Dec. 25, 1934. P. J. LUNATI 1,985,510

AUTOMOBILE SERVICING LIFT

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Fig. 1.

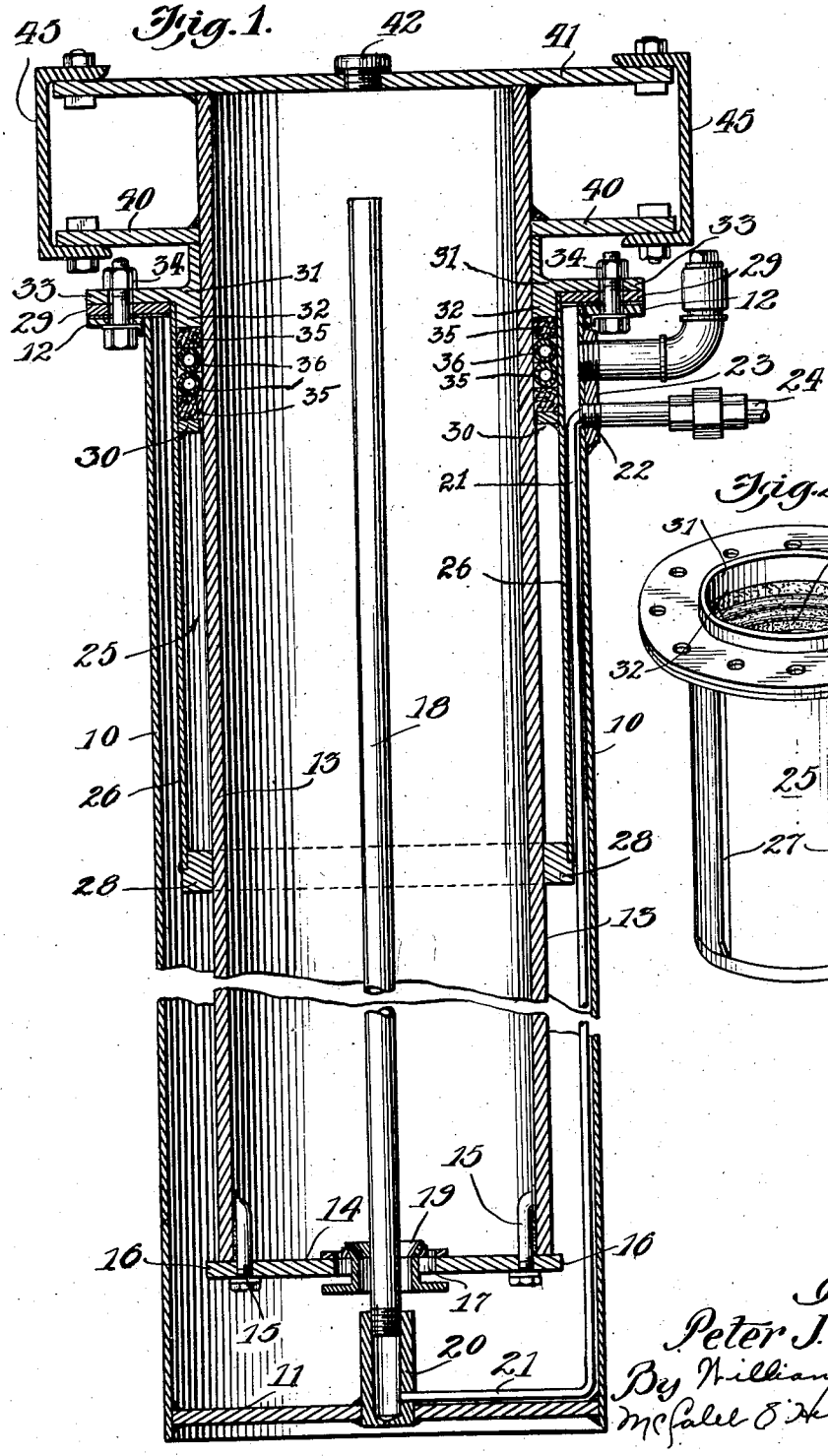



Fig. 2.



