May 5, 1936. E. F. GREEN 2,039,896

HYDRAULIC VEHICLE JACK

Filed May 7, 1935 3 Sheets-Sheet 1

Fig. 1.

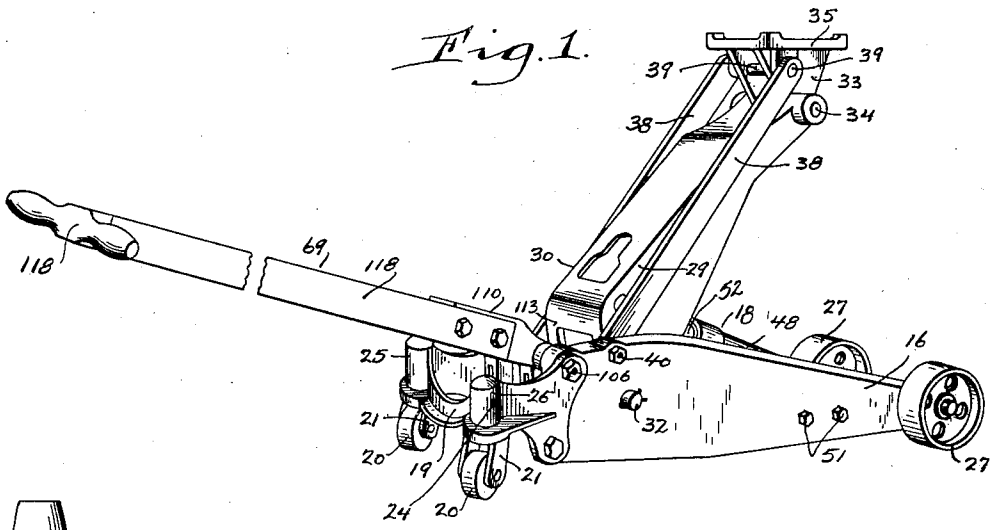


Fig. 5.

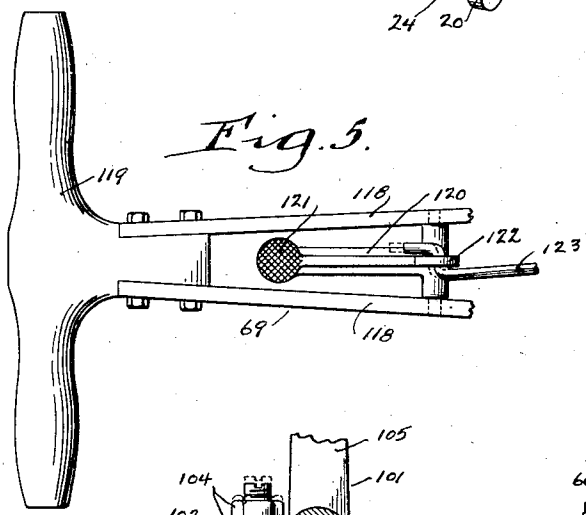
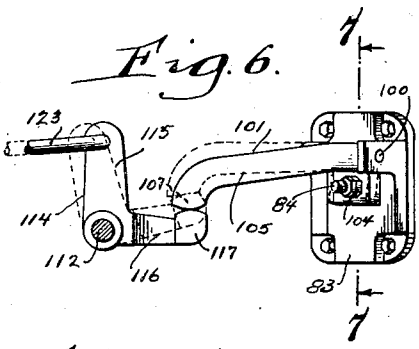


Fig. 6.



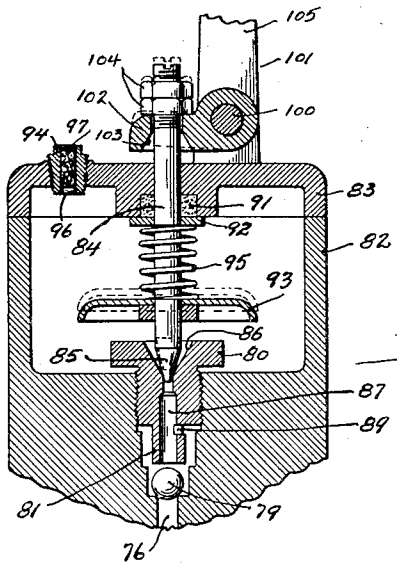
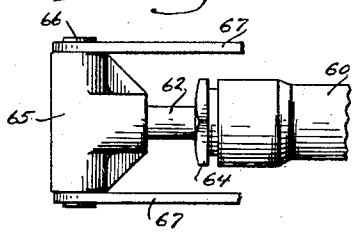


Fig. 7.

