to receive a wheelchair or other invalid conveyance from the outside of the bus for discharge into the interior of the bus on the other side of the lift member.

1 Claim, 6 Drawing Figures

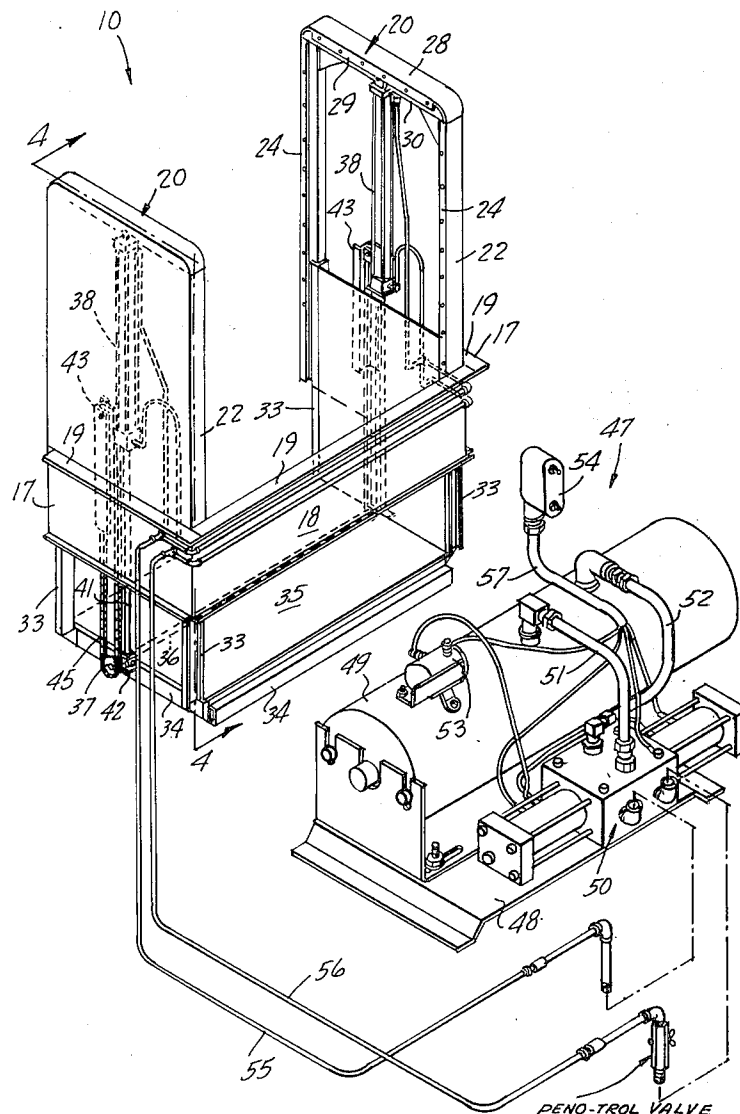


FIG. 1.

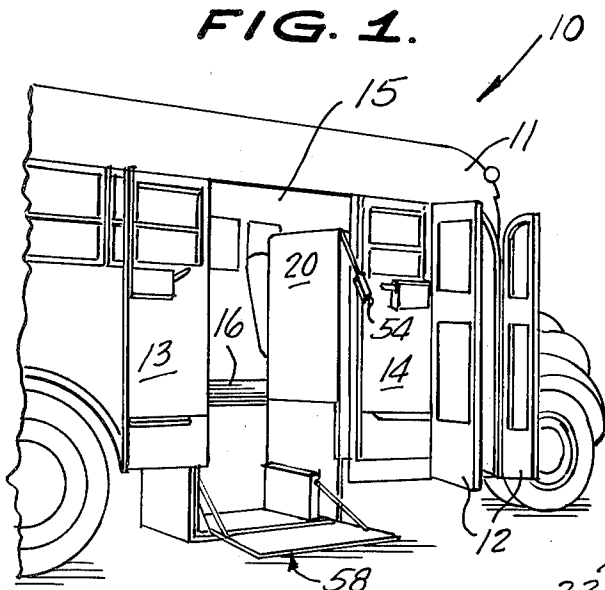


FIG. 2.

