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AUTOMATIC LEVELING MEANS FOR HEARSEES AND OTHER VEHICLES

Filed Dec. 9, 1932

2 Sheets-Sheet 1

Fig. 1

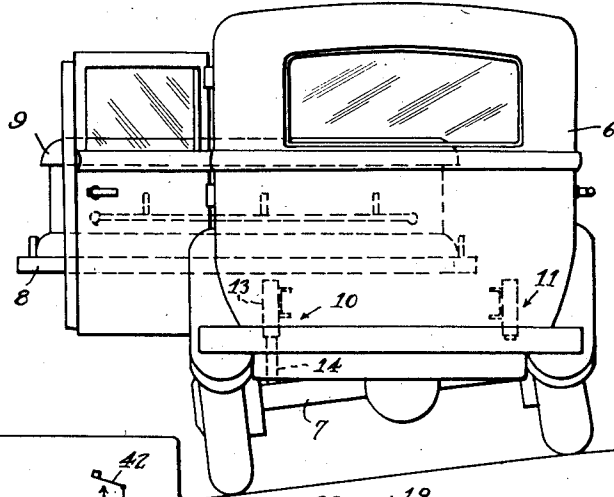
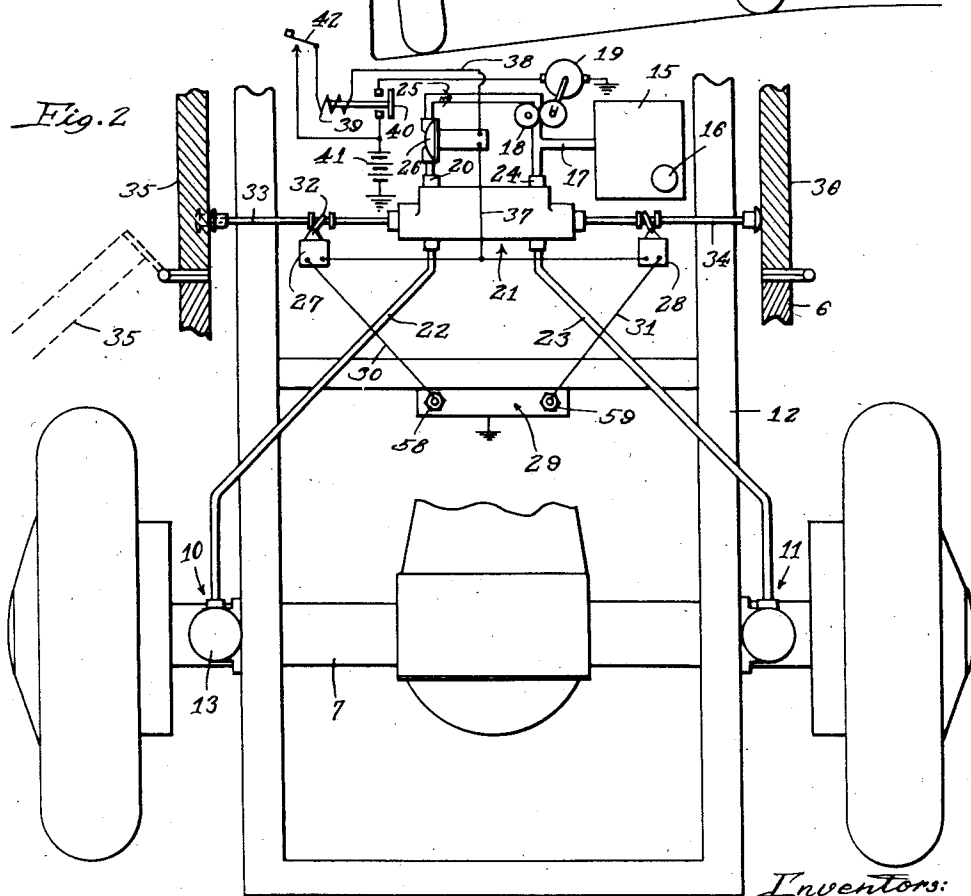