Fig. 11.



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HYDRAULIC VEHICLE JACK

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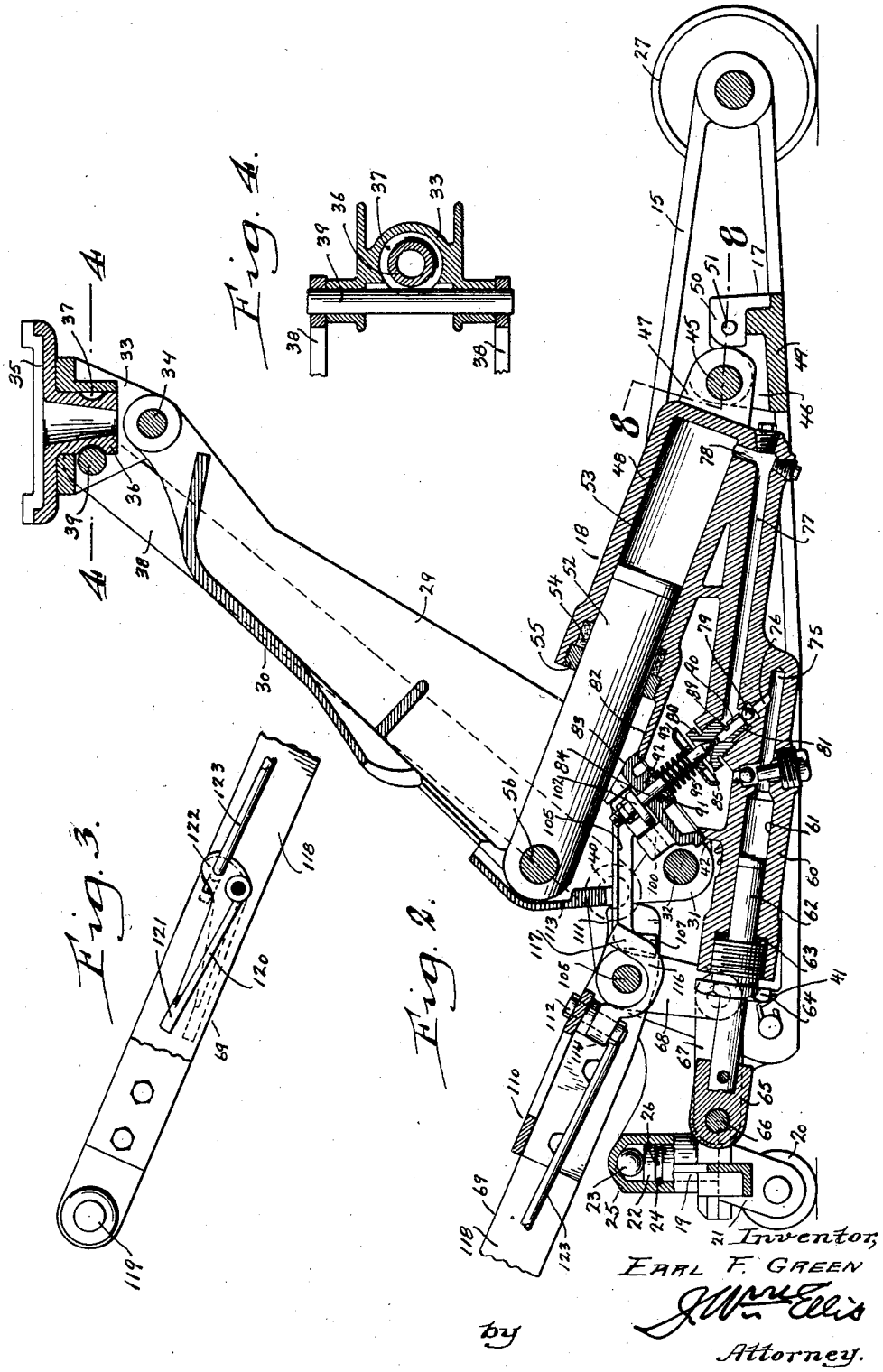

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HYDRAULIC VEHICLE JACK

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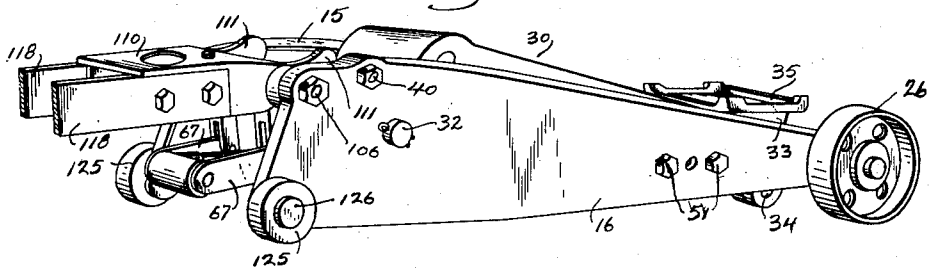
Fig. 10.



