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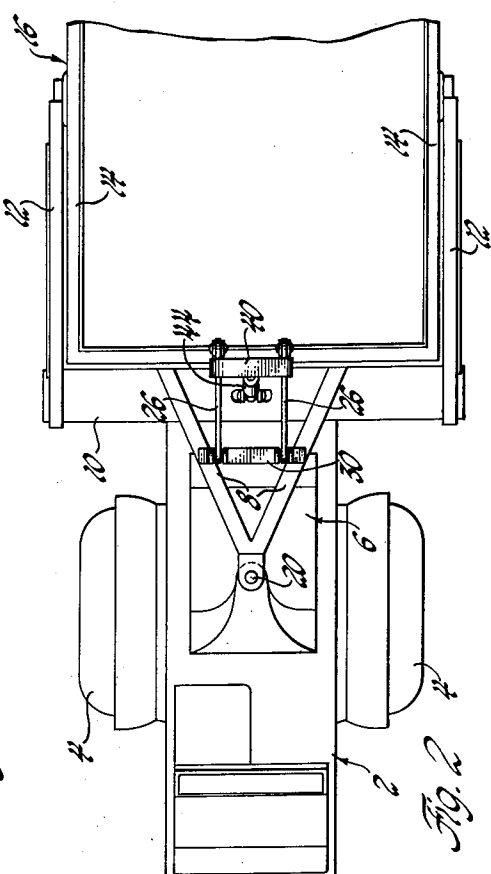
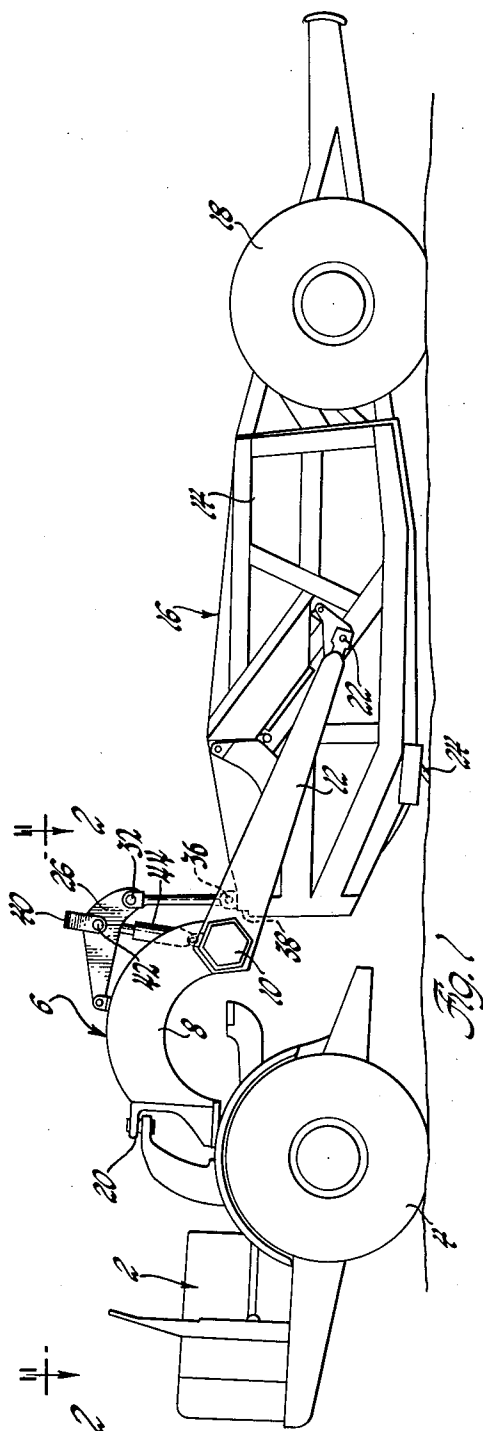
D. M. KELLEY