Fig. 2



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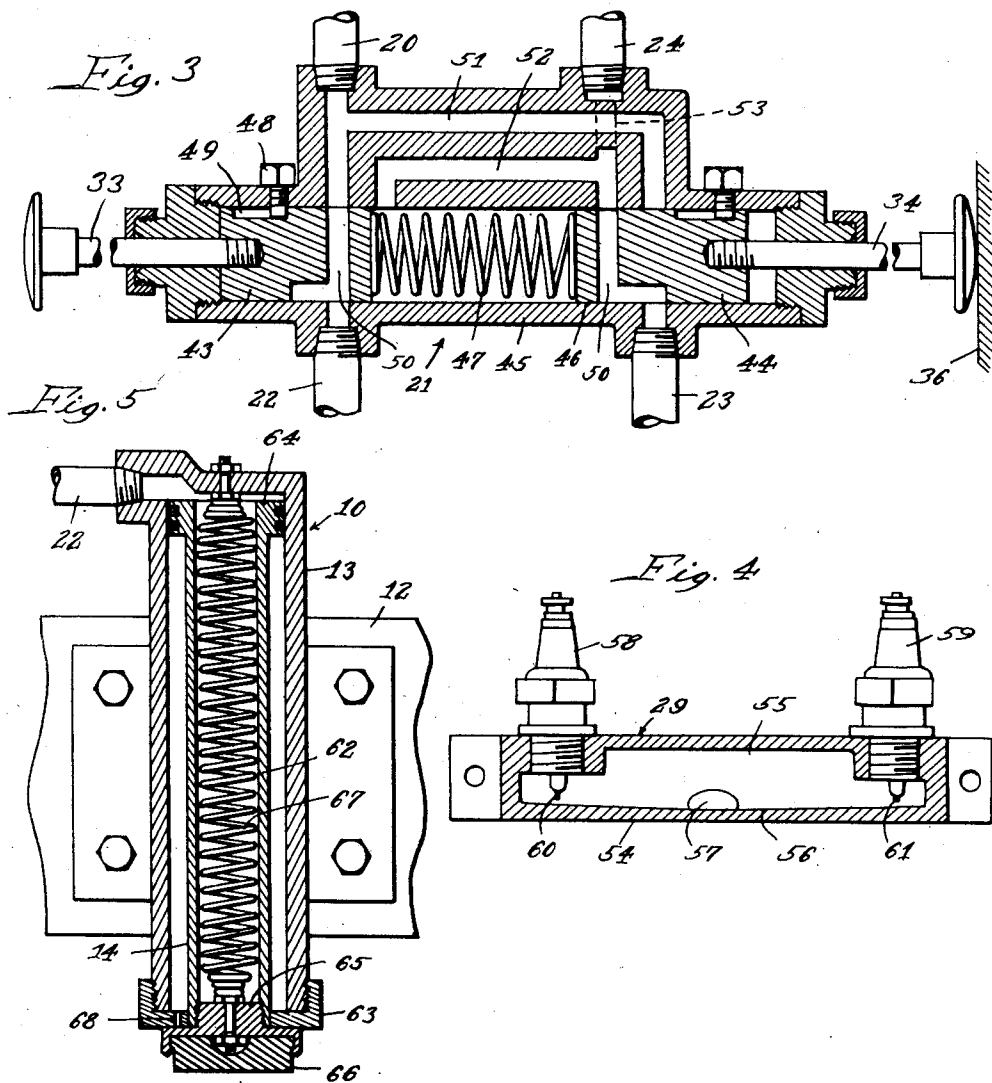
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AUTOMATIC LEVELING MEANS FOR
HEARSES AND OTHER VEHICLESEdward Richter and August Richter,
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17 Claims. (Cl. 296—16)

REISSUED

Our invention relates to vehicle leveling means generally, and is particularly concerned with one suitable for use on hearses to insure proper disposition of the casket table in loading and unloading the casket.

The principal object of our invention is to provide leveling means of an automatic type in which the movement of a mercury pool to a central position controls the operation of the leveling means, and in which the mere act of opening the door of the hearse throws the leveling means into operation to level the hearse. In other words, we have aimed in our invention to secure entirely automatic operation.

Other objects and advantages of our invention will be brought out in the course of the following detailed description, in which reference is made to the accompanying drawings, wherein—

Figure 1 is a rear view of a side service hearse at a curb, illustrating how the body thereof is leveled in accordance with our invention;

Fig. 2 is a plan view of the hearse chassis illustrating in a schematic fashion the automatic leveling means of our invention;

Fig. 3 is a horizontal section through the control valve incorporated in the oil circuit;

Fig. 4 is a vertical longitudinal section through the level incorporated in the electrical circuit, and

Fig. 5 is a vertical section through one of the jacks for lifting the hearse body relative to the rear axle housing.

The same reference numerals are applied to corresponding parts throughout the views.