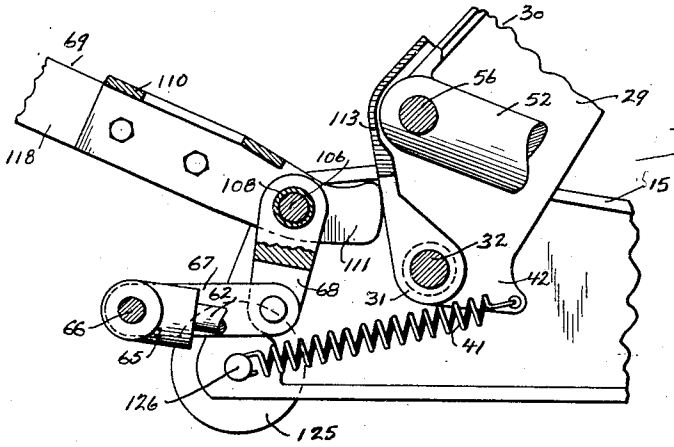


Fig. 9.

Fig. 8.

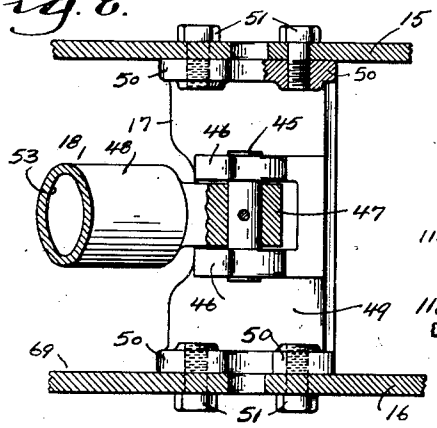
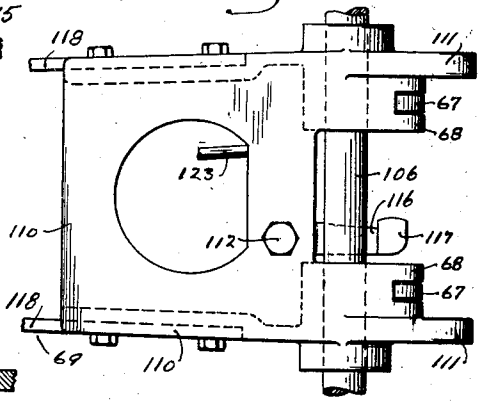


Fig. 12.



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Patented May 5, 1936 2,039,896

UNITED STATES PATENT OFFICE

2,039,896

HYDRAULIC VEHICLE JACK

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Application May 7, 1935, Serial No. 20,187

17 Claims. (Cl. 254—2)

My invention relates in general to hydraulic jacks and in particular to that type of jack having a pivoted power arm for raising vehicles and ordinarily known as curb or garage jacks.

One of the objects of my invention has been to provide a jack having its side members fastened together by a separator which provides the mounting for the power unit of the device.

Another object has been to provide a release control which shall be protected against accidental operation, said control being operable from the handle at any position of the handle.

Another object has been to provide a jack having a baffle plate in the reservoir to prevent the oil discharging therein from striking the valve packing gland or the breather hole of the reservoir.

Another object has been to provide a jack of th's nature having its power unit arranged below the power arm and pivoted at a point in front of the cylinder of such power unit, whereby the power piston of such cylinder will act away from the lifting pad of the jack.

Another object has been to provide a jack having an operating handle which shall be provided with suitable lugs acting as detents to limit further movement of the operating handle after the power arm has been raised to its maximum position.

Another object is to provide a jack having a two-part frame, the members of which are held in interspaced relation by means of a spacer, which provides a pivotal connection for the power unit of the device.

Another object has been to provide a power unit for such a jack, having a detachable cover for the reservoir which shall carry the release valve of the device, thereby making the release valve assembly very accessible.

Another object has been to provide a spacer having right-angled flanges by which it is rigidly secured to the frame members, whereby such members are rigidly held together.

