Jan. 19, 1932. P. J. LUNATI 1,841,900

AUTOMOBILE SERVICING LIFT

Filed Jan. 14, 1927 6 Sheets-Sheet 1

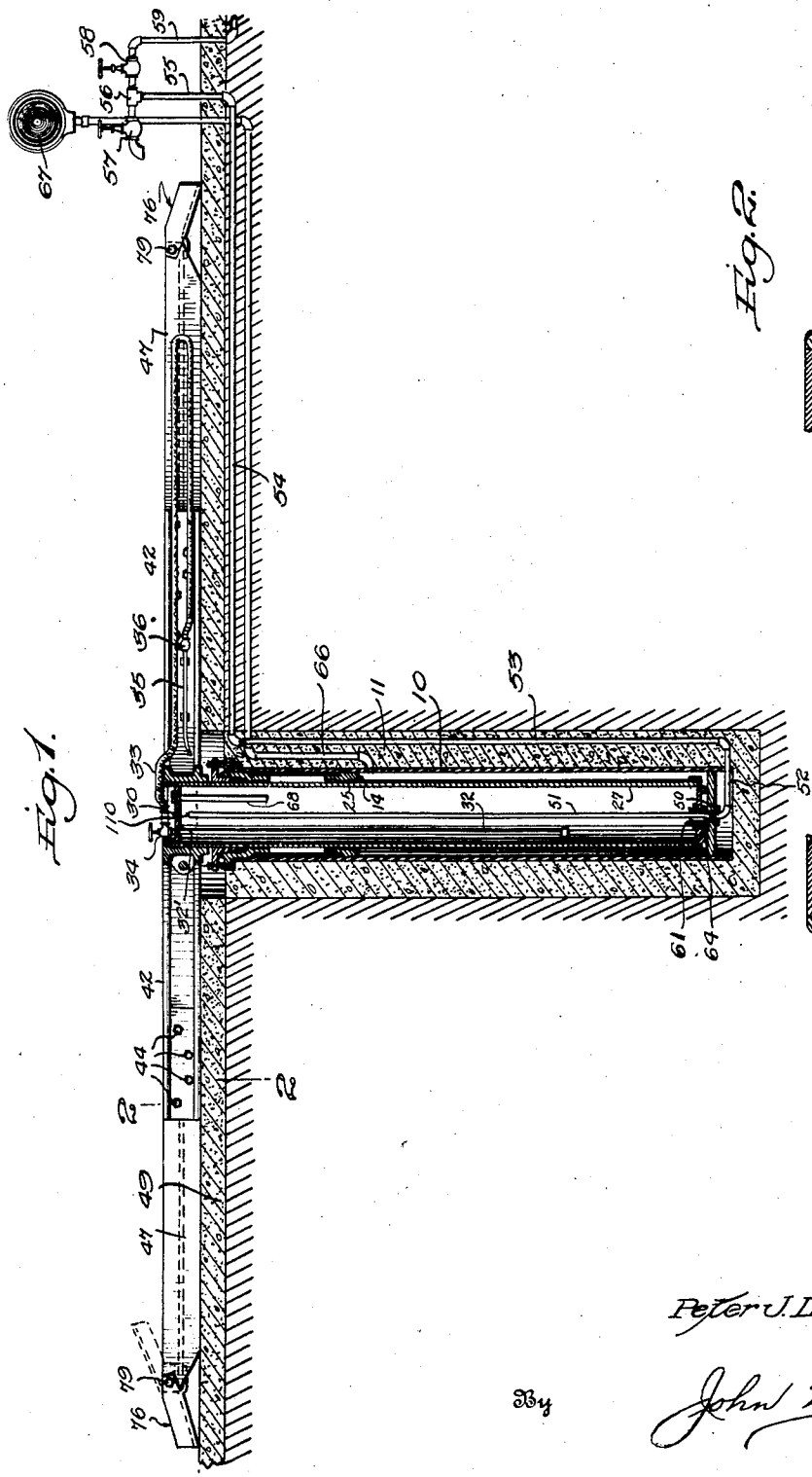


Fig. 1.

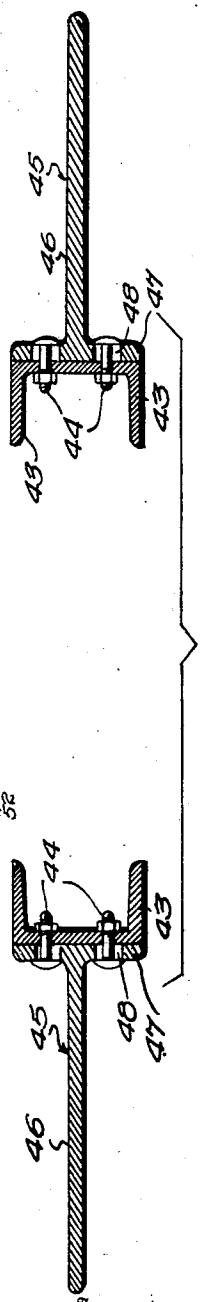


Fig. 2.