Referring to Figure 1, we have illustrated a side service hearse standing at the curb on a street having the usual crown. There is such sidewise inclination of the hearse body due to the grading of the street from the crown to the curb that, unless the hearse is leveled, the casket table when extended from the side of the hearse comes too close to the sidewalk and may even come in contact with it where the street has a high crown and a high curb. Our invention aims to avoid this objection by raising the hearse body, designated by the numeral 6, relative to the rear axle housing 7 on the curb side so as to make it level, and accordingly level the table 8 bearing the casket 9. A jack is indicated generally by the numeral 10 performing the function stated, and another jack is indicated generally by the numeral 11 on the other side of the hearse arranged to be used when the hearse is standing with that side next to the curb. It will be understood that while we have confined the disclosure to hearses, the invention is not to be regarded as limited to such an application but might be used on ambulances and any other vehicle where a similar problem is presented. It

should also be understood that while we refer to the use of jacks for cooperation only with the rear axle housing, other jacks could be provided for cooperation with the front axle, although we have found that there is actually no need for jacking up both ends, especially if the hearse body is of good rigid construction, which is usually the case.

Referring to Fig. 2, the frame or "mount" on which the table 8 is mounted is indicated at 12 and has the cylinders 13 of the jacks 10 and 11 suitably secured to the sides thereof directly over the rear axle housing 7 so that the plungers 14 working therein and extensible therefrom will engage the rear axle housing to lift the frame and body relative to the axle, as illustrated in Figure 1. The jacks 10 and 11 are operable by any suitable fluid, although we prefer the use of oil. A reservoir for the oil is shown at 15 and has a removable filler cap 16. The pipe 17 is for removal of the oil from the tank and also for return thereof. A gear pump indicated at 18 is driven by an electric motor 19 to deliver oil under pressure to the inlet 20 of the control valve, indicated generally by the numeral 21. Two pipes 22 and 23 lead from the valve 21 to the two jacks 10 and 11 for the purpose of delivering oil under pressure selectively to either of the jacks in the manner presently described, or to return the oil from either of the jacks to the valve 21 for return to the tank 15 through the outlet 24 and pipe 17. A spring-pressed check valve 25 seats in the direction indicated so as to maintain pressure on the left side of the valve when the pump 18 has ceased operating, whereby, as will soon appear, to permit holding the plunger 14 of either jack extended with the load thereon. 26 is a pressure switch which is at all times subject to the pressure in the line and is arranged to break the circuit for the motor 19 in case it continues to operate after the jack plunger has been extended as far as it will go, whereby to prevent overload on the motor and undue pressure in the line. Now, the motor 19 is thrown into operation by the closing of either one of two switches 27 and 28, assuming that the level 29 is inclined sufficiently to close a circuit grounding the conductors 30 and 31, as will presently appear. The switches 27 and 28 are of a toggle type having levers 32 projecting therefrom and arranged to be moved from the positions shown by the outward movement of the rods 33 and 34 in the opening of the side doors 35 and 36, respectively. The two switches have a common conductor 37 extending therefrom and connected to one terminal of the switch 26. Another conductor 38 extends from the other terminal of the switch to the coil 39 of a relay 40. The latter is arranged upon completion of a circuit through the coil 39 to close the circuit

through the motor 19 from the battery 41, which may be the battery used also for lighting and starting, or may be a separate battery for the purpose of supplying power for the operation of the leveling means. We prefer to provide a switch 42 on the instrument board to be closed by the driver when the hearse draws up to the curb for loading or unloading, in order that the automatic leveling means will not be operated except when desired.

In operation, assuming that the left side door 35 is opened, as indicated in dotted lines, the rod 33 moves outwardly under the action of a spring in the valve 21 to close the switch 27 and simultaneously connect the inlet 20 of the valve 21 with the pipe 22. Then, assuming that the driver previously closed the switch 42 and that the level 29 is inclined sufficiently to ground the conductor 30, it will be seen that the motor 19 will be thrown into operation by reason of the closing of the relay 40 through the following circuit: From the battery 41 through switch 42, coil 39, conductors 38 and 37, to switch 27, and through conductor 30 to the ground. The pump 18 is accordingly operated to draw oil from the tank 15 through pipe 17 and delivers the oil under pressure through check valve 25 and the diaphragm housing of the pressure switch 26 to the inlet 20 of the valve 21 and thence through pipe 22 to the cylinder 13 of the jack 10. The motor 19 continues to operate the pump 18 until the jack 10 has leveled the frame 12 and body 6, at which time the motor stops because the relay 40 opens as a result of the opening of the circuit at the level 29, when the latter assumes a horizontal position with the frame 12. The jack 10 holds its position because the check valve 25 seats and prevents return flow of oil through the pump 18 to the tank 15. However, when the door 35 is closed, the rod 33 moves a valve plunger in the valve 21 against the action of its spring, as will soon appear, and establishes communication between the pipe 22 and the outlet 24 of the valve 21, thereby allowing the oil to be returned from the jack 10 to the tank 15, so that the hearse body returns to its normal position with relation to the rear axle housing. The operation is the same when the hearse is disposed with the other side next to the curb and the door 36 is opened, the jack 11 in that case being operated to level the body.