Moreover, the release valve of my device is so designed that when the oil is being forced from the cylinder, the valve will be cleaned.

Furthermore, my device is so constructed that the upper pivotal pin for the drag links acts as a retainer for the pivotally mounted rest plate.

Moreover, it has been an object to provide a jack so designed that the power arm may be located over the power cylinder, thus making a very compact arrangement, and providing for a structure which is convenient to assemble and inexpensive to manufacture.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a perspective view of one form of my device in its elevated position.

Fig. 2 is an enlarged, longitudinal, sectional elevation of the device shown in Fig. 1, with portions thereof broken away and other portions in section.

Fig. 3 is a fragmentary view of the upper portion of the operating handle.

Fig. 4 is a sectional view of the upper end of the power arm and is taken on line 4—4 of Fig. 2.

Fig. 5 is a plan view of that portion of the operating handle shown in Fig. 3.

Fig. 6 is a fragmentary view showing a portion of the release mechanism, which is connected to that portion thereof shown in Fig. 5.

Fig. 7 is an enlarged, fragmentary, sectional view of the release valve of my device and is taken through the complete valve structure at the position indicated by the line 7—7 of Fig. 6.

Fig. 8 is an enlarged, fragmentary, transverse, sectional view taken on line 8—8 of Fig. 2.

Fig. 9 is an enlarged, fragmentary, sectional view of the rear end of the device, and shows some parts of a modified form of device.

Fig. 10 is a perspective view of the form of jack shown in Fig. 9 in its lowered position.

Fig. 11 is a fragmentary, plan view showing the oil pump and the plunger links.

Fig. 12 is a fragmentary, top view of the operating handle yoke.

My device comprises two side frame members 15 and 16 which are interspaced and fastened together at their forward ends by means of a spacing block 17 which, as hereinafter set forth, provides the pivotal mounting for the power unit 18 of the device.

In the specific form of invention shown in Figs. 1 and 2, the forward ends of the side frame members are held together and in interspaced relation by means of a yoke bracket 19. This yoke bracket provides a mounting for the caster wheels 20 at the rear end of the device. Each of these caster wheels is mounted in a caster yoke 21, having its vertical shank 22 mounted in the cylindrical projection 25 of the bracket and provided with an anti-friction ball 23 above the same. A lock pin 24 passes through each of the projections and is engageable with a groove 26 formed in the shank. The forward end of the device is provided with wheels 27.

My device is provided with a power arm 30 which is attached at its lower end 31 to the side

frames 15 and 16 by means of a pivot pin 32. This arm is preferably of inverted U-shaped cross-section, having depending side flanges 29. Attached to the upper end of the power arm is the rest plate bearing yoke 33 which is pivotally connected to the arm by means of a pivot pin 34. Pivotally carried by this yoke is a rest plate 35 which has a downwardly extending bearing stud 36 formed with a groove 37. Drag links 38 are provided at each side of the power arm and these drag links are connected together and to the bearing yoke by means of a pin 39. This pin passes through the yoke 33 and is so positioned that it engages with the groove 37 of the bearing stud 36. The upper surface of the rest plate is so formed that it will engage various under portions of the chassis of the vehicle without slipping. The bottom end of each drag link is pivotally connected to one of the side frame members 15 and 16 by means of a pivot pin or bolt 40. By means of the drag links the rest plate bearing yoke 33 and the rest plate 35 carried thereby will be held in substantially the same position irrespective of the movement of the power arm.

Suitable means are provided for bringing the power arm back to its lower position when, of course, the release valve is open. These means preferably comprise pull-back springs 41, one arranged preferably at each side of the device and having its forward end attached to a spring arm 42 carried at each side of the lower end of the power arm and extending downwardly and backwardly from the pivotal connection 32 thereof. The rear end of each of these springs is suitably connected to one of the side frame members in any suitable way. In the form of invention shown in Figs. 9 and 10, the spring is attached to the bearing pins 126 of the rear wheels 125. It will be seen that the arms 42 and springs 41 are so relatively located that when they are in the positions shown in Fig. 9, where the power arm has been raised its maximum amount, the springs will be under maximum pull, but the effective length of the arms 42 is at a minimum. When the power arm is rotated to normal position about its pivot 32, the effective length of the arms 42 will increase, but the pull on the springs will also decrease in proportion to their movement, thus the effective pull of the springs upon the arm is substantially uniform throughout the range of movement of the power arm.