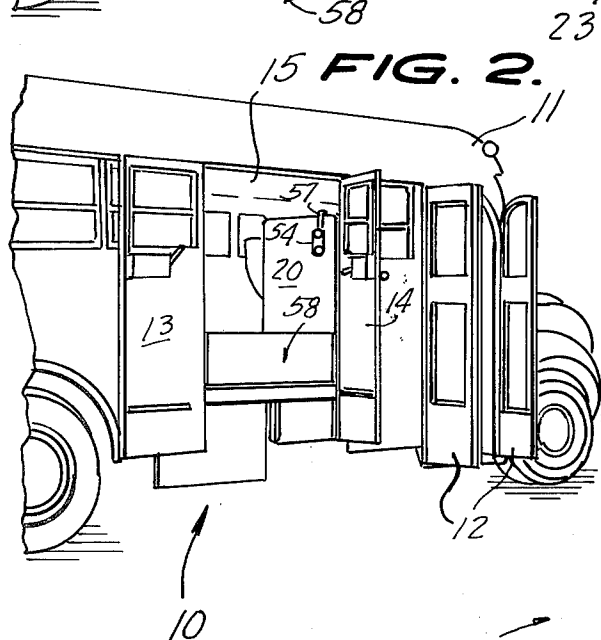
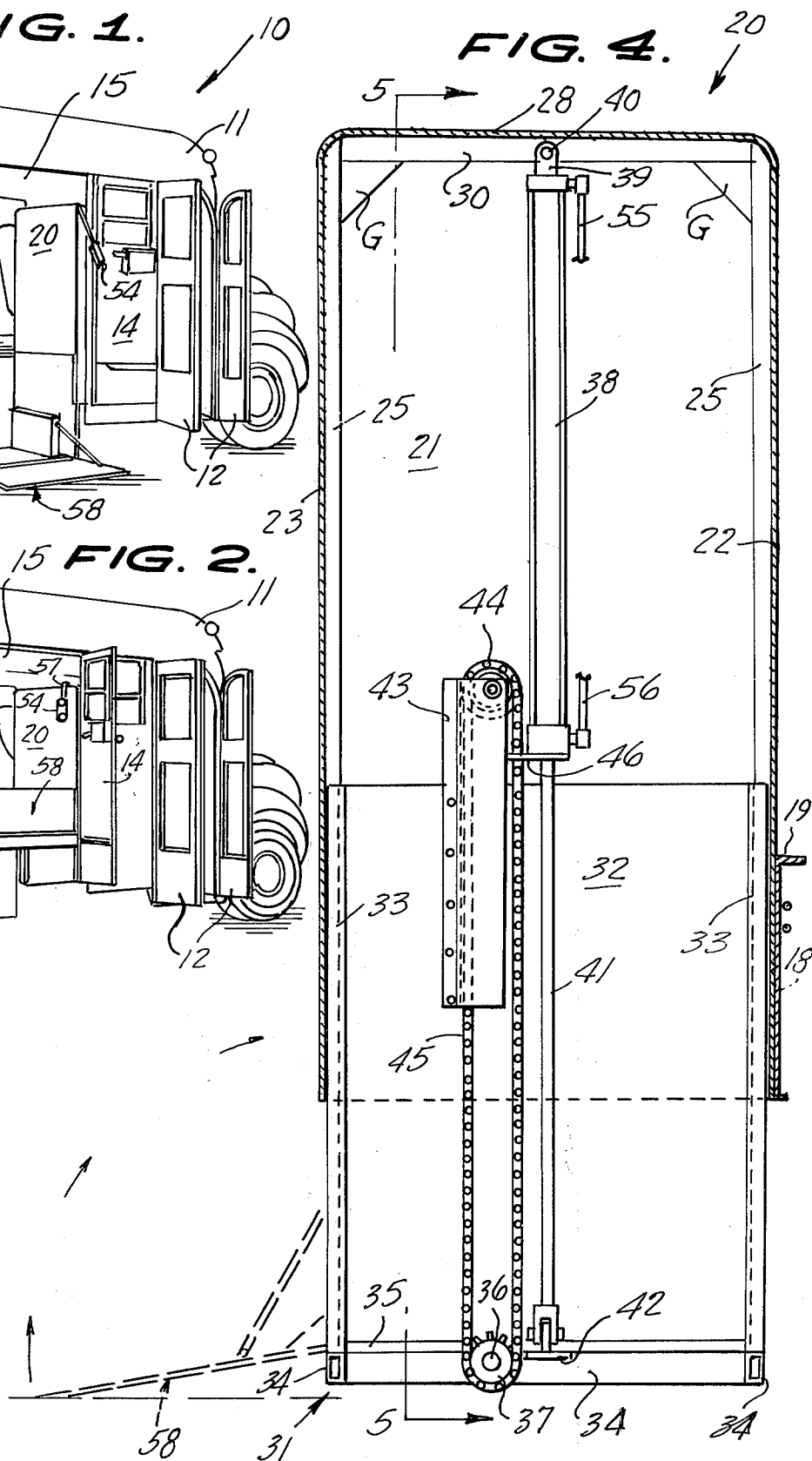
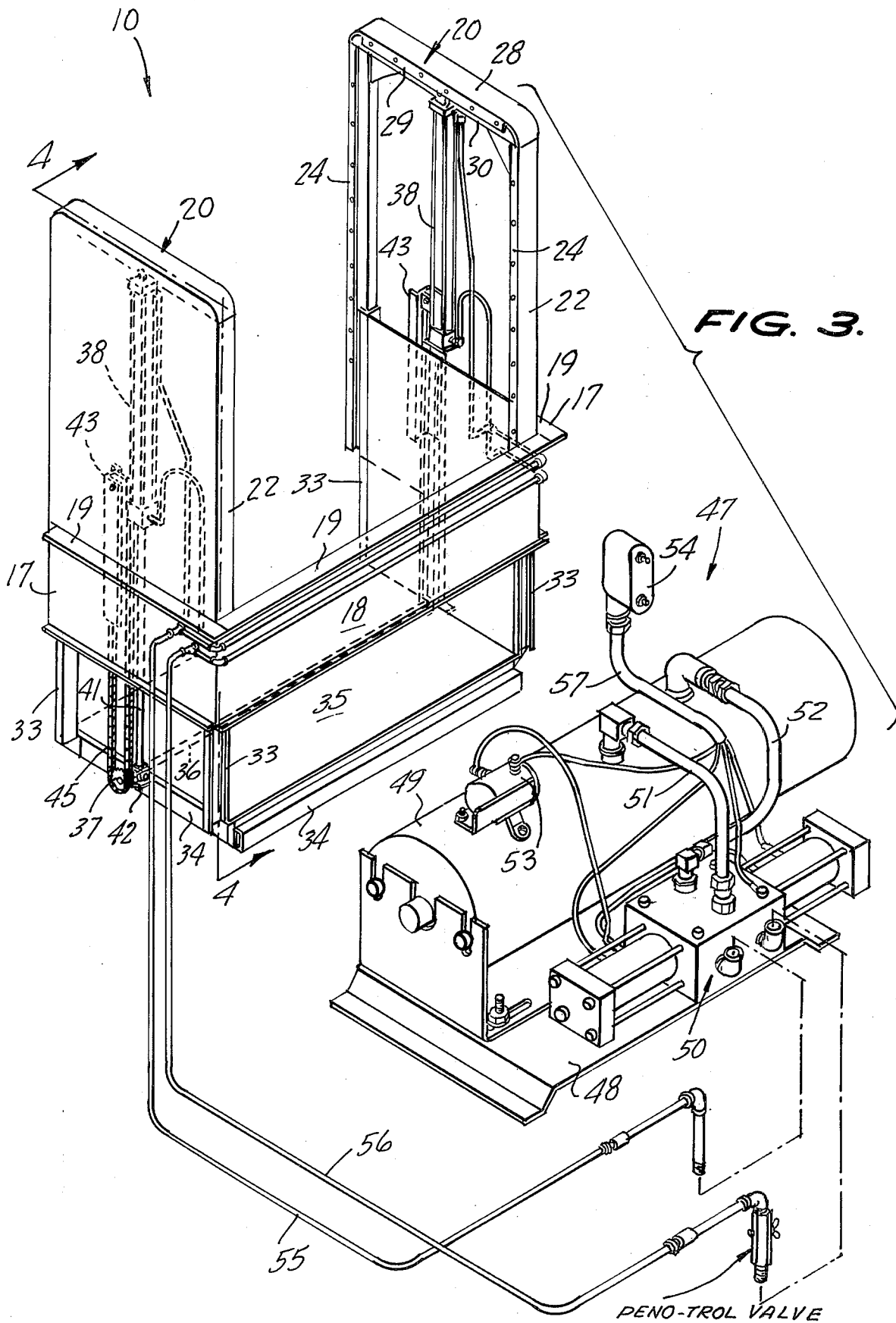