Inventor

Peter J. Lunati

By John W. Farley

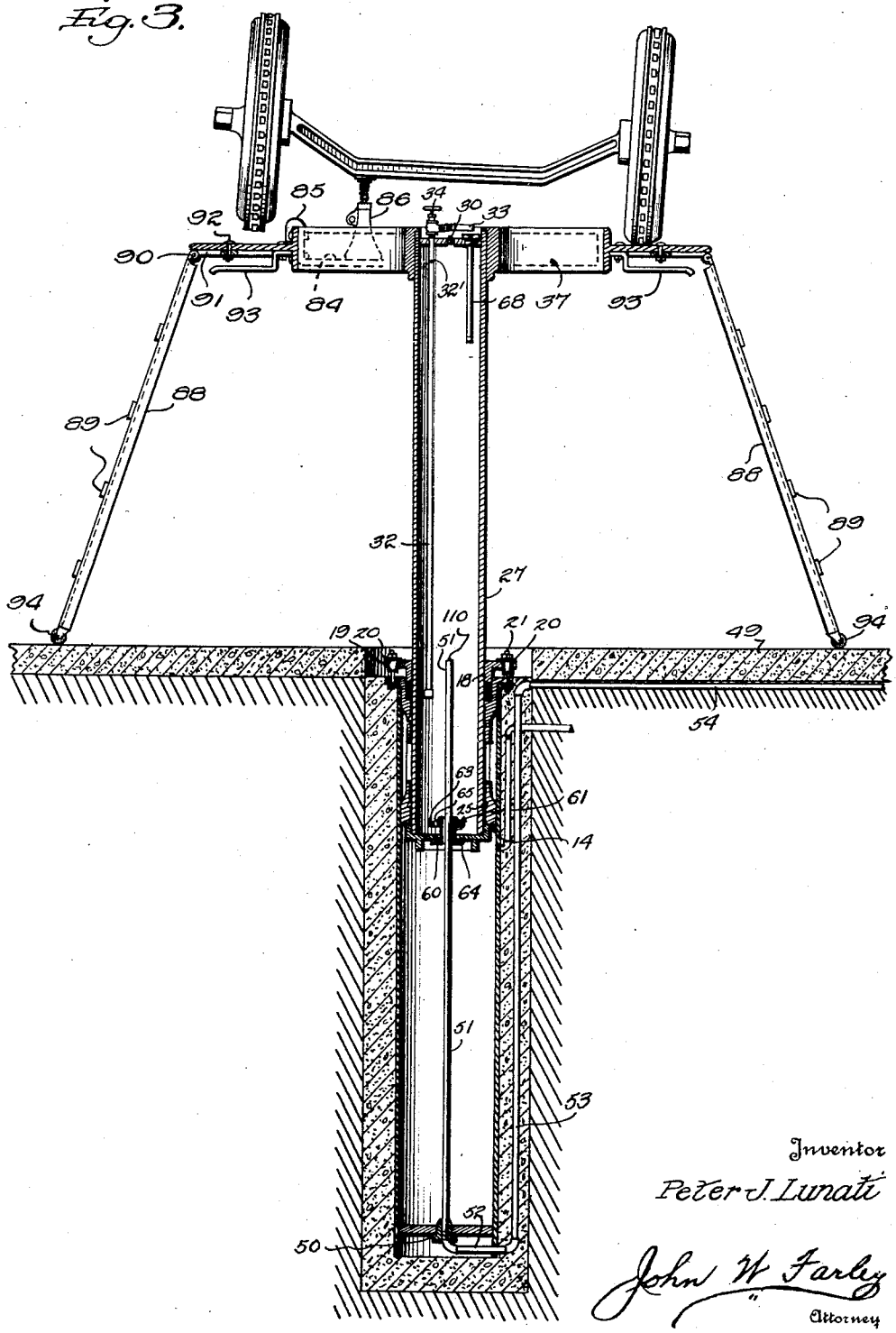
Attorney

Jan. 19, 1932. P. J. LUNATI 1,841,900

AUTOMOBILE SERVICING LIFT

Filed Jan. 14, 1927 6 Sheets-Sheet 2

Fig. 3.




Inventor

Peter J. Lunati

John W. Farley

Attorney

Jan. 19, 1932. P. J. LUNATI 1,841,900

AUTOMOBILE SERVICING LIFT

Filed Jan. 14, 1927 6 Sheets-Sheet 3

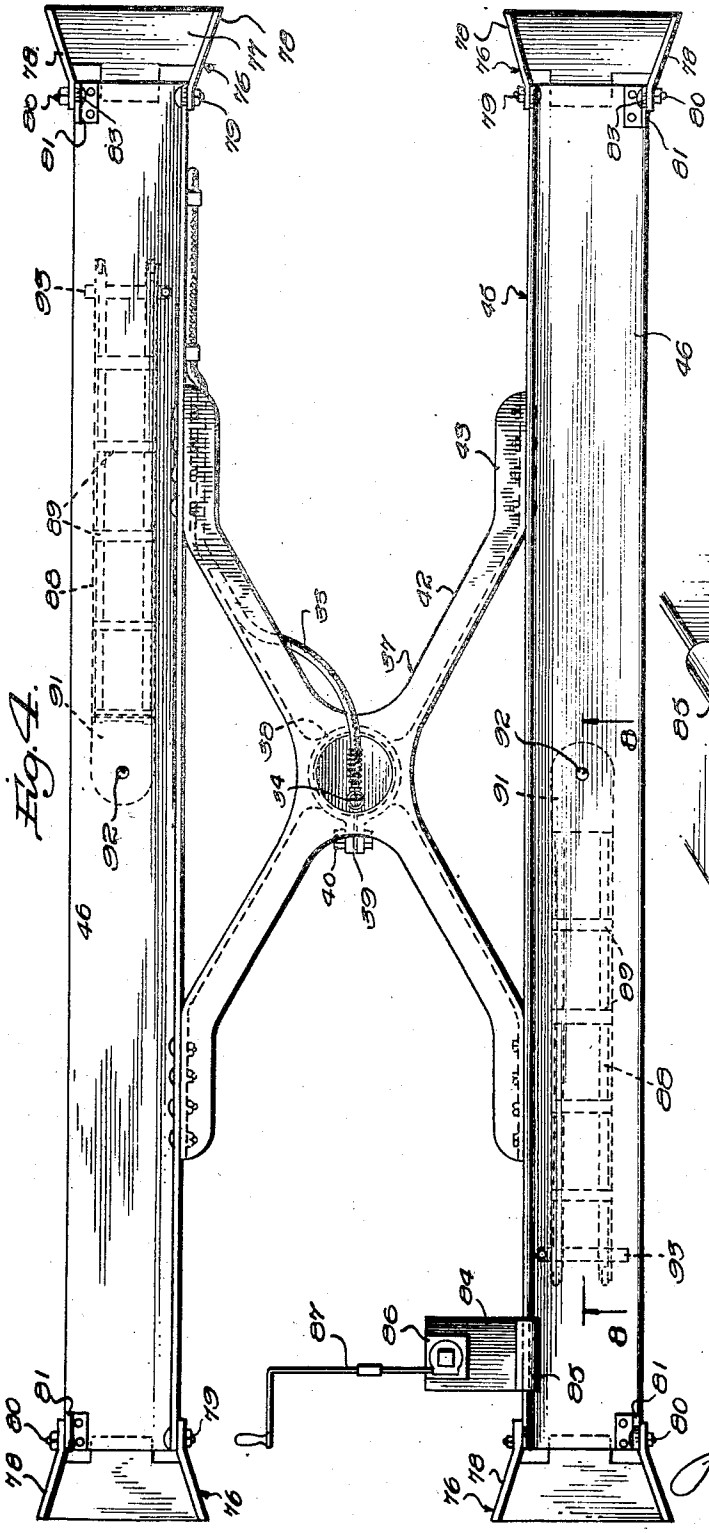


Fig. 4.

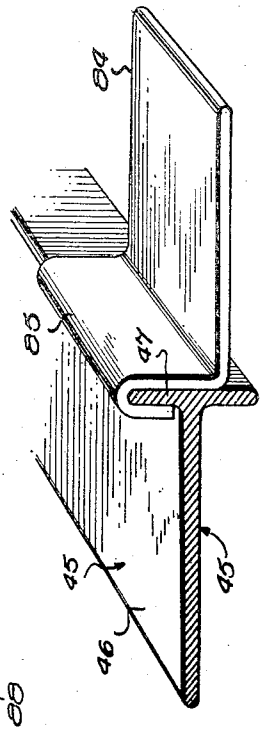


Fig. 5.