As hereinbefore set forth, the power unit 18 of my device is pivotally attached to the spacing block 17 by means of a pivot pin 45 which passes through suitable lugs 46 carried by the block and through a pivot lug 47 carried at the forward end of the cylinder 48 of the power unit. The lugs 46 are arranged near the center of the spacing block and the pivot pin 45 is, therefore, arranged near the center of the block, thus leaving a space between each of the ends of the pin and the adjacent side member for the reception of the side flanges 29 of the power arm when the same is in its normal, lower position. The lugs 46 are carried by a web 49 which extends across the space between the side frame members and which is connected to suitable attaching lugs or bosses 50 provided at each side of the web for attachment to the side members by means of bolts 51. The power unit extends rearwardly from its pivot pin 45 and the cylinder 48 thereof is provided with a power piston 52 which is slidable within the bore 53 of the cylinder. The cylinder is provided with suitable packing 54 held in place by means of a gland 55. The outer end of the piston is pivotally attached to a pivot pin 56 which is carried by the power arm 30. This pin is arranged some distance above the pivot pin 32 of the power arm and the power arm is elevated by it when the piston is moved outwardly within the power cylinder.

Arranged below and to the rear of the power cylinder 48 is a pump cylinder 60, in the bore 61 of which is slidably mounted a pump plunger 62. This plunger is suitably packed by means of packing 63 carried by the cylinder 60 and by means of packing gland 64. At the outer end of the pump plunger is rigidly secured a plunger head 65 which carries a pivot pin 66. This pivot pin extends outwardly from each side of the head and provides pivotal connections for the plunger links 67, one of each of which is arranged at each side of the head. These plunger links extend forwardly and are attached to the operating arms 68 of the operating handle 69 of my device, to be hereinafter described.

The power cylinder 48 is connected with the plunger cylinder 60 by means of passageways 75, 76, 77, and 78. At the upper end of passageway 76 which is arranged in an inclined plane is a ball check valve 79 which serves to prevent fluid which has been forced through passageway 75 to passageway 76 from returning to passageway 75. A release valve plug 80 is screwthreaded into the power unit and preferably in line with the passageway 76. This plug, to be hereinafter described, has a tubular projection 81 which extends down toward the passageway 76 and which acts as a retainer to keep the ball check valve 79 in registering position with its seat at the top of passageway 76.

The release valve plug 80 extends up into an oil reservoir 82 located preferably underneath the power cylinder 48 and above the pump cylinder 60. This reservoir is provided with a cover 83 in which is slidably mounted a release valve stem 84. The lower end of this stem 84 is provided with a tapered end 85 which engages with a V-shaped valve seat 86 formed in the upper end of the plug. The included angle of the tapered end 85 of the valve stem is less than the included angle of the valve seat 86 formed in the upper end of the plug, so that just as soon as the valve is lifted off its seat, the oil will be permitted to pass over the tapered surface of the end 85 thereof and clean the same. This valve seat is in communication with the passageway 76 through a central bore 87, formed through the plug and the extension 81 thereof. So as to prevent the ball check 79 from closing the central bore 87, an opening 89 and a slot 90 are formed in the extension 81. The stem 84 is provided with suitable packing 91 carried by the cover 83 of the oil reservoir, and a washer 92 is arranged about the stem and disposed adjacent the packing 91. A baffle plate 93 is carried by the stem 84 and arranged a short distance from the point 85 thereof. This baffle plate is suitably attached to the stem in rigid manner and it serves to deflect the oil coming through the release valve plug and thus prevent its being forced along the stem and out through the packing thereof or being forced toward the breather plug 94 of the reservoir. A helical spring 95 is arranged about the valve stem and between the washer 92 and the baffle plate 93. This spring serves to keep the tapered end 85 of the stem upon the seat 86 formed in the plug 80. The breather plug 94 is preferably carried by the cover 83 of the reservoir and is provided with a central bore

96 which is closed by means of a felt plug 97. The felt will permit the passage of air only therethrough as the oil is being drawn from and discharged into the reservoir.

Pivotally carried upon a pivot pin 100, mounted upon the cover 83 of the reservoir, is a release lever 101. This lever has a short arm 102 having an opening 103 formed therein through which the outer end of the release valve stem 84 is passed. Lock nuts 104 are secured to the outer end of the stem so that when the lever is rotated in clockwise direction as viewed in Fig. 7, the release valve will be raised from its seat. The lever is also provided with a long arm 105 which extends rearwardly toward the pivot pin 106 of the operating handle 69. This arm does not extend to the pivot pin 106 but close to it and is provided with an outer depending lug 107.