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SCRAPER BOWL HOIST ASSEMBLY

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2 Sheets-Sheet 1



INVENTOR.
Douglas M. Kelley
BY
E. L. M. C. Glynn Jr.
ATTORNEY

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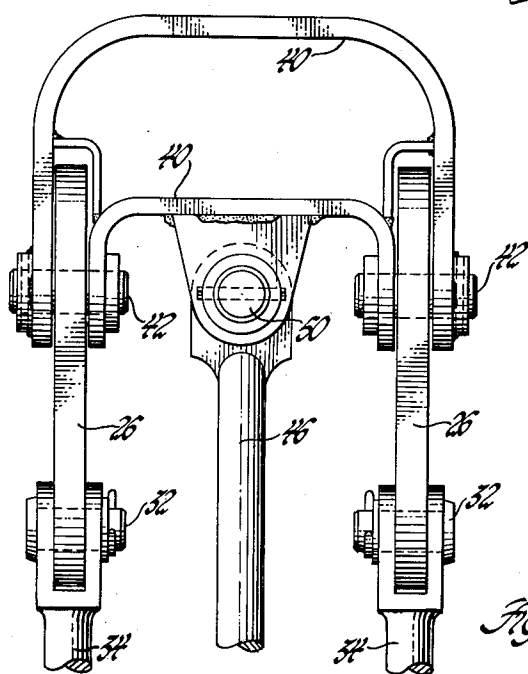
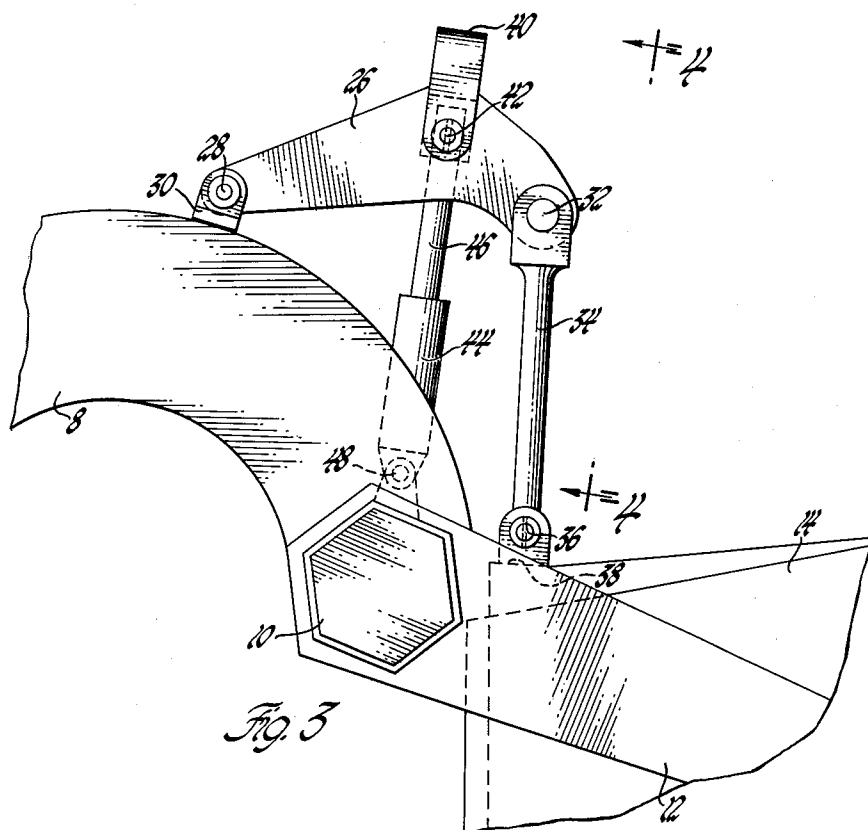
D. M. KELLEY

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2 Sheets-Sheet 2



INVENTOR.
Douglas W. Kelley
BY
J. E. McElynn Jr
ATTORNEY

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SCRAPER BOWL HOIST ASSEMBLY

Douglas M. Kelley, Cleveland, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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10 Claims. (Cl. 37-129)

This invention pertains to a bowl control mechanism for a self-propelled scraper vehicle and, in particular, to a bowl control mechanism of the type comprising a plurality of pivotally mounted operating levers controlling the position of the bowl.

Self-propelled scrapers of the type to which the present invention pertains typically comprise a tractor connected through a drawbar or pull yoke to a drawn frame member including a scraper bowl. The rear end of the drawbar is suitably pivotally connected to the side walls of the scraper bowl for controlled relative articulation therebetween about a horizontal transverse axis for movement of the bowl between a lowered digging position and a raised carrying position. While various means have been provided in the prior art for controlling the position of the scraper bowl, such as cable operated mechanisms including a power cable control unit, the present invention pertains particularly to improvements in the lever type of bowl control mechanism, an example of which is disclosed in United States Patent No. 2,773,320 entitled "Digging and Carrying Scraper" and issued to E. R. Fryer and W. J. Adams on December 11, 1956.

