United States Patent

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[54] VEHICLE CONTROL LINE CONNECTIONS

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[52] U.S. Cl. ..... 191/12 R

[51] Int. Cl. H02g 11/00

[58] Field of Search ..... 187/1, 8.41, 8.61, 8.62, 8.64, 187/8.65, 69; 191/12 R, 12 C

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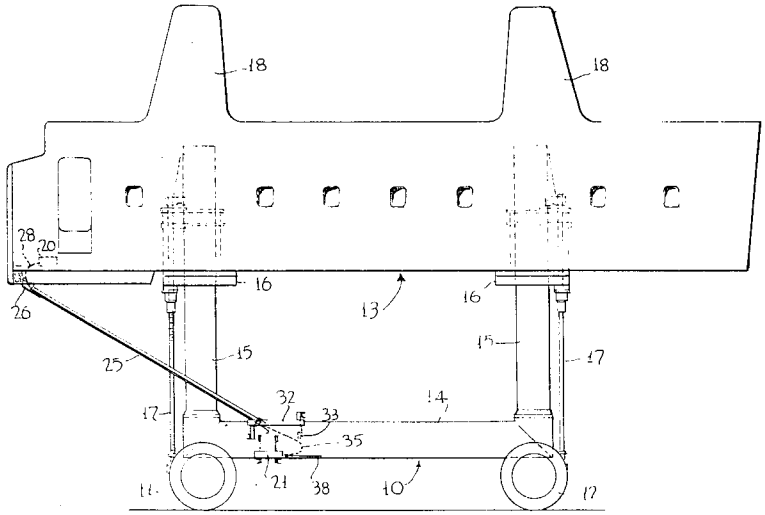
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[57] ABSTRACT

This application discloses control line connections between a chassis and an elevatable body thereon wherein the line terminals on chassis and body are spaced laterally relative to each other and wherein flexible control lines between terminals are supported on rigid bar or beam means which at one end has lateral movement relative to the adjacent terminal to accommodate vertical body movements with minimum flexing and fatigue of the control lines.

7 Claims, 6 Drawing Figures



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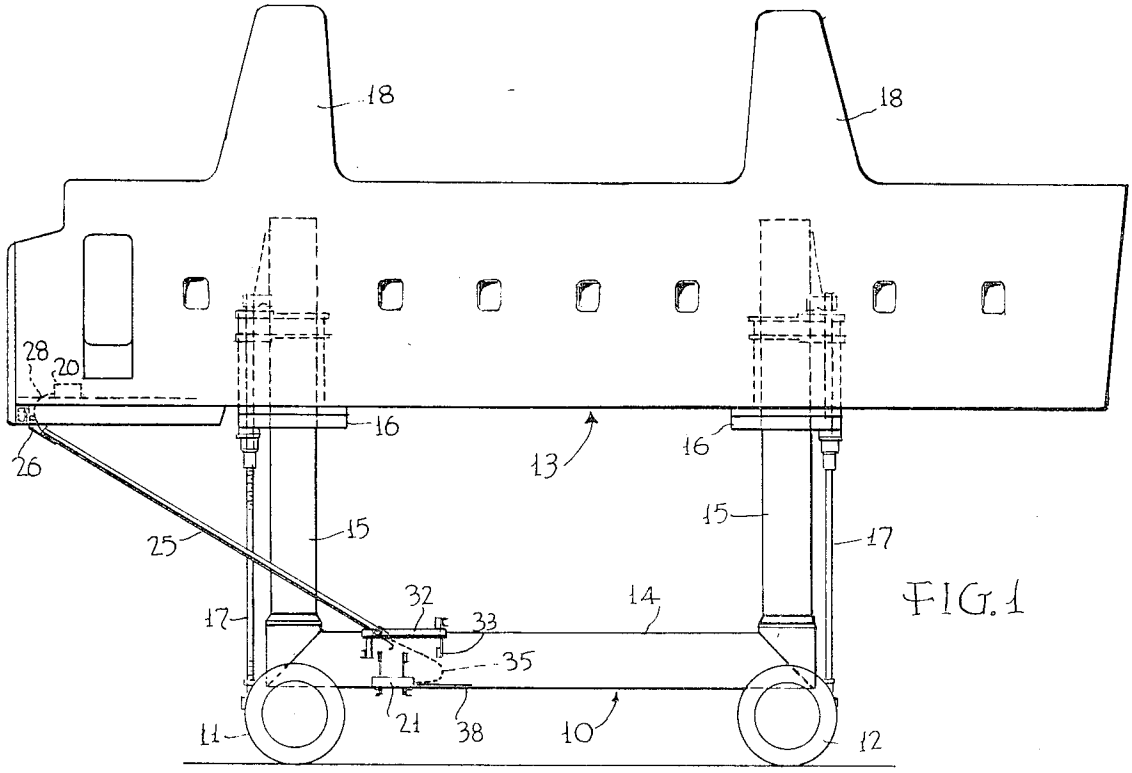