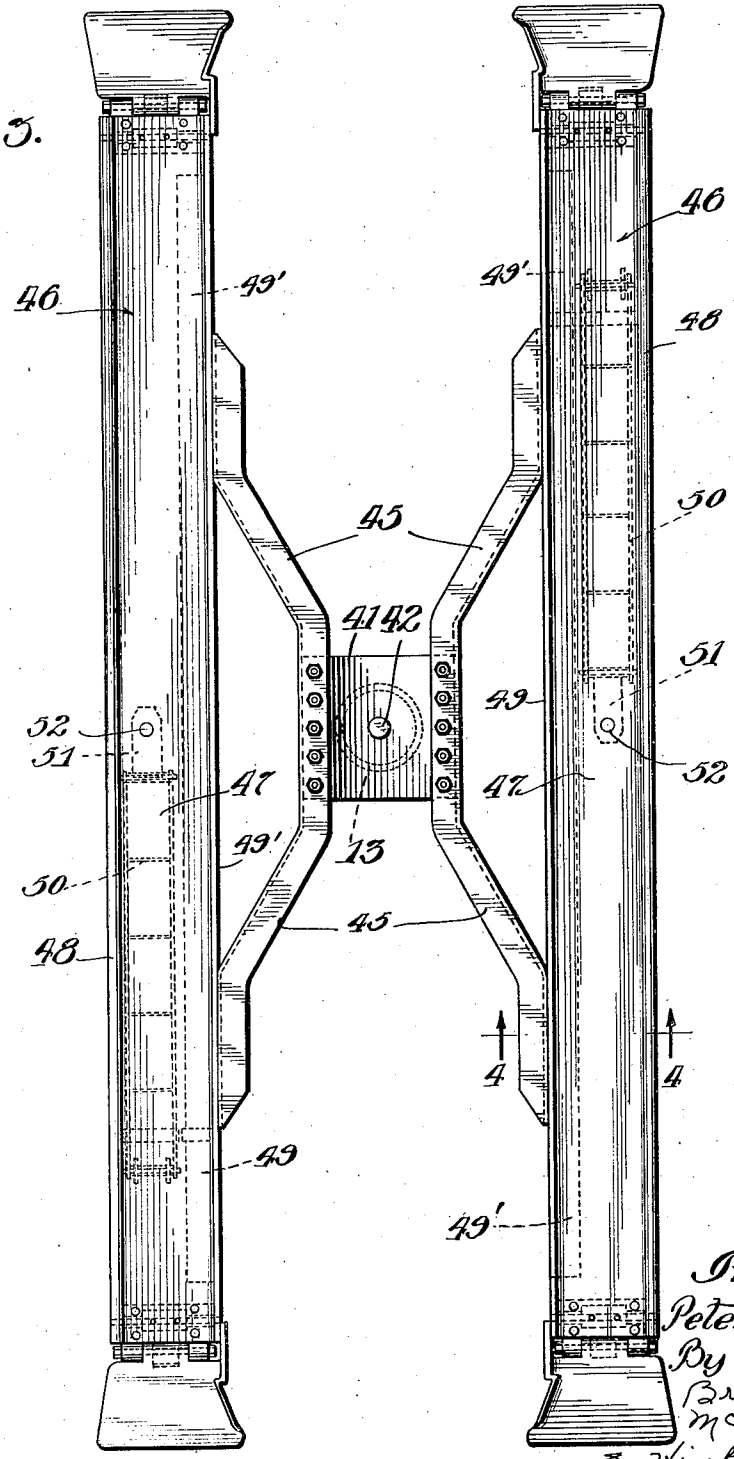

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Fig. 3.




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Fig. 4.

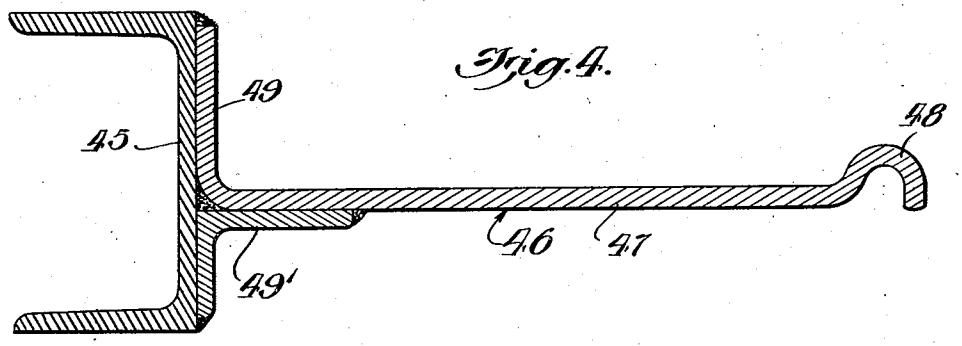



Fig. 5.