Inventor
Peter J. Lunati

John W. Farley
Attorney

Jan. 19, 1932. P. J. LUNATI 1,841,900

AUTOMOBILE SERVICING LIFT

Filed Jan. 14, 1927 6 Sheets-Sheet 4

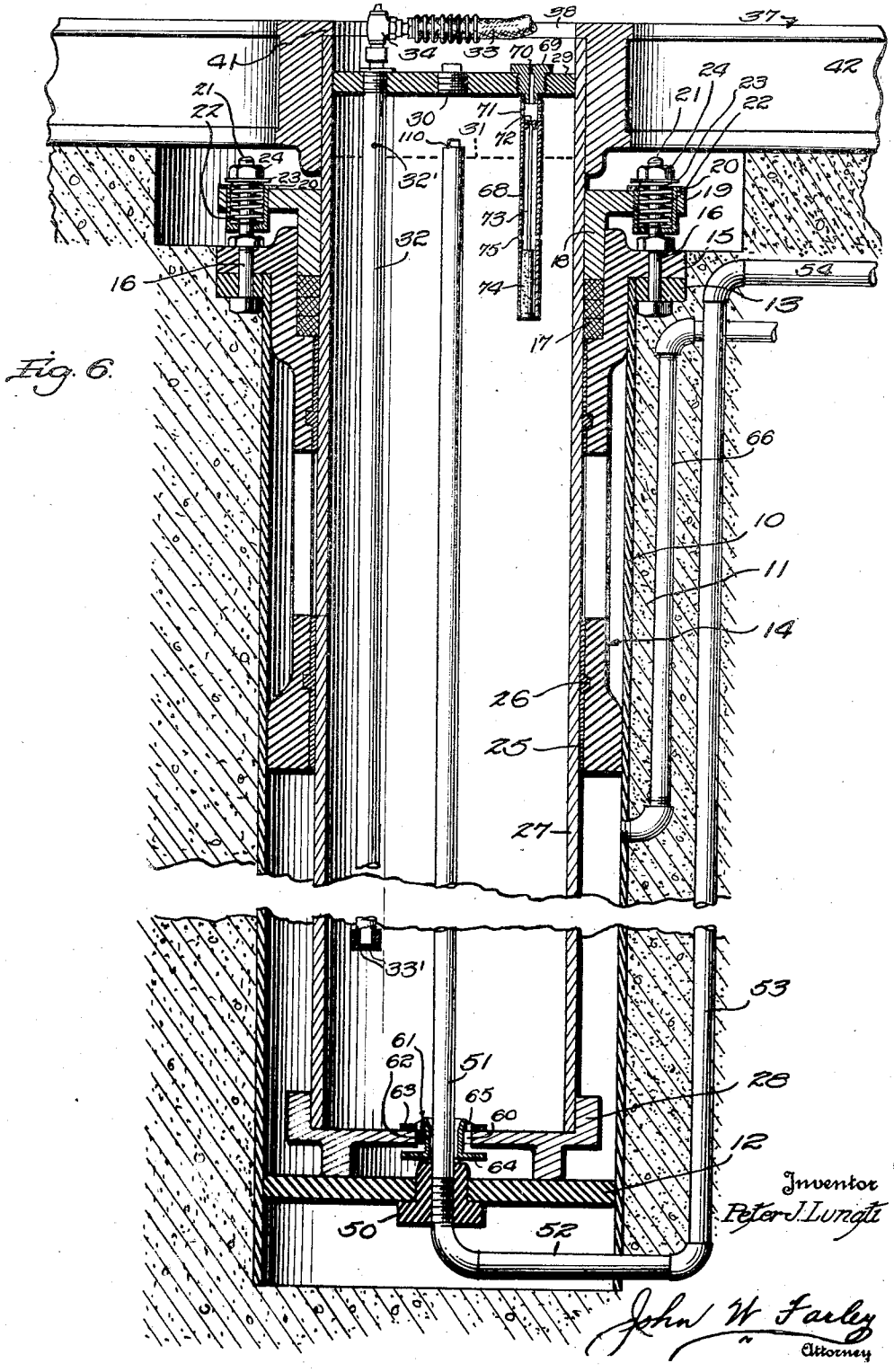



Fig. 6.

Inventor
Peter J. Lunati

John W. Farley
Attorney

Jan. 19, 1932. P. J. LUNATI 1,841,900

AUTOMOBILE SERVICING LIFT

Filed Jan. 14, 1927 6 Sheets-Sheet 5

Fig. 7.

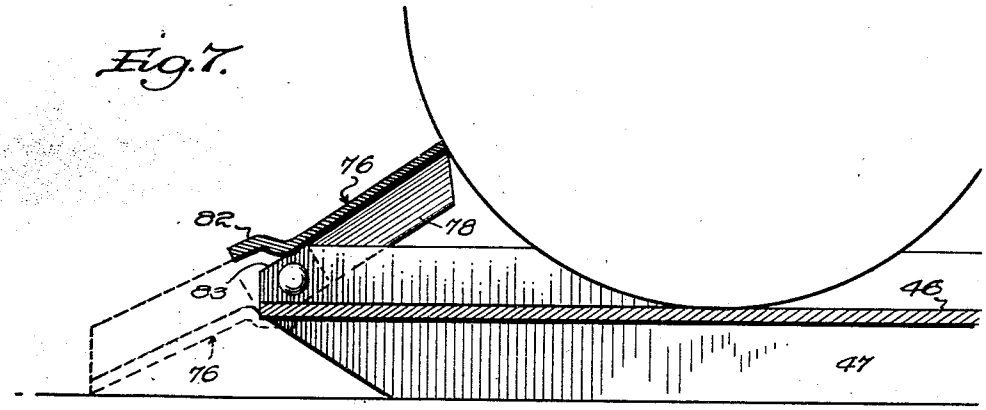



Fig. 8.

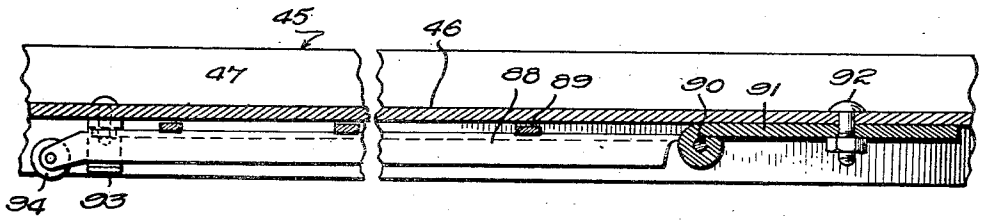
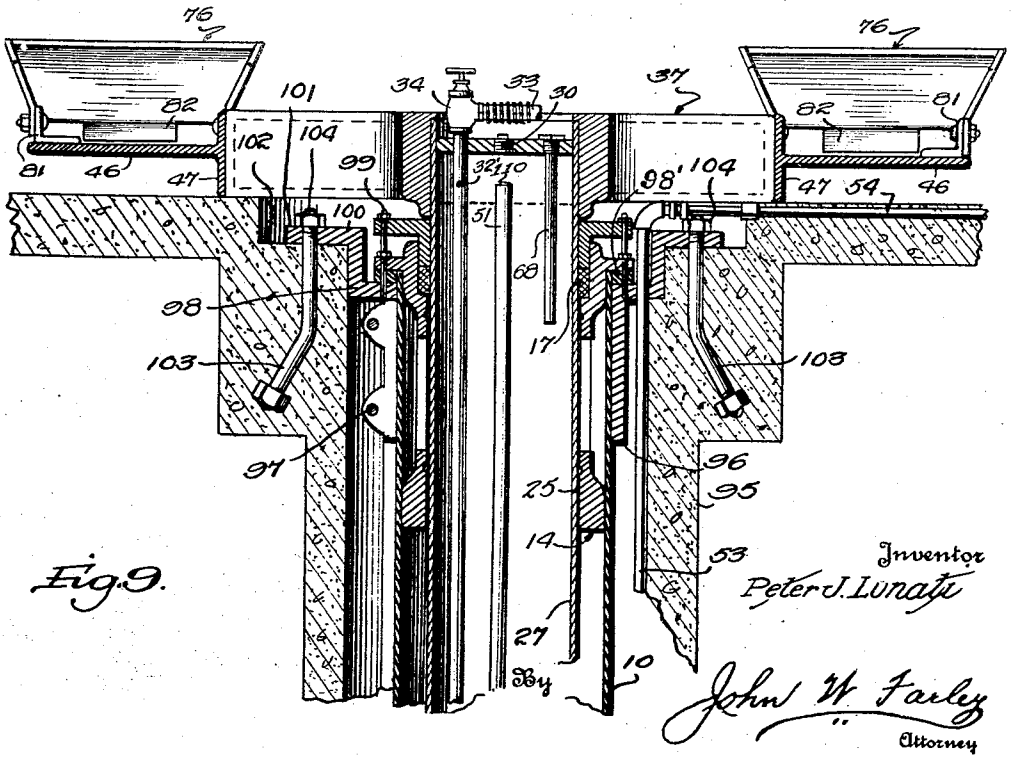



Fig. 9.