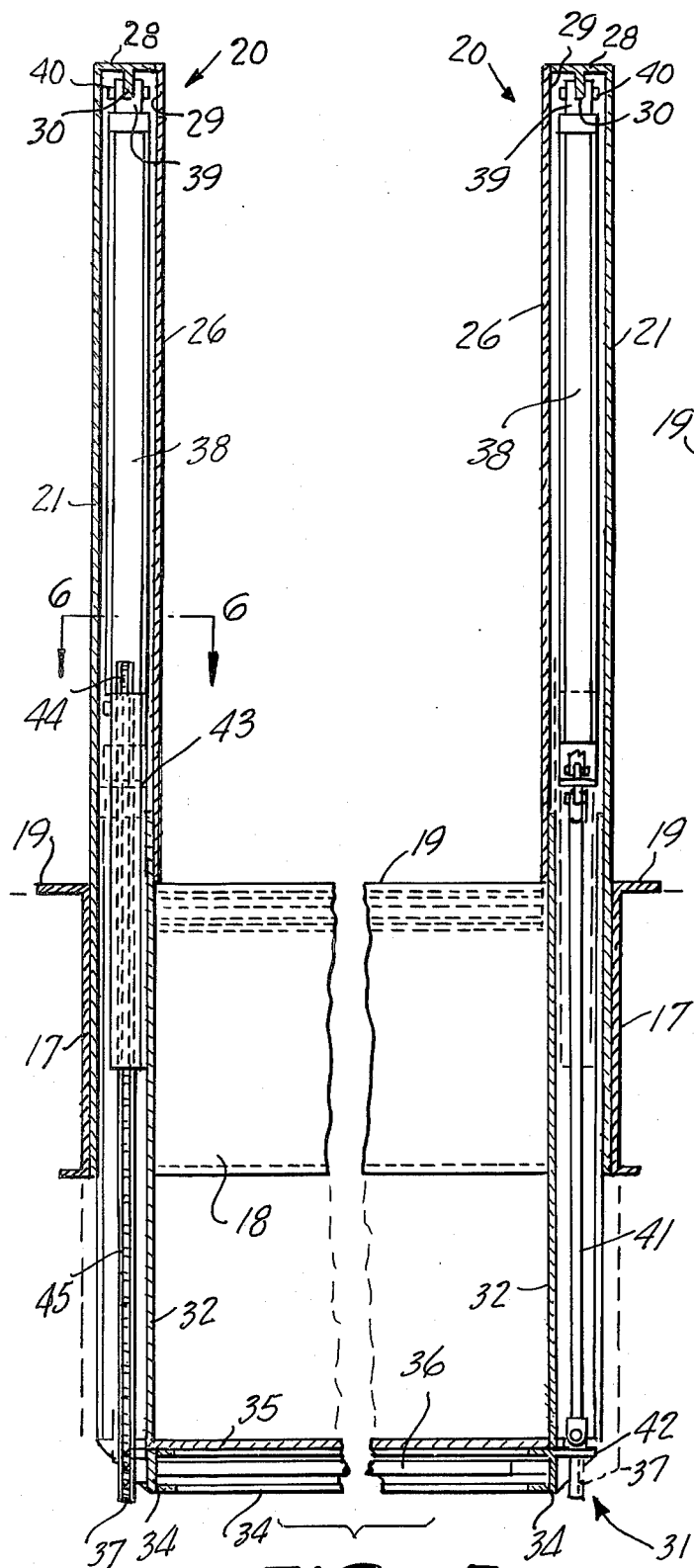