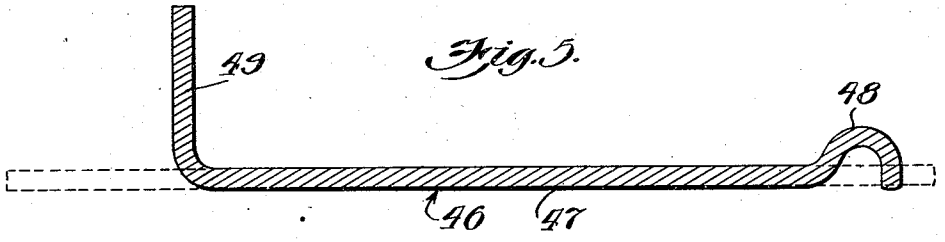
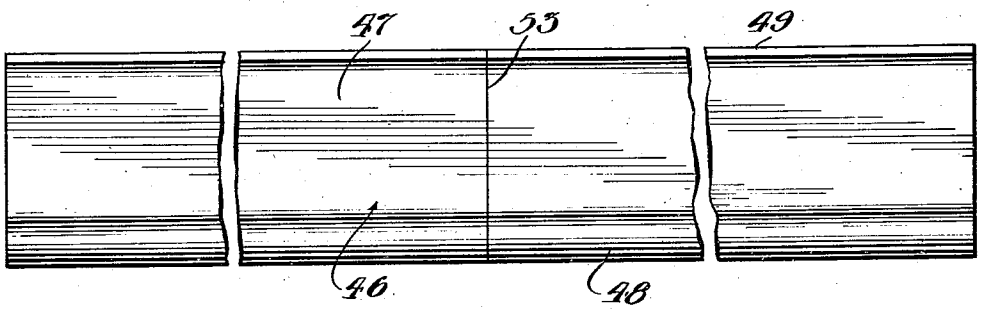



Fig. 6.




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# UNITED STATES PATENT OFFICE

1,985,510

## AUTOMOBILE-SERVICING LIFT

Peter J. Lunati, Memphis, Tenn.

Application September 4, 1930, Serial No. 479,622

11 Claims. (Cl. 254—93)

My invention relates to automobile-servicing lifts.

It will be explained as embodied in a lift of the general type set forth in my prior Patents No. 1,552,326, No. 1,589,144 and No. 1,689,145.

This application is a continuation, in part, of my copending application, Serial No. 161,167; filed January 14, 1927 (Patent No. 1,841,900).

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

Another object is to provide an improved bearing and packing whereby the single rotary lifting plunger is effectively journaled and rigidly supported.

Another object is to provide a bearing and packing which will be durable and reliable.

Another object is to provide a plunger bearing and guide which may be readily assembled with the plunger and form a unit quickly and properly associated with the pressure cylinder without the necessity for expert manipulation or attention.

Another object is to provide a lift having automobile supporting runways of improved construction.

Another object is to provide a lift with runways which will not catch and crush a workman's feet when the lift is lowered.

Another object is to provide runways under which ladders or other servicing equipment may be stored when not in use without danger of injury when the lift is lowered.

Another object is to provide runways which are suited to accommodate over wide tires, such as the so-called "dual tires" commonly employed on trucks and busses.

Another object is to provide a simple, effective and relatively inexpensive construction of runway for receiving and lifting an automobile to afford ready access to the underside for servicing operations.

Other objects and advantages of my invention will hereinafter appear.

An embodiment of my invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a vertical central section through the outer stationary cylinder, lifting plunger and the head whereby the runways are secured to the plunger;

Fig. 2 is a perspective of the plunger bearing and guide;

Fig. 3 is a top plan of the lift on a reduced scale;

Fig. 4 is an enlarged section through one of the runways, taken on the line 4—4 of Fig. 3;

Fig. 5 is a cross section of a runway tread, showing in dotted lines the developed shape of the steel plate from which it is formed, and

Fig. 6 is the top plan of a tread.

My automobile servicing lift comprises, in general, a closed-bottom cylinder adapted to be embedded in the earth in a fixed position with its upper end substantially flush with the floor or ground level, a plunger-piston mounted for vertical reciprocation in the cylinder and for rotation in any vertical position, and an open or skeleton like superstructure attached to the upper end of the plunger-piston whereby the underbody of an automobile elevated thereon is readily accessible for inspection, greasing and repair, together with connections for applying to and removing from the cylinder-plunger combination the influence of a pressure fluid whereby the plunger and superstructure and the automobile carried thereby may be raised and lowered at will. The present invention is especially concerned with the guiding, supporting and packing of the plunger-piston in the stationary cylinder and with the automobile-wheel receiving runways of the superstructure.