The operating handle of my device is provided at its lower end with a yoke 110 which is pivotally secured to the pivot pin 106 and forming part of which are the operating arms 68. This yoke is provided with two detent arms 111 which extend outwardly toward the power arm. When the power arm has been operated beyond the position shown in Fig. 2, these detent arms will frictionally engage the outside surface of the wall 113 and serve to retard further actuation of the operating handle 96, thereby preventing the further movement of the power arm 30. A release segment lever 114 is pivotally attached to the yoke 110 of the operating handle by means of a pivot bolt 112 and this lever is provided with a lowering rod arm 115, and a release lever arm 116, arranged at right angles to the rod arm. As shown in Fig. 2, the release lever arm of the lever is curved downwardly and upwardly around the operating arm pivot 106 and is provided at its outer end with a segment 117 which is engageable with the depending lug 107 of the long arm 105 of the release lever. The segment is of considerable length and it will always engage with the depending lug regardless of the position of the operating arm.

The operating handle is preferably formed of interspaced side members 118 which are held together at their lower ends by means of the yoke 110 and at their upper ends by means of the handle grip 119. Below the handle grip and between the members 118 is pivotally mounted a lowering lever 120. This lever is provided with a serrated button 121 at its outer end for engagement with the finger of the operator when it is desired to lower the jack. This lever with its button lies between the upper and lower edges of the side members 118, as clearly shown in Fig. 3, and thus it is protected from accidental operation. This lever is provided with an upwardly extending arm 122 which is connected with the rod arm 115 of the segment lever 114 by means of a control rod 123.

The form of invention shown in Figs. 9 and 10 is similar to that shown in the other figures except that it is provided at its rear end with wheels 125 which are rotatably mounted on fixed bearing pins 126. One of these bearing pins is carried by each of the side frame members 15 and 16. In this form of invention, the rear ends of the side members are preferably held in interspaced relation by means of a spacer sleeve 108 which is disposed about the pivot pin 106 of the operating handle. The sleeve extends through the operating handle and bears against the inner surfaces of the side frame members.

From the foregoing it will be clear that when my device is to be used, it is wheeled into position where the rest plate 35 will engage with the desired part of the vehicle, and the operating handle 69 is moved up and down which causes oil to be drawn from the reservoir 82 into the pump cylinder 60 which, through the medium of the pump plunger 62, will be forced through passageways 75 and 76, past ball valve 79, and into the power cylinder through passageways 77 and 78. The oil in the cylinder 48 will, of course, force the power piston outwardly against its pivotal connection 56, which will cause the arm to be raised. Should the operating arm be actuated to raise the power arm beyond the height for which the device is designed, the detent arms 111 will frictionally engage with the outer surfaces 113 of the power arm and thus retard further actuation of the operating arm.

When it is desired to lower the load, the operator's finger is pressed upon the button 121 of the lowering lever which will cause the lowering rod to be drawn upwardly toward the outer end of the lever. Movement of the lowering rod in this direction will cause the segment 117 to be pushed against the operating arm 107 of the release lever 105. This will cause the short arm 102 of the release lever to be operated to move the release valve stem 84 outwardly and to move its tapered end 85 off of the seat 86 formed in the plug 80. Liquid will now pass from the power cylinder 48, under pressure created by the weight of the load carried by the jack, as well as the weight of the arm and the rotative tendency created by the pull-back springs 41, through passageways 78 and 77 and through the central bore 87 of the release valve plug 80, the tapered end 85 of the valve stem being off its seat, the oil will pass out of the plug 80 and into the reservoir 82. Since the angle formed by the V-shaped seat 86 of the plug 80 is preferably greater than the angle of the pointed end 85 of the release valve stem 84, the oil returning from the power cylinder to the reservoir, as just above described, will be forced under considerable pressure past the pointed end 85 of the valve and over the surface 86 of its seat and thus serve to keep this valve clean and in normal working condition. As hereinbefore stated, the baffle plate 93 will prevent oil from being projected or impinged upon the packing of the valve stem or the breather plug 94. It is obvious that during this lowering movement, pressure of the oil in the passageway 77 will cause the ball check valve 79 to be forced down onto its seat and thus prevent the oil from flowing into the plunger cylinder 60.

Having thus described my invention, what I claim is:

1. A hydraulic vehicle jack comprising a two-part, wheeled frame, a spacing member secured to the frame members, a power arm pivotally carried by the members of the frame, a power unit disposed between the frame members and pivotally secured to the spacing member by means separate and independent of the means for securing the spacing member to the frame, and means pivotally mounted on the frame for operating the power unit.