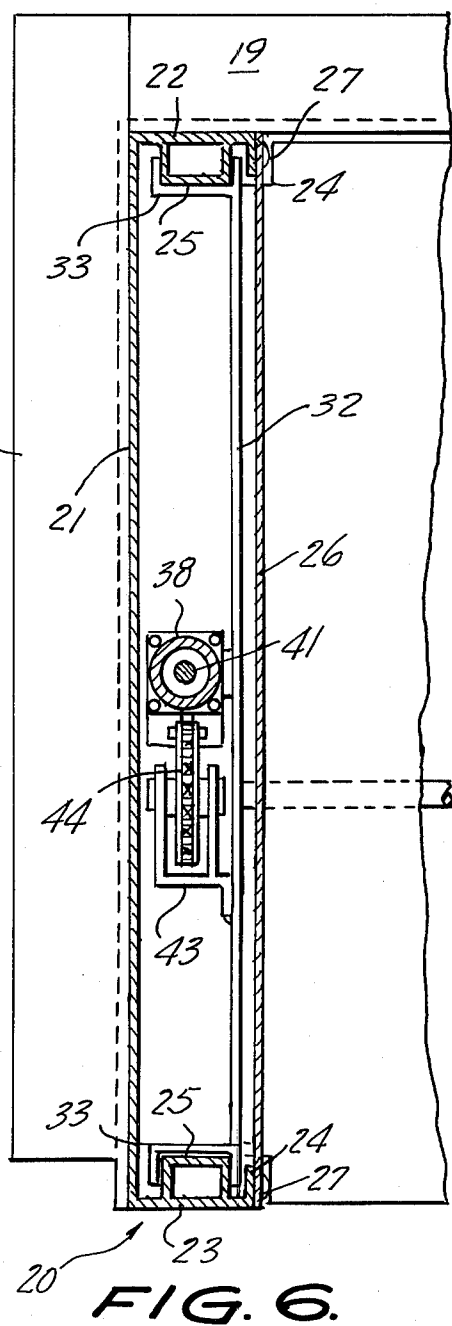