Referring particularly to Figs. 1 and 2, my improved relationship of cylinder and plunger-piston will first be described.

The stationary cylinder comprises a cylindrical tube 10, preferably formed from a steel sheet bent to the desired diameter and then the abutting edges tightly welded together. The lower end of cylinder 10 is tightly closed by a metal head 11 welded therein and the upper open end is provided with an outwardly projecting annular flange 12 welded thereto. This cylinder is adapted to be embedded in the earth with its upper flange 12 about flush with the ground or floor surface.

The movable plunger-piston comprises a suitable length of steel pipe 13, the outer surface of which is finished or ground so as to insure a tight fit with, but permit relatively easy movement through, the guide and supporting bearing hereinafter described. The lower end of the plunger is closed by a circular metal head 14 tightly welded to the end of pipe 13. The attachment of this plunger head may be reenforced by a set of anchor bolts 15 which are welded to the inside of pipe 13. The rim of head 14 extends slightly beyond the pipe to provide a projecting flange 16 which serves as a stop and to assist in insuring rigidity to the plunger when elevated, as will be presently explained. The center of head 14 is provided with a hole 17 therethrough in which a fluid pressure pipe 18 and a differential safety check valve 19 are located, as and for the pur-

poses fully explained in my aforementioned Patent No. 1,689,145. Pressure pipe 18 is screwed into and supported by a socket 20 which is welded to cylinder head 11 and joined by an air pipe 21 to a threaded air supply connection 22. This air connection may be formed in an enlargement or boss 23 welded to the outside of cylinder 10 at the desired height and by which the lift may be connected to a suitable source of fluid pressure, such as a compressed air tank (not shown) through a pipe 24.

The plunger-piston is guided in its movements and rigidly held upright in any position and an effective packing to prevent escape of fluid is properly retained by a guide-bearing cage 25. This cage is shown in perspective on a somewhat reduced scale in Fig. 2. It has a tubular body 26 preferably formed by rolling a sheet of steel into cylindrical shape and welding together the abutting edges. The external diameter of the body of the cage is considerably less than the inner diameter of cylinder 10 but it is provided with a series of outwardly projecting longitudinal ribs 27 which do bear against the inside of the cylinder. A lower bearing ring 28 of steel is welded to the bottom edge of body 26, its inner surface being finished to afford a good bearing fit with the plunger-piston. A relatively heavy stiff flange 29 is welded to the upper rim of cage body 26. A packing-seat ring 30 is welded to the inside of cage body 26 far enough down from its upper edge to insure room for the desired packing to lie thereabove. This packing-seat ring is of greater internal diameter than the external diameter of the plunger-piston so that it does not contact with or form any bearing for the plunger piston,—it merely serves to support and confine the packing. The upper bearing for the plunger-piston is provided by a removable ring 31 which has a downwardly extending annular shoulder 32 for engaging the top of the packing and a stiff lateral flange 33 which may be immovably clamped to the corresponding flanges of the cage and cylinder by suitable means, such as bolts 34. The inner surface of ring 31 is suitably machined or finished to afford the proper bearing fit with the plunger-piston.

Suitable compressible packing is interposed between seat 30 and shoulder 32, its depth or amount being such that, when the upper bearing, cage and cylinder flanges are tightly bolted together, it will be compacted sufficiently tight to prevent leakage of fluid or liquid at the operating pressures required. Thus the packing is located between rigid bearings so that it is not subjected to side thrust and excessive and unequal wear. And the easily permissible longitudinal separation between rigid lower bearing 28 and rigid upper bearing 31 affords a high degree of lateral rigidity or stability to the plunger-piston in all conditions of elevation. The lateral rigidity of the plunger-piston in fully elevated position,—that position most employed when the lift is in use, is further augmented by the effect of the fluid pressure pushing the stop flange 16 into tight and bracing contact with the under side of lower bearing ring 28. And, of course, the engagement of flange 16 and ring 28 effectively prevents the plunger from being forced too far out of the cylinder when pressure is applied.

I have discovered that an especially effective packing is afforded by an upper and lower ring of rectangular cross sectioned fabric-body packing material 35 and two intermediate rings 36 of tubular fabric-body packing material.