In Fig. 3 the valve 21 is shown with the parts thereof in a position assuming that the door 35 is opened and the door 36 closed, which corresponds to the condition above outlined. The valve plunger 43 on the end of the rod 33 is in a position establishing communication between the oil inlet 20 and the pipe 22 leading to the jack 10, and the valve plunger 44 on the end of the rod 34 is in a position establishing communication between the pipe 23 extending from the jack 11 and the oil outlet 24. The two valve plungers are slidably received in the body 45 of the valve 21 and are normally urged to the outermost ends of the bore 46 under the action of a coiled compression spring 47 disposed between the plungers. Screws 48 cooperate with grooves 49 in the plungers to hold the same against rotation, whereby to keep the passages 50 in said plungers in the same plane with passages 51 and 52 provided in the valve body, in order that communication will be established with the one or the other passage, according to the position of the respective plungers. The passage 51 is for establishing communication with the inlet 20 for either of the passages 50,

when the plunger is at the outer end of the bore, like plunger 43. A passage 53 establishes communication between the outlet 24 and the passage 52, and the latter establishes communication with the outlet for either of the plungers when the same is moved in against the action of the spring 47 to a position like the plunger 44. It will be seen that the passage 52 prevents dash-pot action in the bore 46 between the two plungers by allowing the admission of fluid to this space or the escape of fluid therefrom in the back and forth movement of the plungers. It should be clear that when the door 35 or 36 is opened, the plunger associated with that door moves outwardly under the action of the spring 47 to a position like the plunger 43 so that oil under pressure will be delivered from the inlet 20 to the jack controlled by the plunger in question, and, further, that when the door is closed, the same plunger is moved inwardly to a position like the plunger 44 so as to permit return of the oil from the jack through the outlet 24 to the tank 15.

The level 29 comprises a hollow elongated metallic body 54 suitably secured to the frame 12 in a plane parallel to the plane of said frame. The chamber 55 in the body 54 has the floor 56 thereof sloped from both ends toward the middle so that the mercury pool or button 57 provided therein will gravitate toward the central position shown when the level is truly horizontal. Terminal plugs 58 and 59 are provided on the opposite ends of the level and have insulated terminals 60 and 61, respectively, connected with the conductors 30 and 31 mentioned above. In that way, since it is clear that the body 54 of the level is grounded by being fastened to the frame, either of the conductors is grounded by having the mercury pool come in contact with the terminal associated therewith. Thus, if the level is tilted to the left, the pool occupies a position at the left end of the floor 56, in contact with the terminal 60, thereby grounding the conductor 30 connected with the plug 58, and if the inclination is to the right, the conductor 31 is similarly grounded.

Any suitable or preferred form of hydraulic jack may be used in connection with the present invention. The one shown in Fig. 5 has the plunger 14 formed with a reduced tubular portion 62 guided in a gland nut 63 on the lower end of the cylinder 13, the upper end of the plunger being enlarged as shown at 64 and having a close working fit in the cylinder bore. A plug 65 closes the lower end of the plunger 14 and serves both as a mounting for a bumper block 66 of any suitable sound-deadening material, for engagement with the rear axle housing, and as a place for anchoring the lower end of a coiled tension spring 67 disposed inside the plunger, the upper end of the spring being attached to the upper end of the cylinder 13 as shown. When oil under pressure is admitted to the cylinder, the plunger is moved downwardly against the action of the spring 67, the air in front of the enlarged portion 64 being allowed to escape through a small vent 68 provided in the nut 63. Then, when the pipe 22 is thrown into communication with the outlet 24 of the valve 21, as above described, the spring 67 is allowed to return the plunger to the retracted position as the oil is returned to the tank 15.

We claim:

1. In a hearse, having doors, and a casket table extensible through a selected door opening, power operated means placed in operable condition by the opening of the door for leveling said hearse from a position of sidewise inclination whereby

automatically to bring the table to substantially horizontal position.

2. In a hearse, having doors, and a casket table extensible through a selected door opening, power operated means rendered operative by the opening of the door for raising the table automatically to substantially horizontal position from a position of sidewise inclination caused by sidewise inclination of the body of the hearse.