In lever-type bowl control mechanisms as generally exemplified by the Fryer et al. patent aforementioned, raising and lowering of the scraper bowl is controlled by two separate levers each having one end pivotally connected to the scraper drawbar and the other end suitably connected as by rigid links or rods to the scraper bowl frame. A fluid pressure operated extensible and contractable hoist or jack is provided to control the operation of each of these levers, one end of each jack being pivotally connected to the drawbar and the other end thereof being respectively pivotally connected to one of the levers. Usually, the jacks are of the single-acting type which are extensible upon supply of power fluid thereto to lift the scraper bowl, and may be vented to lower the scraper bowl by gravity.

It will be noted that, in prior lever-type bowl control mechanisms as aforescribed, one hoist or jack has been used to control each bowl control lever. Apart from the fact that this type of mechanism involves one power device or hoist for each lever, it also results in considerable variation in the forces imposed on the respective lift rods or other equivalent means which connect the respective levers to the bowl to control the position of the latter. In this regard, it should be noted that relatively large tolerances are employed in the manufacture of such scraper vehicles and, consequently, there often is considerable variation in the effective distances between the respective levers and the connections of their associated lift rods to the scraper bowl. Finally, due in part to the tolerances involved as mentioned above and in part to the fact that each lever and its associated hoist acts independently of the others to control the position of the bowl, some twisting of the bowl about its longitudinal axis can occur resulting in the introduction of stresses in the rear bowl frame of the vehicle.

It is, therefore, a principal object and feature of this invention to provide a lever-type bowl control mechanism in which a single power device controls a plurality of levers which are operatively connected to and control the position of the bowl.

It is yet another object and feature of this invention to

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provide a lever-type bowl control mechanism of the type aforementioned characterized by means connecting a single power device to a plurality of levers in such a manner as to substantially equalize, within limits, the forces or stresses imposed on the lift rods or equivalent devices respectively connecting each lever to the scraper bowl.

It is yet another object and feature of this invention to provide a lever-type bowl control mechanism in which a single axially extensible and contractable power operated device is connected to a plurality of bowl control levers by means which substantially equalizes, within limits, the forces imposed on the lift rods or other equivalent means connecting the respective levers to the scraper bowl, while preventing the introduction of large stresses in the bowl frame due to twisting of the latter about its longitudinal axis.

It is yet another object and feature of this invention to provide a lever-type bowl control mechanism comprising a pair of bowl control levers pivotally connected to a drawbar, a single fluid pressure operated jack for controlling movement of the levers, and a yoke connecting the jack to both levers.

It is yet another object of this invention to provide a yoke construction as aforementioned which is pivotally connected to the levers for rotation relative thereto as the jack is extended or retracted, thereby maintaining the plane of the yoke aligned with the axis of the jack and minimizing the loads imposed on the yoke.

These and other objects of this invention are attained in a self-propelled scraper vehicle of the type comprising a tractor connected to a drawbar, and a frame member including the scraper bowl pivotally connected to the drawbar for relative articulation therebetween about a horizontal transverse axis for lifting and lowering the scraper bowl between a lowered digging position and a raised carrying position. A pair of spaced levers each have one end thereof pivotally connected to the drawbar and the other end thereof operatively pivotally connected to the front end of the bowl by means of rigid links or rods. A yoke or bridge extends between the aforementioned levers and has its opposite ends respectively pivotally connected to the levers intermediate the ends of the latter on a common horizontal transverse axis. A fluid pressure operated jack comprising the usual relatively extensible and contractable piston and cylinder elements has one element thereof pivotally connected to the drawbar and the other element pivotally connected to the aforementioned yoke on an axis extending longitudinally of the vehicle at right angles to and approximately intersecting the common axis of pivotal interconnection of the levers and the aforementioned yoke. Thus, the respective pivotal connections of the yoke or bridging member to the jack and the levers form a universal joint which functions to substantially equalize, within limits, the loads or stresses on the lift rods and to avoid the imposition of severe stresses on the bowl frame due to twisting of the latter. Further, the yoke may pivot relative to the levers as the jack is extended or retracted to stay aligned with the jack and the thrust exerted thereby. Hence, the loads imposed on the yoke are minimized and the latter may be of a minimum size.

These and other objects, features and advantages of the invention will become more apparent hereinafter as the description of the invention proceeds, and in which reference is made to the drawings in which:

FIGURE 1 is a side elevation of a self-propelled scraper vehicle equipped with a preferred embodiment of the invention;

FIGURE 2 is a fragmentary view taken on line 2-2 of FIGURE 1;

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FIGURE 3 is an enlarged fragmentary view of a portion of FIGURE 1 illustrating certain details of the invention; and

FIGURE 4 is a view taken on line 4—4 of FIGURE 3.