Inventor
Peter J. Lunati

By John W. Farley
Attorney

Jan. 19, 1932. P. J. LUNATI 1,841,900

AUTOMOBILE SERVICING LIFT

Filed Jan. 14, 1927 6 Sheets-Sheet 6

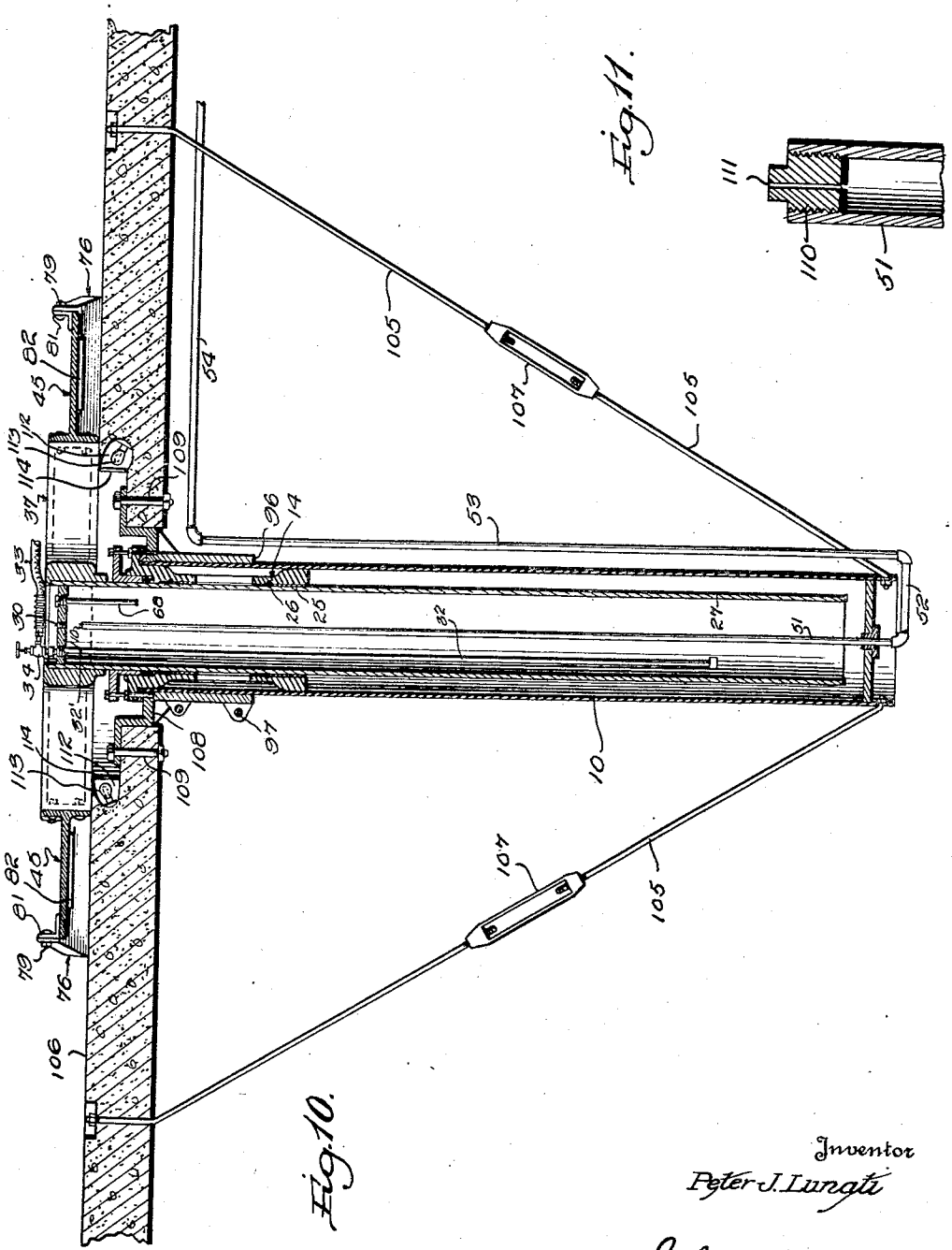


Fig. 10.



Fig. 11.

Inventor
Peter J. Lunati

By John W. Farley
Attorney

Patented Jan. 19, 1932

1,841,900

# UNITED STATES PATENT OFFICE

PETER J. LUNATI, OF MEMPHIS, TENNESSEE

## AUTOMOBILE SERVICING LIFT

Application filed January 14, 1927. Serial No. 161,187.

This invention relates to hydraulic automobile-servicing lifts, and is an improvement over the structures shown in my prior Patent No. 1,552,326, granted September 1st, 1925, and my copending applications Serial Nos. 36,019, filed June 9th, 1925, Patent No. 1,689,144, and 86,569, filed February 6th, 1926, Patent No. 1,689,145.

In my prior patent and copending applications above referred to, I have shown and described a hydraulic lift adapted particularly for elevating motor vehicles to facilitate servicing them and including a cylinder having a plunger-piston therein adapted to be lifted by fluid pressure, a super-structure being supported by the upper end of the plunger and including a pair of parallel rails or runways upon which a motor vehicle or the like is adapted to rest. The plunger is adapted to be lifted to elevate the vehicle, whereby inspections may be made of the underside of the vehicle and any desired work performed thereon, and the plunger and super-structure is adapted to be rotated whereby the apparatus may be employed as a turn table.

One of the objects of my invention is to provide an improved automobile-servicing lift.

Another object is to provide a lift of the single plunger type wherein the rigidity of the plunger against lateral displacement is increased, particularly when elevated and while going up or down.

Another object is to provide multiple vertically-spaced bearings which permit ready vertical and rotary movements of the plunger while affording the plunger an effective brace against lateral inclination from eccentric loads or other causes.

Another object is to provide a plunger-bearing unit which removably fits within the plunger cylinder and cooperates with the cylinder side wall to resist any side thrust from the plunger.

Another object is to provide a structure which readily lends itself to fabrication and relatively permanent co-relation of moving parts whereby assembly, transportation and installation are simplified and cheapened.

A further object is to provide such an apparatus with means for indicating each operation of the device and the pressure necessary for each vehicle elevation whereby a permanent record may be kept of the operation of the device to permit the owner thereof to determine not only the number of times the apparatus has been operated, but also to permit him to obtain some idea as to the weights and consequently the makes of vehicles which have been elevated.

A further object is to provide a pair of relatively wide rails or runways upon which the vehicle is adapted to rest whereby an operator may stand or walk upon the runways beside the vehicle, novel ladders and carrying means therefor being provided to permit the operator to gain access to the runways.

A further object is to provide an apparatus of the above mentioned character wherein the plunger and cylinder are adapted to contain oil or similar liquid and wherein fluid pressure is adapted to be introduced above the level of the liquid to effect the elevation of the vehicle, and to provide a novel form of safety device to prevent the elevation of the vehicle when the level of the liquid therein falls below a predetermined level.

A further object is to provide an apparatus of the above mentioned character provided with novel coacting jack means whereby either wheel of a vehicle arranged on the runways may be independently elevated to permit it to be revolved.

A further object is to provide a novel form of chock to prevent a vehicle from rolling from the runways, the chocks being adapted to be swung to initial operating positions to act as skids to permit a vehicle to be driven upon the runways.

A further object is to provide a novel form of guide sleeve for the plunger whereby the latter may be successively elevated and lowered without scoring the sides thereof.

A further object is to provide an apparatus of the character just referred to having a packing gland at the upper end of the guide sleeve and provided with automatic take-up means.

A further object is to provide an apparatus of the character referred to wherein the various parts such as the plunger, guide sleeve and packing gland are readily accessible for making repairs and replacements.

A further object is to provide a superstructure of the character referred to wherein the runways are adapted to be vertically adjusted according to different conditions, and wherein each runway is arranged a substantial distance above the floor or other supporting surface when the device is in lowered position, thus preventing the runways from descending upon and injuring the feet of operators.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings I have shown several embodiments of the invention. In this showing,

Figure 1 is a central vertical sectional view showing the apparatus in lowered position,

Figure 2 is a detail section on line 2—2 of Figure 1,

Figure 3 is a central transverse sectional view showing the apparatus in elevated position,

Figure 4 is a plan view,

Figure 5 is a fragmentary sectional perspective view of a vehicle jack supporting member and a portion of the adjacent runway,

Figure 6 is an enlarged central vertical sectional view of the cylinder and associated elements,

Figure 7 is a detail section showing one end of one of the runways and its associated chock,

Figure 8 is a section on line 8—8 of Figure 4,

Figure 9 is a fragmentary central vertical sectional view of a modified form of the apparatus,

Figure 10 is a central transverse vertical sectional view showing another modification of the apparatus, and,

Figure 11 is a detail section of the upper end of the air pressure pipe.