FIG. 4.







SCHOOL BUS INVALID LIFT

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an invalid lift for school buses to permit the transportation of invalids in wheelchairs by raising the wheelchair to the bus floor level and discharging it interiorly of the bus.

Summary of the Invention

The present invention encompasses a pair of spaced parallel lift frames secured in upright relation in a school bus adjacent one side thereof. The school bus is provided with doors which open between the frames. A generally U-shaped lift member including a horizontal lift platform is arranged for vertical reciprocation in the frames and is driven by hydraulic cylinders mounted in the frame. The lifting action of the hydraulic cylinders is maintained uniform by a shaft coupled at each end with a chain to the lift members. The shaft is secured to the bottom of the lift member platform and extends from one of the frame members to the other.

The primary object of the invention is to provide an invalid lift for school buses in which the lift effort is so interconnected that the lift platform can not become wedged in the lift frames during a lifting operation.

Other objects and advantages will become apparent in the following specification when considered in light of the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of the invention;

FIG. 2 is a view similar to FIG. 1 with the lift platform partially raised;

FIG. 3 is an exploded perspective view of the system adapted for attachment to a school bus;

FIG. 4 is an enlarged vertical sectional view taken on the line 4—4 of FIG. 3 looking in the direction of the arrows;

FIG. 5 is a vertical sectional view taken along the line 5—5 of FIG. 4 looking in the direction of the arrows; and

FIG. 6 is an enlarged fragmentary horizontal sectional view taken along the line 6—6 of FIG. 5 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, wherein like reference characters indicate like parts throughout the several figures, the reference numeral 10 indicates generally an invalid lift attachment for school buses constructed in accordance with the invention.

The invalid lift attachment 10 is mounted on a school bus 11 having conventional front doors 12 and a pair of special doors 13, 14 which open to provide a space 15 in the side of bus 11. The floor 16 of the bus 11 is cut away interiorly of the doors 13, 14 to permit mounting of the attachment 10 to the school bus 11.

The attachment 10 includes a pair of spaced parallel channel members 17 which are arranged to extend transversely of the bus 11 connected by an elongate channel member 18 extending longitudinally of the bus 11. The upper flange 19 of the channel members 17

and 18 are horizontal and are level with the floor 16 of the bus 11.

A pair of upright frame members 20 are secured to the channel members 17, 18 and are arranged in spaced apart parallel upright relation. Each of the frame members 20 includes a plate 21 carrying end walls 22, 23 on opposite sides thereof with each end wall having a flange 24 extending inwardly thereof. A channel member 25 is welded to the innerface of the end walls 22, 23 in spaced parallel relation. A removable cover 26 is detachably secured to the flanges 24 by securing elements 27. The upper ends of the end walls 22, 23 are connected by a top wall 28 including a depending flange 29. A reinforcing bar 30 is secured to the underside of the top wall 28 and has gusset plates G at it's opposite end connecting it rigidly to the channel members 25.

A lift member generally indicated at 31 is mounted in the frame members 20 for vertical reciprocation therein. The lift member 31 has a pair of upright plates 32 extending across the frame member 20 terminating adjacent the channel members 25 at each end thereof. Upright channel members 33 are rigidly secured to each side of the plate 32 and encompass the channel members 25 as can be seen in FIG. 6, to provide for the plate 32 on the channel members 25. Channel members 34 extend between the plates 32 and are connected by channel members 34 to form a rectangular horizontal frame. A floor 35 is supported on the channel members 34 and is secured at it's opposite sides to the plates 32.

A shaft 36 is journaled in the channel members 34 and extends from a point beyond one plate 32 to a point beyond the opposite plate 32 under the lift member 31. A sprocket 37 is mounted on each end of the shaft 36 for reasons to be assigned.

A hydraulic ram 38 has a yoke 39 on it's upper end and the yoke 39 is secured to the reinforcing bar 30 by a clevis pin 40. The hydraulic ram 38 is of a size to easily fit between the wall 21 and the plate 26 as can be seen in FIG. 5.

A piston rod 41 extends downwardly from the ram 38 and has it's lower ends secured to a bracket 42 extending outwardly from the platform 35. A bracket member 43 is secured to each of the plates 32 and extends upwardly thereabove. A sprocket 44 is journaled in the bracket 43 and is arranged in vertically aligned relation with the sprocket 37 therebelow. A drive chain 45 is trained over the sprockets 37, 44 and has it's opposite ends connected to a bracket 46 forming part of the hydraulic ram 38.