FIG. 1

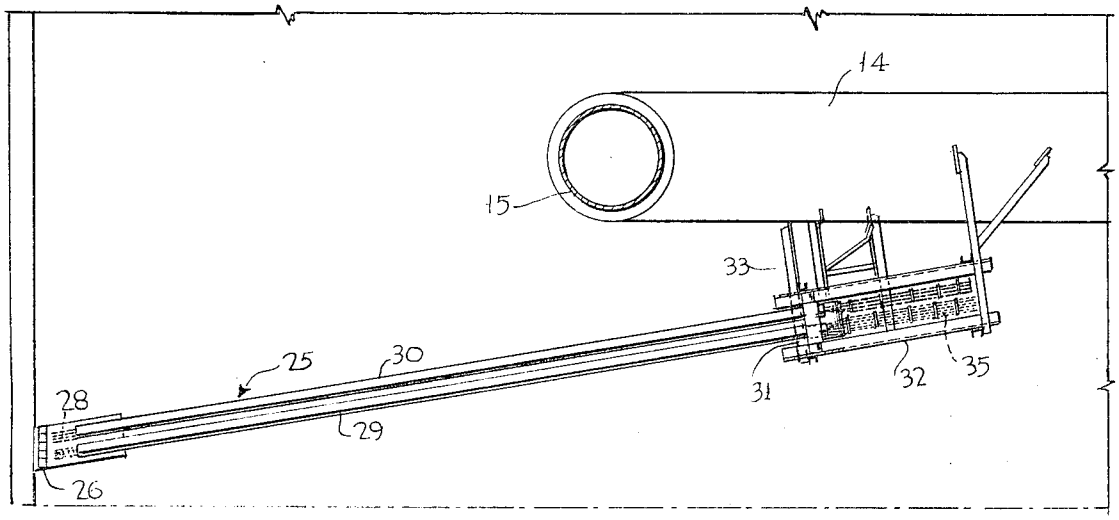


FIG. 4