Referring to Figures 1 to 6 of the drawings, the numeral 10 designates a cylinder or casing which is embedded in a concrete or similar foundation or well 11. The cylinder is preferably formed of steel or similar tubing and it is closed at its lower end by a head 12 which may be secured within the end of the cylinder by welding. An upper horizontal flange 13 is welded or otherwise secured to the upper end of the cylinder and projects outwardly therefrom.

A guide and bearing sleeve or cage 14 is arranged in the upper end of the cylinder, and this sleeve is of substantial length for a purpose to be described. As clearly shown in Figure 6, the guide sleeve is provided at it upper end with an outstanding flange 15 which is secured to the flange 13 by bolts or the like 16. The guide sleeve is recessed at its upper end to receive and provide an annular seat for suitable packing 17 adapted to be compressed by a gland 18, the latter having an outstanding flange 19 at its upper end. Means is provided for automatically maintaining the packing 17 under proper compression. As shown, a flanged cup 20 is arranged in the flange 19 in alinement with each of the bolts 16, the latter having upwardly extending ends 21 projecting through each of the cups. A coil spring 22 is arranged in each cup, and contacts at its upper end with a washer 23 held in position by an adjusting nut 24. Obviously each spring contacts with the bottom of the cup in which it is arranged, tending to exert a downward pressure on the flange 19, and consequently the gland 18. The guide sleeve is provided within opposite ends with babbitt or similar bearings 25, the guide sleeve being provided with internal grooves 26 to receive a portion of the bearing metal to maintain the bearings in position.

A plunger-piston 27 is adapted to reciprocate in the guide sleeve 14. The plunger also is preferably formed of steel or similar piping and is preferably partially closed at its lower end by a head 28 preferably welded thereto. The upper end of the plunger is closed by a head 29, and a filling plug 30 may be arranged in the center of this head. The cylinder and plunger are adapted to contain a liquid substantially to the level indicated by the dotted line 31 in Figure 6. The liquid employed is preferably lubricating oil, and when the device is in operation, this oil is adapted to be utilized for spraying various parts of a vehicle, as will become apparent. A pipe 32 is mounted in the head 29 and projects downwardly within the plunger to a point near the bottom thereof. This pipe is adapted to supply lubricant to a hose 33 through a valve 34, the hose 33 being provided with a spray nozzle 35 adapted to be controlled by a manually operable valve 36, as shown in Figure 1. Above the level of the oil, the pipe 32 is provided with a small opening 32′ to provide an atomizing action for the oil spray means, and oil is admitted into the pipe through openings 33′ in a suitable cap or the like mounted in the lower end of the pipe.

A support indicated as a whole by the numeral 37 is arranged on the upper end of the plunger. This support includes a central cylindrical portion or head 38 surrounding the upper end of the plunger. The head 38 is split at one side as indicated at 39 and is adapted to be clamped in position on the plunger by a heavy bolt 40 as shown in Figure 4. Referring to Figure 6 it will be noted that the head of the support is provided with an internal flange or shoulder 41 which overlies the upper end of the plunger to prevent

downward movement of the support with respect thereto. The support further includes a plurality of diverging arms 42 having parallel extensions 43 at their ends. The arms 42 are substantially U-shaped in cross section, and are provided with openings for the reception of bolts 44 by means of which rails or runways 45 (preferably of substantially T-shaped cross section) may be secured to the support. Each of the runways includes a relatively wide tread portion 46 upon which a vehicle is adapted to be driven, in a manner to be described, and further includes base portions or flanges 47 having slots 48 therein through which the bolts 44 extend. The slots 48 are provided to permit vertical adjustment of the runways. The runways are adapted to rest upon a concrete foundation, floor or the like 49, when the device is in lowered position, as shown in Figure 1, and it will be apparent that under such conditions, the tread portions 46 are arranged a slight distance above the support.

In practice it has been found that workmen, standing near the apparatus while it is being lowered, are liable to injury by having their feet caught beneath the runways when the latter are lowered into contact with the surrounding support. With the present construction as above described, sufficient space is left beneath the runways to prevent the occurrence of such an accident.

Means are provided for introducing fluid pressure into the interior of the plunger 27 to effect the elevation thereof. As shown in Figure 6, a plug 50 is arranged in the head 12 of the cylinder and supports an air pipe 51, the lower end of the latter preferably being threaded in the plug. The upper end of the pipe 51 terminates above the level of the body of oil within the plunger and upon the introduction of air into the plunger above the oil therein, the pressure thereof elevates the plunger while the oil flows outwardly from the lower end of the plunger into the cylinder, in a manner to be described. An air supply pipe 52 also is threaded in the plug 50 to deliver air to the pipe 51. The pipe 52 extends transversely from the casing 10 and then vertically parallel to the casing, as indicated at 53. The vertical portion of the pipe communicates at its upper end with a horizontal pipe 54 which extends parallel to the surface of the concrete base 49, as shown in Figure 1. At its outer end, the pipe 54 turns upwardly as at 55 and connects to a T-joint 56, one side of which is connected to an exhaust valve 57 while the opposite side connects to an inlet valve 58. The latter valve is connected by a pipe 59 with a suitable source of air pressure such as is usually present at gasoline filling stations for the purpose of inflating tires, and for like uses. It will be apparent that when the valve 57 is closed and the valve 58 opened, air will be supplied under pressure to the interior of the plunger to lift the latter, while the plunger and associated elements readily may be lowered by closing the valve 58 and opening the valve 57.

Means is provided for permitting a relatively free flow of fluid from the plunger to the cylinder when the former is elevated and for restricting the flow of fluid from the cylinder to the plunger when the latter is being lowered. As shown in Figure 6, the pipe 51 extends through a relatively large opening 60 formed in the plunger head 28, and a fluid control member 61 is arranged in the opening 60. This control member or differential valve includes a cylindrical stem 62 surrounding the pipe 51 and upper and lower heads 63 and 64. The pipe 51 fits fairly loosely within the stem 62 to permit the slow passage of oil therethrough. The lower head 64 is adapted to contact with the plunger head 28 when the plunger is being lowered, while the upper head 61 contacts with the plunger head 28 when the plunger is being elevated. As clearly shown the upper head 61 is provided with openings 65 for the passage of oil when the plunger is being elevated. The structure and operation of the fluid control differential valve 61 are fully disclosed in my Patent No. 1,689,145 previously referred to. It will be apparent that when the plunger is being elevated, oil may flow freely through the openings 65 and through the space between the pipe 51 and the interior of the stem 62, while the imperforate head 64 contacts with the plunger head 28 to restrict the flow of oil when the device is being lowered, thus providing a dash pot action which would prevent the sudden falling of the plunger if a break should occur in the air line.

In the operation of devices of this character, it has been found that operators fail to report all of the individual operations carried out by the apparatus, and accordingly means are provided for indicating each elevation of the plunger and the general character of the vehicle elevated, is indicated by the weight thereof. Referring to Figure 1, the numeral 66 designates a pressure pipe which is tapped into the casing 10. The opposite end of the pipe 66 is adapted to deliver pressure to an indicating gage 67 of any well known type which is adapted for performing the desired functions. In the type of gage preferred, a dial is provided which is calibrated as to time and pressure, and is provided with clock work and similar mechanism for moving the dial. It will be obvious that each time the plunger is elevated, the full pressure required to raise the plunger will be indicated upon the dial of the gage, and since different pressures are necessary for vehicles of different sizes, it will be apparent that a clear idea of the characters of the vehicles operated upon may be gained

from an examination of the indicator sheets. Such sheets also will disclose the time at which each operation takes place. It will be apparent therefore that with the use of the gage in the combination referred to, the proprietor of a filling station or a garage or the like in which the apparatus is employed, may keep a careful check upon the operators.