2. A hydraulic vehicle jack comprising a two-part, wheeled frame, a spacing member secured between the frame members and formed with a socket portion, a power arm pivotally carried by the members of the frame, a power unit disposed between the frame members and pivotally carried by and having a portion thereof mounted in

the socket of the spacing member, and means pivotally mounted on the frame for operating the power unit.

3. A hydraulic vehicle jack comprising a two-part, wheeled frame, a spacing member secured between the frame members, a power arm pivotally carried by the members of the frame, a power unit disposed between the frame members, a pivot pin for the power unit, said pivot pin being carried by the spacing member and being shorter than the distance between the frame members, and means pivotally mounted on the frame for mounting the unit.

4. A hydraulic vehicle jack comprising a two-part, wheeled frame, a spacing member disposed between the frame members and formed with an attaching flange at each end thereof, said flanges being arranged at right angles to the spacing members and rigidly secured to the frame members, a power arm pivotally carried by the members of the frame, a power unit disposed between the frame members and pivotally carried by the spacing member, and means pivotally mounted on the frame for operating the power unit.

5. In a hydraulic vehicle jack, the combination with a wheeled frame, a power arm, a power unit carried by the frame and connected to the arm, an operating handle pivotally carried by the frame, of release means comprising a release valve carried by the power unit, a release lever carried by the power unit for operating said valve and having an arm extending rearwardly toward the pivotal connection of the operating handle, a lowering lever pivotally mounted near the upper end of the operating handle, a lowering rod extending downwardly toward the pivotal connection of the operating handle, and a release segment lever pivoted near the lower end of the handle and connected to the lower end of the lowering rod, said segment lever having a forwardly extending arm movable laterally of the handle, said arm being engageable with the rearwardly extending arm of the release lever.

6. In a hydraulic vehicle jack, the combination with a wheeled frame, a power arm, a power unit carried by the frame and connected to the arm, and an operating handle pivotally carried by the frame, of release means comprising a release valve carried by the power unit, a release lever for operating said valve and having an arm extending rearwardly toward the pivotal connection of the operating handle, a lowering lever pivotally mounted near the upper end of the operating handle, a lowering rod extending downwardly toward the pivotal connection of the operating handle, a release segment lever pivoted near the lower end of the handle and connected to the lower end of the lowering rod, said lever having a forwardly extending arm, said segment lever arm extending underneath the pivot point of the operating handle and up on the side thereof opposite to the pivotal connection of the release segment lever, a segment formed at the outer end of this arm, said segment being engageable with the rearwardly extending arm of the release lever, the axis of the pivotal connection of the release segment lever being arranged at substantially right angles to the axis of the pivot of the operating handle, whereby the segment of the segment lever will move laterally with respect to the handle.

7. In a hydraulic vehicle jack, the combination with a wheeled frame, a power arm, a power unit carried by the frame and connected to the arm, and an operating handle pivotally carried by the frame, of release means operable independently of the operating handle, comprising a release valve carried by the power unit, a lowering lever pivotally mounted near the upper end of the operating handle and being so located that it lies between the side members of the handle and intermediate the top and bottom surfaces thereof, and means connecting the lowering handle with the release valve.

8. In a hydraulic vehicle jack, the combination with a wheeled frame, a power arm, a power unit carried by the frame and connected to the arm, and an operating handle pivotally carried by the frame, of release means comprising a release valve carried by the power unit, a unit release lever for operating said valve, a lowering lever pivotally mounted near the upper end of the operating handle and being so located that it lies between the side members of the handle and intermediate the top and bottom surfaces thereof, a lowering rod extending downwardly toward the pivotal connection of the operating handle, a laterally movable release segment lever pivoted near the lower end of the handle and connected to the lower end of the lowering rod, said laterally movable release lever being engageable with the rearwardly extending arm of the unit release lever.

9. In a hydraulic vehicle jack, the combination with a wheeled frame, a power arm, a power unit carried by the frame and connected to the arm, and an operating handle pivotally carried by the frame, of release means comprising a release valve carried by the power unit, a bearing for said valve, means for operating the release valve, and a baffle plate carried by the stem of the release valve and arranged between the valve end thereof and the bearing.