Referring now to the drawings, FIGURE 1 thereof illustrates a scraper vehicle comprising an overhung tractor or prime mover 2 equipped with ground engaging drive wheels 4 and a drawbar 6 including rearwardly diverging arms 8 rigidly secured to a transversely extending torque tube 10 having the usual rearwardly extending pull arm 12 at each end thereof embracing the side walls 14 of a rear bowl frame member 16 equipped with the ground engaging and support wheels 18. The forward merged ends of arms 8 are connected by a conventional hitch 20 to the tractor 2, while the ends of each of the pull arms 12 are suitably pivotally connected to the side walls of the scraper bowl on a common horizontal transverse axis indicated generally at 22. The bowl is equipped with the usual transversely extending cutting edge 24 adjacent the forward end thereof, an apron, an ejector and suitable devices for controlling operation of the apron and ejector as will be apparent to those skilled in the art. However, since the details of the scraper bowl form no part of the present invention, further description thereof is deemed to be unnecessary. For a more detailed disclosure of one type of scraper bowl mechanism preferably utilized with the subject construction, reference may be made to the copending United States application of Ralph J. Bernotas, Serial No. 839,820, entitled "Scraper Bowl" and filed September 14, 1959.

Referring now particularly to FIGURES 3 and 4, a pair of substantially identical levers 26 each have one end pivotally connected at 28 to a support bracket 30 rigidly secured to the diverging arms of the drawbar 6, it being noted that these connections have a common pivot axis extending horizontally and transversely of the vehicle. The other end of each of the levers is connected pivotally at 32 to one end of a rigid lift rod or link 34 having its lower end pivotally connected at 36 to a lift beam 38 extending transversely between and rigidly secured to the forward portions of the bowl side walls 14. A generally U-shaped bridge member or yoke 40 has its opposite ends pivotally connected at 42 to the respective levers 26 intermediate the ends of the latter and on a common horizontal axis extending transversely of the vehicle. A single-acting fluid-pressure operated hoist or jack comprises the usual cylinder 44 having a piston including the piston rod 46 reciprocally disposed therein. The end of the cylinder is pivotally connected to the drawbar on a horizontal transverse axis as indicated at 48, while the end of the piston rod is pivotally connected at 50 centrally of the bridge member or yoke 40 substantially equidistantly from the pivotal connections 42. The axis of the pivotal connection 50 extends longitudinally of the vehicle at a right angle to the common pivot axis of the connections 42, and approximately intersects the axis of the latter although preferably spaced slightly above thereof. The jack is connected in a suitable fluid system and is extensible upon application of fluid under pressure thereto, and may be vented to permit its contraction due to the weight of the bowl.

In operation, and assuming that the bowl is to be lifted as from its digging position to its carrying position, fluid under pressure is supplied to the jack to cause the piston and piston rod 46 to move outwardly thereof. Extension of the jack pivots the levers 26 about their pivotal connections 28 to the drawbar to lift the scraper bowl through lift rods 34. As will be readily apparent, as the levers pivot upwardly about their pivot connections 28 to the drawbar, the line of action or thrust axis of the jack between its pivotal connections 48 and 50 swings counterclockwise in FIGURE 3 about the pivotal connection 48. As this line of action or thrust supplied by

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the jack changes in this manner, the bridge or yoke member 40 is free to rotate accordingly about its pivotal connections 42 to the levers 26. Consequently, the general plane of yoke 40 is maintained in alignment with the thrust axis of the jack, thereby eliminating the extraneous forces or stresses which would otherwise be imposed on the yoke and minimizing the size of yoke required. Furthermore, the bridge or yoke 40 is also free to pivot about the pivotal connection 50 thereof to the piston rod 46 so as to tend to equalize the loads on the lift rods 34, to prevent the introduction of severe stresses in the bowl frame 16 due to twisting thereof about a longitudinal axis, and to compensate for differences which may exist in the lengths of the rods 34 between the connections 32 and 36 and other such structural variations arising from the relatively large tolerances employed in the manufacture of such scrapers. To lower the bowl, the jack is vented, permitting gravity-lowering of the bowl and return of the piston within its cylinder. As will be obvious, the yoke construction and its connections to the levers 26 and piston rod 46 function as aforesaid, except that the yoke pivots clockwise in FIGURE 3 relative to the levers 26.

While but one form of the invention has been shown and described, other forms will now be apparent to those skilled in the art. Therefore, the embodiment shown in the drawing is merely for illustrative purposes, and is not intended to limit the scope of the invention which is defined by the claims which follow.

I claim:

1. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers pivotally connected to said first frame member, means connecting each of said levers to said second frame member, a yoke connected to said levers about a first pivot axis, and power operated means mounted on said first frame member and connected to said yoke about a second pivot axis perpendicular to the first pivot axis so as to permit limited twisting movement of the second frame member about said second pivot axis.

2. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers pivotally connected to said first frame member on a horizontal transverse axis, means connecting each of said levers to said second frame member, a yoke connected to said levers about a first pivot axis, axially extensible and retractable means mounted on said first frame member and pivotally connected to said yoke on an axis perpendicular to the first axis and extending longitudinally of said vehicle to pivot said levers to permit limited twisting movement of the second frame member about its said perpendicular pivot axis.

3. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers each having one end thereof pivotally connected to said first frame member on a common horizontal

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transverse axis, a rigid link pivotally connected to the other end of each of said levers and to said second frame member, a yoke connected between said levers on a first pivot axis intermediate the ends of the lever, and axially extensible and retractable means mounted on said first frame member and pivotally connected to said yoke about a second pivot axis perpendicular to the first pivot axis and on a longitudinal axis equidistantly from the connections of the yoke to said levers to permit limited twisting movement of the second frame member about the second pivot axis.

4. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers pivotally connected to said first frame member on a common horizontal transverse axis, means connecting each of said levers to said second frame member, a yoke extending between and having its opposite ends pivotally connected respectively to said levers on a common horizontal transverse axis and axially extensible and retractable means pivotally connected to said yoke about an axis extending longitudinally of the vehicle and pivotally connected to said first frame member on a horizontal transverse axis so as to permit limited twisting movement of the second frame member about said longitudinal axis.

5. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers each having one end thereof pivotally connected to said first frame member on a common horizontal transverse axis, a rigid link pivotally connected to the other end of each of said levers and to said second frame member, a yoke extending between and having its opposite ends pivotally connected respectively to said levers intermediate the ends of the latter and on a common horizontal transverse axis, and axially extensible and retractable means pivotally connected to said yoke about an axis perpendicular to said transverse axis and pivotally connected to said first frame member on a horizontal transverse axis so as to compensate for any difference in length of said links.

6. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers pivotally connected to said first frame member, means connecting said levers to said second frame member, power operated means mounted on said first frame member and operable to lift and lower said levers, and a universal joint connection between said power operated means and said levers.

7. The invention as defined in claim 6 in which said universal joint connection comprises a yoke extending between and having its opposite ends pivotally connected respectively to said levers on an axis parallel to and spaced from the axis of the connections of said levers to said first frame member, and means pivotally connecting said power operated means to said yoke equidistantly from the connections of the latter and to said levers and on an axis at a right angle to the axis of the pivotal connections of said yoke to said levers.

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8. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers, means pivotally connecting said levers to said first frame member on a common horizontal transverse axis, means connecting said levers to said second frame member, a jack including relatively reciprocable elements, means pivotally connecting one of said elements to said first frame member on an axis parallel to and spaced from said first-named axis, and a universal joint connection between the other of said elements and said levers.

9. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers, means pivotally connecting said levers to said first frame member on a common horizontal transverse axis, means connecting said levers to said second frame member, a yoke extending between said levers, means pivotally connecting the opposite ends of said yoke to said levers on a common axis parallel to and spaced from said first-named axis, a jack including relatively reciprocable elements, means pivotally connecting one of said elements to said first frame member on an axis parallel to and spaced from said first and second-named axes, and means pivotally connecting the other of said elements to said yoke equidistantly from the connections of the latter to said levers and on an axis extending at a right angle to the common axis of the pivotal connections of said yoke to said levers.

10. A scraper vehicle comprising a first frame member, a second frame member including a scraper bowl, means pivotally interconnecting said frame members for movement of said bowl between a lowered digging position and a raised carrying position, bowl control means mounted on said first frame member and connected to said second frame member to control the position of said bowl, said bowl control means comprising a pair of spaced levers, means pivotally connecting one end of each of said levers to said first frame member on a common horizontal transverse axis, a pair of rigid links, means pivotally connecting one end of each of said links to the other end of a respective lever, means pivotally connecting the other end of each of said links to said second frame member, a yoke extending between said levers, means pivotally connecting the opposite ends of said yoke to said levers intermediate the ends of the latter on a common axis parallel to and spaced from said first-named axis, a fluid pressure operated jack including relatively reciprocable piston and cylinder elements, means pivotally connecting one of said elements to said first frame member on an axis parallel to and spaced from said first and second-named axes, and means pivotally connecting the other of said elements to said yoke equidistantly from the connections of the latter to said levers and on an axis approximately perpendicular to the common axis of the pivotal connections of said yoke to said levers.

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