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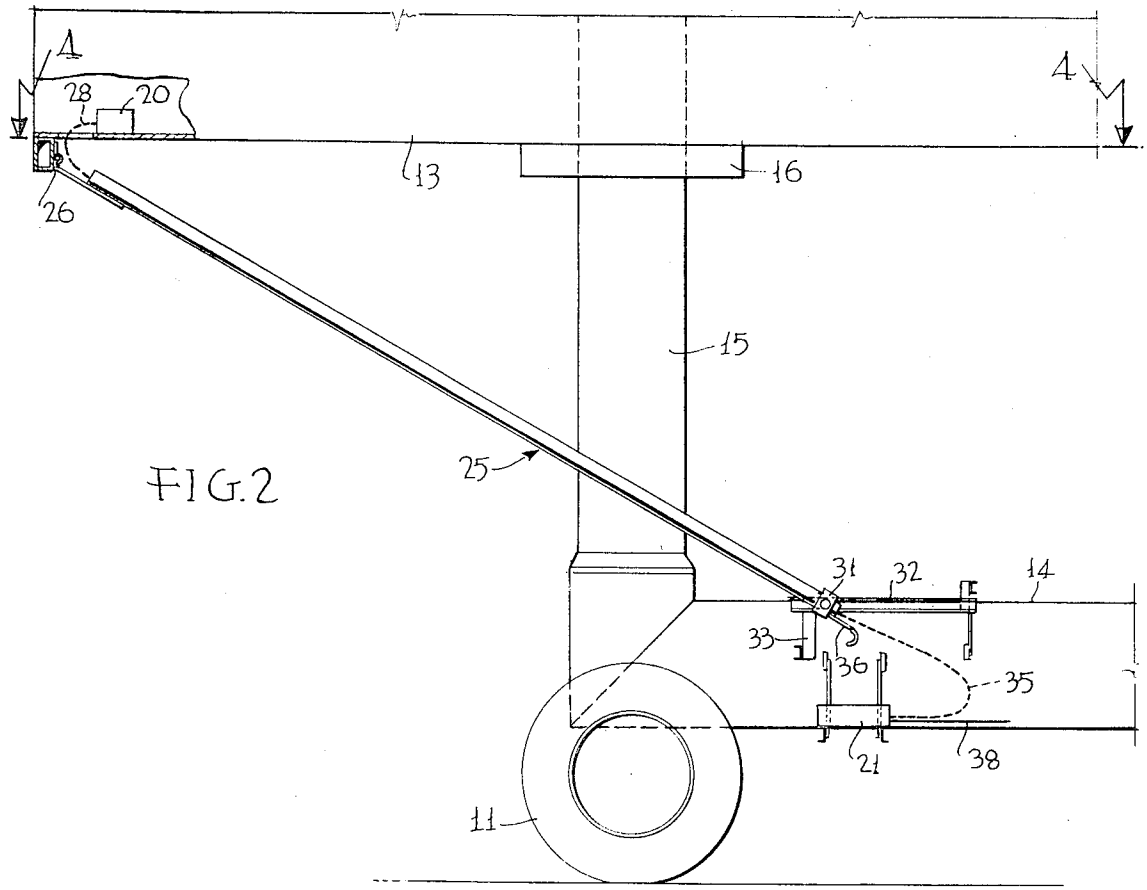