As a further means for insuring the safety of operators and other persons who may be near the apparatus during its operation, means are provided for preventing the elevation of the plunger after the level of the oil drops below a predetermined point. Referring to Figure 6, the numeral 68 designates a pipe or similar tubular member the upper end of which is threaded on the lower end of a plug 69, the latter being threaded through a suitable opening in the upper plunger head 29 to be supported thereby. The plug 69 is provided with an opening 70 extending therethrough for the passage of air, in a manner to be described. The pipe 68 is provided beneath the plug 69 with a plurality of air openings 71 communicating with the interior of the plunger above the level of the oil therein. A valve 72 is arranged in the upper part of the pipe 68 and is secured to the upper end of a valve stem 73. A cork or similar float 74 is secured to the lower end of the valve stem 73 as shown. The lower end of the pipe 68 is open, and the pipe is further provided with openings 75 just above the float 74. It will be apparent that when the plunger is filled with oil to the proper level the float 74 will elevate the valve 72 to a position against the lower end of the plug 69 to close the passage therethrough.

Referring to Figures 1, 4 and 7, the numeral 76 designates a plurality of combined approaches and chocks arranged on the ends of the runways 45. Each chock is provided with a tread portion 77 and side flanges 78 which preferably diverge toward their outer ends, as shown in Figure 4. One of the flanges 78 is pivotally connected as at 79 with the flange 47 of each runway, while the other flange of each chock is pivotally connected as at 80 with a bracket 81 secured to each end of each of the runways. As shown in Figures 4 and 7, each chock is provided with a central offset extended portion 82 which is adapted to engage beneath the tread of each runway when the device is adapted to act as an approach, as indicated in dotted lines in Figure 7. The members 76 are adapted to be swung upwardly and inwardly to the solid line position shown in Figure 7 to act as chocks for the wheels of a vehicle arranged on the runways. Further inward movement of the chocks is adapted to be limited by contact between the tread portions thereof and bevelled edges 83 formed at the extremities of the flanges 47 and the brackets 81.

As shown in Figures 3, 4 and 5, a jack support 84 is adapted to engage the upper portion of the flange 47 of either runway. For this purpose, the jack support is provided with a hanger 85 as clearly shown in Figure 3, and it will be apparent that the jack support is adapted to slide along the flange of either runway whereby it may be arranged in any desired position. A jack 86 of any desired type may be arranged upon the support 84 whereby either end of either axle of a vehicle may be elevated to permit the wheel to turn freely. The jack may be operated by a suitable handle 87. In Figure 3 I have shown one of the front wheels of a vehicle elevated by means of the jack 86 arranged on the support 84.

The apparatus is adapted to elevate a vehicle to a substantial height to permit an operator to work freely thereunder, and occasionally it becomes necessary or desirable for an operator to gain access to the runways and to the vehicle for various purposes when they are elevated. Accordingly I provide a pair of ladders 88 having steps 89 thereon and adapted to be arranged in the positions indicated in Figure 3. Each ladder is pivotally connected at one end as at 90 to a support 91 which in turn is pivotally connected to one of the runways as at 92. Thus it will be apparent that either ladder is adapted to be raised to a horizontal position, and then to be swung in a horizontal plane to a position beneath the runway as indicated in Figure 8, and hangers 93 are arranged beneath the runways to support the ladders when they are in inoperative position beneath the run-way treads. If desired, the free end of each ladder may be provided with casters 94 to facilitate outward movement of the lower end in the event the plunger is lowered while the ladder is down.

In Figure 9 of the drawings I have shown a somewhat modified form of apparatus which is adapted to be bodily removed from position when desired. In this form of the invention, the plunger, operating elements, supporting head and runways, etc., are the same as in the form previously described, and need not be referred to in detail. In the modified form of the invention, the tubular casing 10 also is the same as in the form previously described, but in this case, a relatively large well 95 is employed, and the casing 10 is spaced a substantial distance from the walls of the well, for a purpose to be described. The casing 10 is supported at its upper end by a clamping sleeve 96 which is split and adapted to be clamped about the casing by bolts 97. The sleeve is provided with a shoulder 98 which engages the lower face of a flange 98′ to support the casing 10 and is secured to the flange 98′ by bolts 99

which also are employed for tightening the packing gland. The clamping member 96 is further provided with a cylindrical portion 100 which substantially fits within the well 95, as shown. An upper horizontal flange 101, formed integral with the clamping sleeve is adapted to rest on the bottom of a shallow pit 102 formed in the concrete at the upper end of the well. The flange 101 is secured in position by anchor bolts 103 embedded in the concrete of the wall as clearly shown in Figure 9. Nuts 104 are arranged on the upper ends of the anchor bolts 103. In the present embodiment of the invention, the air supply pipe 53 is arranged in the space between the casing 10 and the well 95, whereby it will be apparent that the anchor bolts are the only elements embedded in the concrete.

In Figure 10 of the drawings I have shown a further embodiment of the device which, in general, is particularly adapted for use in connection with one of the upper floors of a garage or the like. The details of construction of this form of the device are similar to the forms previously described and need not be referred to in detail. In this form of the invention, guy rods 105 are embedded at their upper ends in the floor 106, while their lower ends are connected to the lower end of the casing 10. Turnbuckles 107 are provided for tightening the guy rods. Obviously the concrete well is eliminated in this form of the invention. In connection with the clamping member 96, a supporting member 108 is employed which is bolted to the floor of the building as at 109. If desired, the lower plunger head may be eliminated and the entire lower head of the plunger left open. In this form of the device, a plug 110 is preferably threaded in the upper end of the air pipe 51, this plug being provided with a restricted opening 111 therethrough. The opening 111 is provided for preventing the rapid escape of air from the interior of the plunger if a break in the air line should occur. The plug 110 also has been illustrated as a secondary safety device in the previously described forms of the apparatus. In practice, both the plug 110 and the fluid control member 61 may be employed, and the plug 110 is illustrated at the upper end of the air pipe 51 in each of the forms of the invention previously described.

In each of the forms of the invention illustrated, a shallow pit of relatively small diameter surrounds the upper end of the cylinder, and it has been found that such pit advantageously may be employed for furnishing lighting means for illuminating the lower portions of a vehicle. As shown in Figure 10, the pit may be recessed as at 112 and provided with lights 113, the upper portions of the recesses preferably overhanging the lights to prevent accidental damage thereto. If desired, guards 114 may be arranged over the lights to afford additional protection thereto.

The operation of the apparatus is as follows:

Referring to Figures 1 to 6 inclusive, it will be apparent that a vehicle may be driven into position on the runways by lowering the chocks at either end of the apparatus. After the vehicle is in position, the chocks are swung inwardly to the dotted line position shown in Figure 1, whereupon the valve 57 is closed, and the valve 58 opened. Compressed air will be supplied to the interior of the plunger above the level of the oil therein, and this pressure will elevate the plunger as will be apparent. The maximum elevation of the plunger is limited by the engagement of the lower end of bearing cage 14 with the projecting flange of plunger head 28, which engagement under the influence of the upward pressure effectively assists in maintaining the plunger in a substantially vertical position when elevated. It will be apparent that the pressure required to elevate the plunger will depend upon the weight of the vehicle being elevated, and the pressure required will be registered on the gage 67 together with the time at which the operation takes place. The gage sheets therefore serve as a permanent record of the operations of the apparatus, and a fairly accurate idea of the characters of the vehicles elevated may be determined from the recorded pressures.

During the elevation of the plunger, it will be apparent that the oil within the plunger will flow downwardly through the oil control device. The space between the stem 62 and pipe 51, and the passages provided by the openings 65 permit the flow of oil to take place freely, but the flow of oil from the cylinder into the plunger when the apparatus is lowered will be retarded by upward movement of the oil control device whereby the oil is permitted to flow only through the restricted space between the pipe 51 and stem 62 of the differential liquid-control valve. Thus it will be apparent that in the event of a failure of any part of the apparatus as would release air pressure therefrom while a workman is beneath the vehicle, such as if a break should occur in the air line, a dash pot action is provided to greatly retard downward movement of the vehicle, thus providing ample time in which the operator may escape from the working position referred to.