10. A hydraulic vehicle jack comprising a two-part, wheeled frame, a spacing member secured between the frame members near the forward end thereof, a power arm pivotally carried by the members of the frame and having a rest plate at the free end thereof, a power unit disposed between the frame members and formed with a cylinder, a reservoir, and a pump, the unit having pivotal connection with the spacing member at the cylinder end thereof, a power piston slidably mounted in the cylinder and connected to the power arm, the power unit being so positioned that the power piston will be moved toward the rear end of the device during its elevating stroke, and means pivotally mounted on the frame for operating the power unit.

11. A hydraulic jack comprising a wheeled frame, a power unit pivotally mounted within the frame and having a power cylinder, a piston slidable therein, means pivotally mounted on the frame for operating the power unit, a power arm pivotally attached to the frame at its extreme lower end, a rest plate at the outer end of the arm, the power piston being pivotally attached to the arm at a point above and near the pivotal connection of such arm and between such pivotal connection and the rest plate.

12. A hydraulic jack comprising a wheeled frame, a power unit pivotally mounted within the frame and having a power cylinder, a piston slidable therein, means pivotally mounted on the frame for operating the power unit, a power arm pivotally attached at its extreme lower end to the frame, a rest plate at the outer end of the arm, the power piston being pivotally attached to the arm at a point above and near the pivotal connection of the arm and between the pivotal connection of the arm and the rest plate, and a drag

link disposed on each side of the power arm and having its lower end connected to the frame and its upper end connected to the rest plate.

13. A hydraulic jack comprising a wheeled frame, a power unit pivotally mounted within the frame and having a power cylinder, a piston slidable therein, means pivotally mounted on the frame for operating the power unit, a power arm pivotally attached at its extreme lower end to the frame, a rest plate at the outer end of the arm, the power piston being pivotally attached to the arm at a point above and near the pivotal connection of the arm and between the pivotal connection of the arm and the rest plate, and a drag link disposed on each side of the power arm and having its lower end connected to the frame and its upper end connected to the rest plate, the upper ends of the drag links being pivoted above and to the rear of the pivotal connection of the rest plate with the power arm and the lower ends of the drag links being pivoted above and rearwardly of the lower pivot point of the power arm.

14. In a hydraulic vehicle jack, the combination with a wheeled frame, a power arm, a power unit carried by the frame and connected to the arm, of an operating handle pivotally carried by the frame, said handle being provided with detent arms extending forwardly from the pivotal point of the handle, such arms being frictionally engageable with the power arm when the same has been elevated its maximum distance, thereby retarding the actuation of the operating handle and preventing further movement of the power arm.

15. In a hydraulic vehicle jack, the combination with a wheeled frame and a power arm, of a power unit carried by the frame and pivotally mounted therebetween, said power unit comprising a power cylinder, an oil reservoir, and an oil pump, said power unit being formed with a pump passageway, a valved port connecting the reservoir with the pump passageway, a cylinder passageway connected at one end to the cylinder, a release valve plug formed with a release valve seat disposed at the other end of the cylinder passageway, the unit being formed with a port connecting the cylinder passageway with the pump passageway, a gravity actuated ball valve controlling the flow of fluid downwardly through the connecting port, the release valve plug being formed with a ball retaining projection, a release valve mounted in the reservoir, means for operating the release valve, and means pivotally mounted on the frame for operating the power unit.

16. A hydraulic vehicle jack comprising a two-part, wheeled frame, a spacing member secured between the frame members, a power arm pivotally carried by the members of the frame and having downwardly extending spring arms, a power unit disposed between the frame members and pivotally carried by the spacing member, means for operating the power unit pivotally carried by the frame, and pull-back springs having one of their ends carried on the frame in fixed manner, the opposite ends of the springs being connected with the spring arms, the spring arms being so positioned that the point of attachment of the springs thereto will be substantially in or in advance of a vertical plane passing through the pivot of the power arm when the power arm is in its lower position, whereby as the spring is stretched the effective length of the spring arms become shorter and the effect of the springs on the arms is thus substantially uniform throughout the travel of the power arm.

17. In a hydraulic vehicle jack, the combination with a wheeled frame, and a power arm pivotally carried by said frame, of a power unit carried by the frame and pivotally mounted therebetween, said power unit comprising a power cylinder, an oil reservoir, and an oil pump, said unit being formed with suitable valved passageways connecting the oil reservoir with the pump and the cylinder and connecting the pump with the cylinder, a removable cover for the reservoir, a release valve carried by the cover and controlling the passageway between the power cylinder and the reservoir, means for operating the release valve, and means pivotally mounted on the frame for operating the power unit.

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