FIG. 2

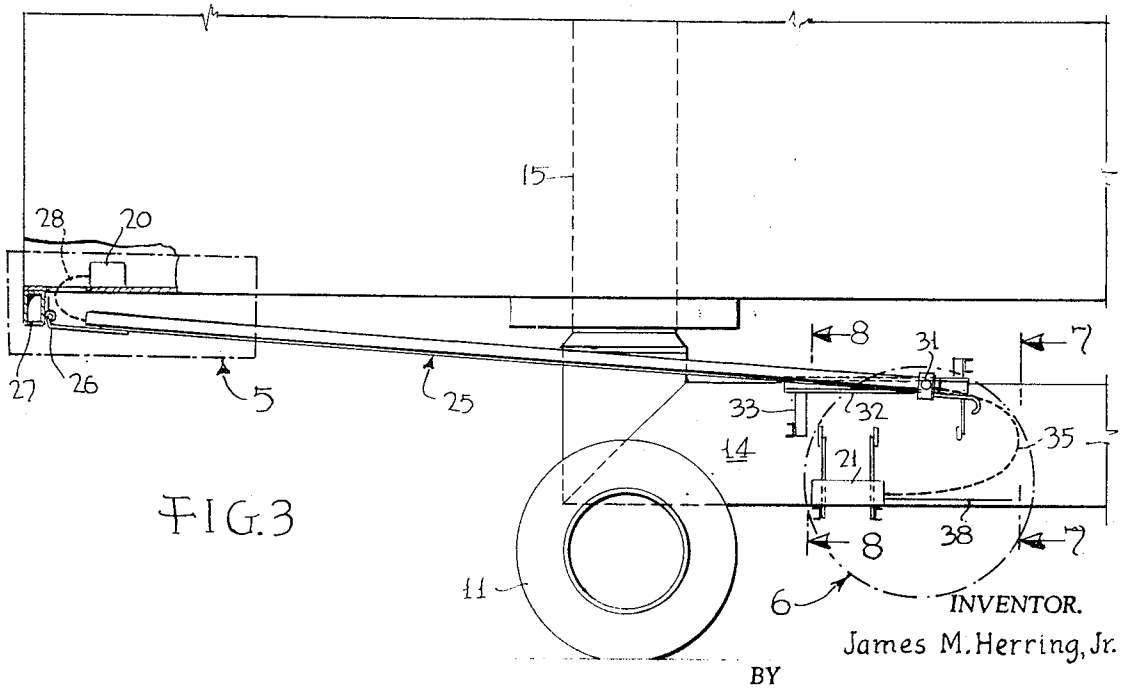


FIG. 3

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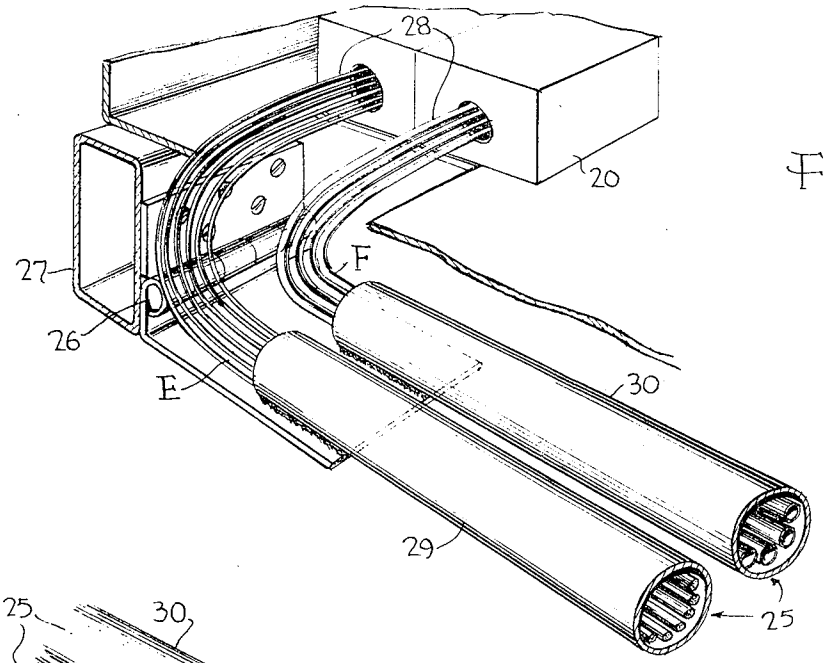