The relatively great vertical separation between and the length of the bearing surfaces provided by the guide sleeve 14 serve to insure lateral rigidity of the plunger and to prevent any undue lateral wear within the guide bearings, and the provision of the babbitt metal or similar bearings within the guide prevents the scoring of the surfaces of the plunger. Thus it will be apparent that

the apparatus is adapted to be used over long periods of time without causing undue wear between the relatively movable surfaces. Occasionally however, it becomes necessary to renew the packings, and to gain access to the interior of the cylinder for various purposes, and the construction employed is of such a character that access readily may be had to the interior of the cylinder. As previously stated, the casing 10 is formed of piping or similar tubular material and is of uniform internal diameter throughout. The support 37 at the upper end of the plunger readily may be removed merely by loosening the clamping bolt 40. The packing gland, clamping bolt nuts 24 and the washers 23 then may be removed, together with nuts which engage the upper face of the flange 15, whereby the plunger and guide sleeve may be withdrawn from the upper end of the casing. Occasionally it is desired to remove the apparatus to a new position, and this may be done by removing the elements referred to and filling the opening within the empty casing 10. The latter elements are relatively inexpensive and readily may be replaced.

As previously stated, the pipe 32 extends downwardly to a point near the bottom of the plunger to receive oil therefrom for the purpose of lubricating various parts of the vehicle. The valve 34 is opened, whereupon the operator may use the spray nozzle 35 for spraying various parts of the vehicle, such as the springs, etc., and the flow of lubricant readily may be controlled by the valve 36. The capacity of the plunger and cylinder is relatively large, and consequently comparatively small amounts of the oil will be used on each individual vehicle. It is desirable, however, to replenish the oil from time to time, and also to prevent operation of the apparatus when the level of the oil falls below a predetermined point. The float 74 obviously will be controlled according to the level of the oil within the plunger. When a sufficient quantity of oil is present, the valve 72 will remain seated against the lower end of the plug 69, thus preventing the escape of air therethrough when pressure is introduced into the plunger. However, when the level of the oil drops an appreciable distance, the float also will drop and upon the introduction of pressure into the plunger, air pressure will escape through the opening 70 thus preventing the device from operating. The plug 30 then may be removed in order to replenish the supply of oil.

When the plunger reaches its uppermost position, the flange of the lower cylinder head contacts with the lower end of the guide 14, and these contacting surfaces are preferably machined to provide a perfect contact to prevent the leakage of oil into the interior of the guide sleeve, thus preventing the escape of oil through the packing gland and the subjection of the latter to the oil pressure. The springs 22 serve to urge the gland 18 downwardly to maintain the packing under proper pressure.

The provision of the slots 48, as shown in Figure 2, permits the runways to be adjusted vertically within reasonable limits to accommodate the apparatus to slightly uneven surfaces of the surrounding concrete 49. As previously stated, the treads of the runways are relatively wide and are arranged a slight distance above the surrounding concrete surface when the plunger is down, and accordingly it will be apparent that no injury can occur to the feet of operators when the device is lowered. The members 76 are adapted to serve both as approaches and chocks as previously stated. The offset portions 82 are adapted to engage the lower faces of the treads of the runways to limit downward movement of the members 76 to prevent them from assuming vertically depending positions when the apparatus is elevated, if the members are left in the full line position indicated in Figure 1. Thus the chocks will not be injured when the plunger is lowered. When employed as chocks, the tread portions of the members 76 are adapted to engage the bevelled edges 83 of the runway flanges to limit the inward movement of the chocks as indicated in Figure 7. Occasionally it becomes desirable to elevate one of the wheels of a vehicle to permit it to turn freely, and accordingly the jack 86 and support 84 are provided. It will be apparent that the hanger 85 of the jack support permits the latter to be arranged in selected positions on either of the runways whereby either vehicle wheel may be elevated. The ladders 88 are provided as convenient means whereby an operator may gain access to the runways. Ordinarily these ladders are arranged in inoperative position closely beneath the runway treads, as shown in Figures 4 and 8. When it is desired to use the ladders, they may be swung outwardly in a horizontal plane about the axes of the bolts 92, and then the free ends swung downwardly about the hinges 90 to operative position as shown in Figure 3.

The operation of the form of the apparatus illustrated in Figure 9 is the same as in the form previously described. The modified form of apparatus, however, more readily is adapted to be removed. As clearly shown, the casing 10 is not embedded in the concrete well 95, but is supported in position wholly by the clamping member 96. The sleeve portion of this member is relatively long whereby the casing will be held rigidly in proper position. The separate elements of the apparatus such as the support 37, plunger 27 and guide bearing cage may be removed in the manner previously described. The apparatus as a whole readily may be removed

merely by removing the nuts 104, whereupon the casing may be withdrawn from the well. The casing or cylinder may be detached from the clamping sleeve by loosening or removing the bolts 97.

It will be apparent that, with the types of construction illustrated in Figs. 1, 3 and 6, the plunger and guide-bearing cage may be together withdrawn from the cylinder simply by the removal of the nuts which hold the bearing cage in place and then pulling the plunger from the cylinder. This action is due to the fact that the projecting stop flange on plunger head 28 is adapted to engage the lower end of guide-bearing cage 14 and, when the cage retaining nuts on bolts 16 are removed, such engagement will cause the guide-bearing cage to be drawn along with the plunger and consequently the pulling of the plunger out of the cylinder will likewise pull out the bearing cage.

The form of the apparatus illustrated in Figure 10 is essentially the same as that illustrated in Figure 9 except that it is adapted to be supported by the floor of a building. In this case, the guy rods 105 are employed for anchoring the lower end of the casing 10 and associated elements. The entire apparatus is adapted to be removed by disconnecting the guy rods and removing the bolts 109. In this form of the apparatus, the lower plunger head and associated elements are eliminated and the restricted opening 111 alone is depended upon to provide a dash pot action to retard downward movement of the plunger if a break should occur in the air line. This means of retarding downward movement of the plunger has been found effective, but as means for providing additional safety it is preferred that the plug 110 and the oil control means previously described both be employed. The provision of the lights 113 affords ample illumination for the lower side of the vehicle when work is being performed thereon, and the arrangement of the lights within the recesses 113 prevents damage to the lights if a workman should step into the shallow pit surrounding the upper end of the cylinder or if tools or the like should be dropped therein. The guards 114 provide additional protection for the lights.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. Apparatus of the character described comprising a cylinder, a plunger mounted to reciprocate vertically within said cylinder, means for supporting a vehicle on the upper end of said plunger, said cylinder and said plunger being adapted to contain a liquid, means for introducing fluid pressure above the level of the liquid in said cylinder and said plunger, and means for preventing elevation of said plunger by permitting escape of fluid pressure when the level of the liquid is below a predetermined point.

2. Apparatus of the character described comprising a cylinder, a plunger mounted to reciprocate vertically within said cylinder, means for supporting a vehicle on the upper end of said plunger, said cylinder and said plunger being adapted to contain a liquid, means for introducing fluid pressure above the level of the liquid in said cylinder and said plunger, and means for permitting fluid pressure to escape from the interior of said plunger when the level of the liquid therein is below a predetermined point to prevent the elevation of said plunger.

3. Apparatus of the character described comprising a cylinder, a plunger mounted to reciprocate vertically within said cylinder, means for supporting a vehicle on the upper end of said plunger, said cylinder and said plunger being adapted to contain a liquid, means for introducing fluid pressure above the level of the liquid in said cylinder and said plunger, said plunger being provided in its upper end with an opening communicating with the atmosphere, a valve normally closing said opening, and means for opening said valve when the level of the liquid in said plunger is below a predetermined point.