Vertical movement of the lift member 31 causes the plate 32 on each side thereof to move equally due to the connection of the chains 45 to the sprockets 37, 44 and the chain to the bracket 46. In the event that one of the hydraulic rams 38 should fail completely to function the other hydraulic ram 38 would move both sides of the lift member 31 equally to the shaft 36, sprockets 37, 44 and chain 45.

A hydraulic power pack is generally indicated at 47 in FIG. 3. The power pack 47 includes a base 48 having a reservoir 49 secured thereto. An electrically actuated hydraulic pump and four-way valve 50 is mounted on the base 48 adjacent the reservoir 49. Conduits 51, 52 connect the reservoir with the four-way valve and an electric switch 53 is mounted on the reservoir 49 for controlling operation of the electrically actuated pump and four-way valve 50. An up and down hand control

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switch 54 is electrically connected to the switch 53 and to the electrically actuated pump and four-way valve 50 to control the hydraulic rams 38. Conduits 55, 56 extend respectively to the upper and lower ends of the hydraulic rams 38 and are connected to the electrically actuated pump and four-way valve 50 so as to carry hydraulic fluid to and from the opposite ends of the hydraulic rams 38 in accordance with the setting of the hand control switches 54. The electrically actuated pump and four-way valve 50 is of conventional construction.

The switch 54 is mounted on a flexible cable 57 and can be moved into a position so as to be operated by the user of the invention.

A folding ramp such as is generally indicated at 58 of any desired construction may be used with the lift attachment if desired. As especially seen in FIG. 2 of the drawings, when the ramp 58 is pivoted to its vertical position, the ramp clears the bus doors 13, 14 and it closes off the outside open bottom portion of the carriage defined by platform 35 and side walls 32. Thus, in its vertical position, the ramp 58 provides a safety feature in that the wheelchair is prevented from rolling off the platform 35 in the direction of the ramp.

Having thus described the preferred embodiment of the invention it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the spirit of the invention.

What is claimed is:

1. An invalid lift attachment for school busses, the combination comprising:
 - a. an opening in the side of and extending into the interior of said school bus, said opening closeable by swinging doors on the side of said school bus,
 - b. two pair of box-shaped guide channels secured vertically to said school bus and positioned in the interior said opening,
 - c. a carriage means guided for vertical movement on said guide channels comprising
 1. two vertical plates each having at each side edge a vertical U-shaped channel attached thereto each of said U-shaped channels accepting therein

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one of the box-shaped guide channels for sliding relative movement,

2. said vertical plates lying in a vertical plane which is transverse to the direction of travel of said school bus,
3. a horizontal platform rigidly connected to said vertical plates for supporting a wheel chair and having attached thereto a pivoted ramp which when pivoted to the vertical position closes off the lower open end of said carriage means,
4. power means for raising and lowering said carriage means comprising,
 - a. a pair of endless chains on each side of said carriage trained over an upper and lower sprocket,
 - b. a shaft connecting each of said upper sprockets and a shaft connecting each of said lower sprockets,
 - c. a pair of hydraulic cylinders, the piston rod of each pivotally connected to each side of said carriage whereby said chains and sprockets and shafts ensure equal travel of each side of the carriage,
 - d. each of said pair of box-shaped guide channels being connected across the top thereof by a connecting beam,
 - e. each of said pair of said hydraulic cylinders having cylinder portions pivotally connected to a respective connecting beam and having the lower end of said cylinder portions connected to the respective endless chains,
 - f. a control system for controlling the supply of fluid to the hydraulic cylinders comprising,
 1. an electrically actuated fluid pump,
 2. a four way valve to control the fluid flow from said pump to said hydraulic cylinders,
 3. a flexible cable having a control portion at one end having thereon two electric switches to control the carriage movement whereby said flexible cable is placed in a position in close proximity to said carriage enabling the wheelchair operator to operate the carriage while being supported and elevated by said carriage.

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