FIG.5

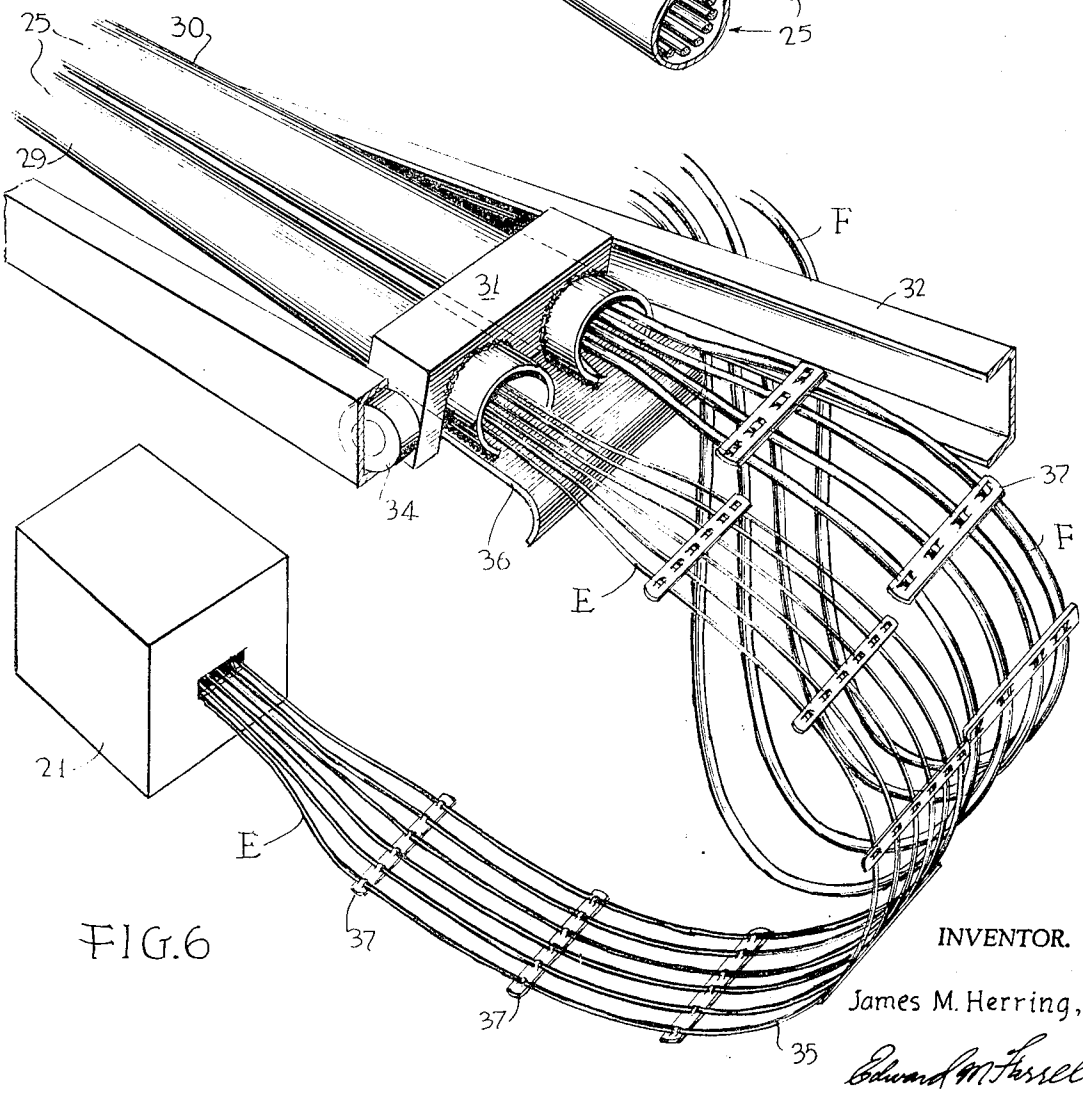


FIG.6

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VEHICLE CONTROL LINE CONNECTIONS

BACKGROUND OF THE INVENTION

Heretofore there have been various devices having flexible control line connections between a fixed terminal, as on a chassis, and a movable terminal, as on a body having vertical movement relative thereto. In a broader sense, there may be considered an elevator car having cables suspended from its floor at one end and secured at the top of the car shaft at the other end, with a loop between. More closely related, there may be considered the often seen linemen's trucks with position controls in the worker's basket and flexible lines with simple loops at the elbow joints of the bars or beams supporting the basket. None of the prior known arrangements satisfy the needs of the vehicle herein considered.

SYNOPSIS OF INVENTION

The present invention provides control line connections between chassis and elevatable body which accommodate for the vertical movement of the body and the lateral spacing between control line terminals by providing means for changing the length of a loop in the control line adjacent one terminal and supporting and protecting the control line intermediately by mounting on rigid beam means having translatory movement at the loop shifting end.