4. Apparatus of the character described comprising a cylinder, a plunger mounted to reciprocate vertically within said cylinder, means for supporting a vehicle on the upper end of said plunger, said cylinder and said plunger being adapted to contain a liquid, means for introducing fluid pressure above the level of the liquid in said cylinder and said plunger, the upper end of said plunger being provided with an opening communicating with the atmosphere, a valve normally closing said opening and adapted to be held in normal closed position by the presence in the plunger and cylinder of liquid above a predetermined minimum level and adapted to move to open position when the liquid level falls below the predetermined level and thereby prevent introduction of pressure fluid elevating the plunger.

5. In a hoist, the combination of an upright cylinder, a plunger slidable in said cylinder, load lifting and lowering means carried by said plunger, means to admit an operating fluid into said cylinder and to permit its discharge therefrom to reciprocate said plunger, a guide-bearing supported in said cylinder for said plunger, and means to remove said guide-bearing from said cylinder by the removal therefrom of said plunger.

6. In a hoist, the combination of an up-

right cylinder, a plunger slidable in said cylinder, load lifting and lowering means carried by said plunger, means to admit an operating fluid into said cylinder and to permit its discharge therefrom to reciprocate said plunger, a plurality of guide-bearings supported in said cylinder for said plunger spaced apart vertically and connected together, and means to remove said guide-bearings from said cylinder by the removal of said plunger therefrom.

7. An automobile-servicing lift having an upright casing open at the top and closed at the bottom, a bearing cage insertable in the casing through its open end and providing vertically aligned and relatively widely separated bracing guide bearings below the open end of the casing, said cage being braced laterally by the side wall of the casing, a plunger vertically and axially movable in said guide bearings and laterally braced thereby, packing between the plunger and bearing cage to form a pressure tight chamber within the casing, and means for subjecting the plunger to fluid pressure to elevate the same.

8. An automobile-servicing lift having an upright casing, open at its upper end and closed adjacent its lower end, a plunger mounted in the casing, a bearing cage insertable in the casing to surround the plunger and provide a laterally bracing plunger-bearing and a packing seat within the casing, said cage being laterally braced by contact with the side wall of the casing, a packing compression ring, packing compressible between the packing seat and the compression ring to engage the plunger and form therewith a pressure tight chamber within the casing, and means for subjecting the plunger to fluid pressure to elevate the same.

9. An automobile-servicing lift comprising an upright cylindrical casing having an open top and closed bottom, a plunger mounted in the casing, a removable bearing cage fitted within the casing to surround the plunger and provide therefor a laterally bracing guide bearing a substantial distance below the open end of the casing and to provide a packing seat, the side wall of the casing a substantial distance below its open end being engageable by the bearing cage to reinforce the lateral rigidity thereof, packing compressed against the packing seat and the plunger to form a pressure tight chamber within the casing, means for communicating fluid pressure to the plunger to elevate the same, and a vehicle supporting superstructure carried by the plunger.

10. An automobile-servicing lift comprising an upright cylindrical casing having an open top and a closed bottom, a plunger mounted in the casing, said plunger having an outwardly extending projection, a bearing cage fitting within and removably attached to the casing to provide a laterally bracing guide bearing around the plunger a substantial distance below the open end of the casing, said cage when attached to the casing forming an abutment for the projection on the plunger to limit the upward movement of and lend lateral rigidity to the plunger when elevated and the side wall of the casing serving as a reenforcement for the cage to resist lateral movement of the plunger, packing interposed between the cage and plunger to form a pressure tight chamber within the casing, means for applying a fluid pressure to the plunger to elevate the same, and a vehicle supporting superstructure carried by the plunger.

11. An automobile-servicing lift including an open topped closed bottomed upright casing having an outwardly projecting flange adjacent its open end, a plunger in the casing, a plunger bearing cage projecting into the open end of the casing around the plunger and having a flange overlying and rigidly attachable to the flange of the casing, the bearing cage being engageable with the side wall of the casing to increase its lateral rigidity and having a seat for retaining packing, a packing ring having a flange overlying the flange of the bearing cage, packing interposed between the packing seat and packing ring to form a pressure tight chamber within the casing, and means for communicating fluid pressure to the plunger to elevate the same.

12. A rotary lift comprising an open topped closed bottomed tubular casing having an outwardly projecting annular flange adjacent its open end, a plunger, a removable guide bearing cage, anchored within the casing around the plunger to laterally brace the plunger and provide a packing seat, a packing retaining ring overlying and bolted to the casing flange, packing interposed between the packing seat and packing ring in contact with the plunger to form a pressure tight chamber of the casing, and means for subjecting the plunger to fluid pressure to elevate the same.

13. A rotary lift comprising an open topped closed bottomed upright casing having an outwardly projecting annular flange adjacent its open end, a plunger, a removable bearing cage having an annular flange overlying the flange of the casing and two annular vertically aligned but relatively widely separated bearings fitting around the plunger within the casing, the side wall of the casing bracing laterally the cage therewithin and the cage having a packing seat, a flanged packing-retaining and compressing ring, packing interposed between the packing seat and packing ring, means for anchoring together the flanges of the casing, bearing cage and packing ring and pressing the packing about the plunger to form of the casing a pressure tight chamber, and means

for subjecting the plunger to fluid pressure to elevate the same.

14. An automobile-servicing lift having in combination an upright cylinder, a plunger slidable in the cylinder and rotatable about the axis thereof, a removable bearing cage supported within the cylinder and gaining lateral support from contact with the side wall thereof, said bearing cage acting upon the plunger to hold the same laterally rigid, means for securing the bearing cage within the cylinder, a projection on the plunger for engaging the bearing cage to limit upward movement of the plunger when the bearing cage is secured within the cylinder and to withdraw the bearing cage from the cylinder when the bearing cage is unsecured and the plunger is raised, means for imparting fluid pressure to the plunger to elevate the same and for withdrawing the fluid pressure to permit the plunger to descend, and a vehicle supporting superstructure carried by the plunger.

15. A rotary lift having in combination an upright cylinder, a removable bearing cage lying within and supported by the cylinder, means for rigidly holding the bearing cage in the cylinder, a plunger slidable in the bearing cage and laterally supported thereby, a projection on the plunger engageable with the bearing cage to limit the upward movement of the plunger when the bearing cage is held within the cylinder and to withdraw the bearing cage from the cylinder when they are not retained together and the plunger is raised, and means for imparting to and withdrawing from the plunger the effects of fluid pressure whereby the plunger is elevated and lowered.

16. A rotary lift having in combination an upright casing, a removable bearing cage within the casing and in contractable relation to the side wall thereof so that lateral thrust upon the bearing cage may be resisted by the casing, means for rigidly retaining the bearing cage within the casing, a plunger slidably and rotatably mounted in the bearing cage and laterally supported thereby, a projection on the plunger to strike the bearing cage and thereby limit the elevation of the plunger when the bearing cage is retained within the casing and to remove the bearing cage from the casing when it is not retained therein and the plunger is removed therefrom, and connections whereby fluid pressure may be applied to and withdrawn from the plunger to elevate and permit depression of the plunger.

17. An automobile-servicing lift comprising an upright cylinder open at one end and closed adjacent the other end, a removable bearing cage insertable within the cylinder in contractable relation to the side wall thereof so that side thrust is imparted to and resisted by the side wall a substantial distance below the open end, said bearing cage also providing a seat for holding a packing against displacement in one direction, a plunger slidably carried and laterally braced by the bearing cage, means for rigidly retaining the bearing cage in the cylinder and retaining the packing under compression in contact with the plunger to form of the cylinder a fluid tight chamber, connections for admitting and withdrawing fluid pressure to elevate and lower the plunger, and a vehicle supporting superstructure carried by the plunger.

In testimony whereof I affix my signature.

PETER J. LUNATI.