3. In a hearse comprising a supporting axle, and a body supported on springs thereon and having doors, the combination of a casket table extensible through a selected door opening, and power operated means rendered operative by the opening of the door for raising one side of the hearse body relative to the axle automatically to level the same sidewise and accordingly bring the table to substantially horizontal position.

4. In a hearse, having a side service door, and a casket table extensible from the side of the hearse when the door is opened, power operated means placed in operation by the opening of the door operable automatically for leveling the hearse sidewise, whereby to bring the table to substantially horizontal position.

5. In a hearse, having a side service door, and a casket table extensible from the side of the hearse when the door is opened, a level, and power operated means controlled in accordance with the sidewise inclination of said level from a horizontal position and rendered operative automatically by the opening of the door, to level the hearse sidewise, whereby to bring the table to substantially horizontal position.

6. In a hearse having a side service door, and a casket table extensible from the side of the hearse when the door is opened, a leveling jack for raising the hearse from the same side as the service door, power operated means rendered operative automatically by the opening of the door to cause the operation of said jack automatically, and a level on the hearse for automatically causing stoppage of the jack when the hearse is leveled.

7. In a hearse having a side service door, and a casket table extensible from the side of the hearse when the door is opened, a power operated leveling jack rendered operative by the opening of the service door for raising the hearse from the same side as the service door, and a level on the hearse for automatically causing stoppage of the jack when the hearse is leveled.

8. In a hearse having a pair of opposed side service doors, and a casket table extensible from either side of the hearse when one of the doors is opened, power operated leveling jack means on both sides of the hearse to raise the hearse from that side on which the door is opened, means arranged in the opening of one of said doors automatically to render operative the leveling jack means associated with that door, and a level on the hearse for automatically causing stoppage of the leveling jack means when the hearse is leveled.

9. In a hearse having a pair of opposed side service doors, and a casket table extensible from either side of the hearse when one of the doors is opened, power operated leveling jack means on both sides of the hearse rendered operative by the opening of a service door to raise the hearse from that side on which the door is opened, the two leveling jack means being operable separately, independently of one another, and a level on the hearse for automatically causing stoppage of the leveling jack means when the hearse is leveled.

10. In a hearse having a pair of opposed side service doors, and a casket table extensible from

either side of the hearse when one of the doors is opened, fluid operated leveling jacks on opposite sides of the hearse, rendered operative by the opening of a service door for raising the hearse from either side depending on which door is opened, a source of pressure fluid supply, a selector valve shiftable automatically in the opening of a door for establishing communication between the source and either of said jacks, and a level on the hearse for automatically interrupting the jacking operation of either jack when the hearse is leveled.

11. The combination set forth in claim 10 including means for automatically operating the selector valve in the opening of either of the doors so as to render operative the jack associated with the open door.

12. The combination set forth in claim 10 including an electric motor for driving a pump constituting the source of pressure fluid supply, and electric switch means operated automatically when either of the doors is opened whereby to throw the motor into operation.

13. The combination set forth in claim 10 including an electric motor for driving a pump constituting the source of pressure fluid supply, and electric switch means operated automatically in the opening of either of the doors whereby to throw the motor into operation, said level being electrically connected with the motor to interrupt the circuit and stop the motor when the hearse is leveled.

14. The combination set forth in claim 10 including an electric motor for driving a pump constituting the source of pressure fluid supply, electric switch means operated automatically when either of the doors is opened whereby to throw the motor into operation, and means for automatically operating the selector valve in the opening of either of said doors so as to render operative the jack associated with the open door.

15. The combination set forth in claim 10 including an electric motor for driving a pump constituting the source of pressure fluid supply, electric switch means operated automatically when either of the doors is opened whereby to throw the motor into operation, and means responsive to a predetermined fluid pressure in the jack being operated for automatically interrupting the circuit for the motor to stop the same when the movable part of the jack has reached a limit position.

16. The combination set forth in claim 10 including a check valve between the source of pressure fluid supply and the selector valve for trapping fluid in the jack being operated, whereby to maintain the hearse in elevated position by means of the jack, said selector valve being constructed to afford an exhausting passage for said jack when the door that was opened has been closed.

17. A structure as set forth in claim 10, wherein a pump constitutes the source of pressure fluid supply, the structure including a reservoir communicating with the pump intake and containing a supply of liquid for operating the jacks, and a check valve between the pump and the selector valve for trapping liquid in the jack being operated, whereby to support the hearse in its jacked-up position, the selector valve being constructed to establish communication between the jack and the reservoir when the door that was opened is closed, whereby to permit return of the hearse to its normal position.

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