DESCRIPTION OF THE DRAWING

The objects, features, and advantages of the invention will be apparent from the following description of an exemplary embodiment, reference being made to the accompanying drawings thereof, wherein:

FIG. 1 is a side elevation, partly in section, of a vehicle having an elevatable body or pod mounted on a chassis and embodying apparatus of the present invention for carrying the control line means between body and chassis;

FIG. 2 is an enlarged view of the parts shown at the left side of FIG. 1;

FIG. 3 is a view like FIG. 2 but showing the body or pod in lowered position on the chassis;

FIG. 4 is a plan view, partly in section, taken on the line 4—4 of FIG. 2;

FIG. 5 is a partial enlarged perspective view at the upper terminal region, the view being taken in the area 5 of FIG. 3;

FIG. 6 is a partial enlarged perspective view at the lower terminal region, the view being taken in the area 6 of FIG. 3.

DESCRIPTION OF EXEMPLARY EMBODIMENT

The invention is illustrated in connection with a transfer vehicle for use at airports to convey heavy loads, as passengers and freight, between aircraft and terminal buildings. This vehicle has a body of pod which is movable vertically between a lower position when the vehicle is travelling between aircraft and terminal and an upper position when halted and mating with the elevated floors and doors of aircraft and terminals. The change in elevation may be great, say 12 feet or more; and since the operator's position or cab is in the body or pod and most of the operating equipment is on the chassis, with long control lines between body and chassis, it is desirable to provide an orderly arrangement or carrier harness for the lines to protect and preserve them. The lines largely comprise flexible electrical power cables and flexible fluid power hoses. Preferably, the electrical and fluid lines are kept apart to minimize trouble if either should fail.

As shown, the vehicle comprises a chassis **10** mounted on front wheels **11** and rear wheels **12** and carrying an elevatable body or pod **13**. The chassis includes a longitudinal beam **14** of tubular form and large diameter, say 30 inches, and body-supporting columns **15** rigidly secured thereto. The body has guides **16** movable along the columns and is moved up and down, as by power operated screw shafts **17**. The body has roof projections **18** to receive the upper ends of the columns **15** when the body is in the lowered position on the chassis.

The front end of the body extends a considerable distance beyond the front end of the chassis and the operator's position or cab is located near the front of the body. There is a power-line terminal or connection point located near the operator's position and this is shown here as a body terminal box **20**.

The chassis carries the other terminal at a distance behind its front end and this is shown here as a chassis terminal box **21**. There are preferably separate terminal boxes for the flexible electrical power control lines or cables, designated generally as E, and the flexible fluid power control lines or hoses, designated generally as F. Two terminal boxes **20** are shown on the body, FIG. **5**; but only one terminal box **21** is shown on the chassis, FIG. **6**, the other being located at any convenient adjacent position. The exact location is not of importance too the present invention.

With these laterally separated or displaced body and chassis terminal locations and with extensive vertical movement of the body on the chassis, it can be appreciated that the flexible control lines E and F must be quite long. Also that if they are not properly supported they will drop down and be damaged or entangled during the movements of the body on the chassis.

The line-supporting means hereby provided comprises rigid beam or bar means **25** on which the intermediate portion of the lines is supported, the beam means **25** having a movable connection at one end with the body and a movable connection at the other end with the chassis. It is desirable to have the mounting beam connected at a relatively fixed point at one end and to have translatory movement at the other end. It is preferable to provide the translatory movement at the chassis end and this is the form illustrated.

At the upper end (FIG. **5**) a hinge mounting **26** for the bar means **25** is supported by a body floor frame bracket **27**. The flexible lines have a loop **28** at the upper end and the loop extends inward so there is twisting as well as flexing or bending of the lines over a considerable length, thus minimizing fatigue and damage to the lines. The lines are free for a considerable distance from the hinge line to form a long loop length.

Here it may be noted that the rigid bar support means provides separate enclosures or ducts for the electrical cables E and the fluid hoses F, the electrical line tube or duct being designated as **29** and the fluid line tube or duct being designated as **30**. The ducts shown are circular in cross section but may have other shapes, as rectangular or even flat flanged plates. Or one tube unit may carry partitions forming as many separate ducts as desired.

At the bottom or chassis end the beam means **225** has a translatory movement, as stated, and this is provided by securing the lower end of the beam means **25**, here the two tubes, to a slide member **31** which moves along guide means **32** secured to the chassis frame by any convenient mounting means **33**. In the specific form shown, the slide **31** has spaced wheels or rollers **34** which move in spaced channel track rails forming the guide means.

The lines form a loop **35** between the chassis terminal **21** and the lower end of the beam means **25** and the slide **31** is provided with a support plate **36** having a downcurved outer end for easing the movement of the lines as the lower loop is shifted by the movement of the slide.

In order to keep the lines in proper position and minimize tangling and chafing, the lines are secured at convenient spacing in the loop to transverse bars or cleats **37**. The connection may be made by clamps, clips or other convenient means. The lines are relatively stiff so the lower loop is made relatively deep, as shown, to accommodate the necessary flexure without local sharp bending. A supporting pan **38** is provided beneath the loop to assure that no part will drop down to an exposed position.

FIG. **4** shows that the terminals on body and chassis are spaced or displaced laterally in a transverse direction as well as in a longitudinal direction, hence the beam means **25** and guide means **32** are not parallel with the axis of the vehicle or chassis frame beam **14**.

This transverse displacement or offset will not cause any difficulty in action with changes in body elevation because the change in angle transversely is quite small and the provision of a single wheel axis support for the slide easily takes any side shift at the lower end. At the upper end the play in the hinge support together with slight bending in the long beam means 25 will easily take care of any lateral shift or change in angle here.

The rigid beam means provides ample support for the lines and greatly reduces the possibility of damage to them; the hinge-and-loop arrangement at the body end provides easy conformation without much bending near the hinge or wear on the lines; and the shiftable slide-and-loop arrangement at the chassis end distributes the bending action very widely in the loop so that the possibility of fatigue or wear here is very slight.

While one embodiment of the invention has been described for purposes of illustration, it is to be understood that there may be various embodiments and modifications within the general scope of the invention.

What is claimed is:

1. Control line connections for a vehicle, comprising in combination with a vehicle having a chassis and a body mounted thereon for extensive vertical movement, a flexible control line connected between a fixed terminal on the chassis and a fixed terminal on the body, the control line having a bending loop adjacent each terminal, means for shifting the position of a loop laterally adjacent at least one terminal as the body changes elevation relative to the chassis, said means for shifting including rigid beam means supporting said control line, and mounting means providing transverse guiding support for one end of said rigid beam means.

2. Control line connections for a vehicle as set forth in claim 1, wherein said control line support beam means is pivoted to the body by hinge means at the loop at the upper end on the body, and pivoted by a slide movable along guides on the chassis at the lower end on the chassis.

3. Control line connections for a vehicle as set forth in claim 1, wherein the body and chassis terminals are displaced laterally along the longitudinal axis of the vehicle relative to each other, said beam means being pivoted at the loop to the body at its upper end and pivoted by a slide movable along guides on the chassis at the lower end, and said beam means occupying an inclined position when the body is in elevated position.

4. Control line connections for a vehicle as set forth in claim 3, wherein said beam means includes at least one tubular member.

5. Control line connections for a vehicle as set forth in claim 4, wherein said control line comprises flexible cable means for electrical controls and flexible hose means for fluid controls, and wherein separate tubular duct means are provided in the beam means for supporting said flexible cable means and said flexible hose means.

6. Control line connections for a vehicle as set forth in claim 1, in which the terminals are displaced relative to each other laterally of the longitudinal vehicle axis as well as longitudinally of the axis, and means at the traversing end which provides lateral turning as well as traversing movement.

7. Control line connections for a vehicle as set forth in claim 6, in which the traversing movement is provided by a slide and a guide which is inclined at an angle relative to the longitudinal axis of the vehicle, and means included in said slide-and-guide means providing any necessary horizontal angular movement between the lines and the guide.

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