The vehicle supporting superstructure is attached to the top of the piston plunger by means of two rectangular steel head plates 40 and 41 welded thereto in proper spaced relation. Lower head plate 40 is formed with a hole in its center so that it may be slipped upon the outside of the plunger-piston, where it is securely anchored by welding. Upper head plate 41 rests upon the top of the plunger-piston and is securely anchored thereto by a pressure tight welded joint. This plate is provided with a small tapped filler hole which is closed by a screw plug 42 and used in filling the lift with liquid, preferably oil.

A pair of channel shaped arms 45 are bolted at their centers to opposite sides of head plates 40 and 41 (as most clearly shown in Fig. 3) and carry a pair of long parallel runways 46 on their outer ends. In order to increase the accessibility to the underbody of an automobile standing elevated on these runways the midportions of arms 45 are bent to lie parallel to the runways, then for some distance they flare outwardly and the extremities are again formed parallel to the runways to afford an extensive attachment thereto,—preferably by a welded joint as will be later explained. Preferably the spacing of head plates 40 and 41 is such that they lie within and against the flanges of channel arms 45, the anchoring bolts passing through the arm flanges and the plates, as most clearly shown in Fig. 1.

The construction of the runways will now be described with particular reference to Figs. 4 to 6.

These runways, which include relatively wide web portions 47, are formed from flat rectangular steel plates indicated by the dotted lines of Fig. 5.

The outer edge of each plate is rolled into a smooth substantially semi-cylindrical or inverted U-shape bead 48. When assembled in position this bead opens downwardly. The opposite or inner edge of the plate is bent to form a relatively deep right angle flange 49 by which the runway is attached to the extremities of the proper supporting arm 45, preferably by welding along the upper and lower edges of the flange. A steel reenforcing angle bar 49', which extends through the greater portion of the length of the runway, is fitted into the angle between the web of each channel arm 45 and the horizontal tread portion of the associated runway 46 and securely attached thereto by welding. This angle bar also serves as a runway rest when the plunger is completely depressed because it will strike the ground or floor and hold the tread and outer beaded edge of the runway slightly elevated,—sufficient to clear the toes of a person standing so close to the lift that his feet otherwise might be caught between the runway and the ground or floor. This clearance serves the additional function of providing a space in which service ladders 50 may be stored when not in use. These ladders may be suspended and hinged at one end to brackets 51, which are movably attached to the underside of the runway treads by such means as rivets or bolts 52. Thus either bracket 51 may be rotated until its ladder extends at right angles to the associated runway and the free end of the suspended ladder let down while the upper end is held. In this condition the ladder is ready for use. Or they may be turned, as shown in Fig. 3, to bring the ladder under the runway tread for storage. The angle bars 49' assist in preventing the ladders from being crushed by the weight of the automobile when the plunger comes down and they are lying below the runways. It also prevents the ladders from be-

ing moved too far under the runway when they are being turned to inoperative position. Should the lift be lowered while the ladders are still out in operative position they will be swung outwardly and not be damaged.

The longitudinal inverted U-shape bead along the outer edge of each runway performs, among others, the very important function of safeguarding a workman who may be standing thereon when the lift is up. It prevents the feet from slipping off the runway and serves as an abutment to prevent inadvertent stepping off backward therefrom. A relatively low ledge is better than a high one because, while affording practically the same or even a greater degree of safety and more comfort to the workman, it does not interfere with overwide tires, such as the dual tires now in common use, and is lighter. A safety ledge, such as this bead is, has been used heretofore but it has been a difficult and expensive thing to produce. It has been proposed to construct the runways of steel rolled in T-shape but the cost of suitable rolls for this work is absolutely prohibitive. Furthermore it is the opinion of steel mill experts that satisfactory T-shapes of the necessary size and width could not be produced commercially by present day methods because of the difficulty of insuring sufficiently uniform cooling to prevent warping. The usual practice heretofore has been to use ship channel of the desired width and plane or cut off enough of one flange to leave the desired relatively low safety ledge along one edge of the web or tread. Obviously such an expedient is costly and troublesome. By my improved method, however, I am able to produce satisfactory runways at a marked reduction in cost. Thus the flat steel plates are relatively cheap and easy to obtain. The formation of the upstanding flange along one edge and of the safety-ledge bead along the other edge are relatively simple and inexpensive operations. The assembly and welding together of the channel shaped supporting arms 45, treads 47 and reenforcing angle bars 49′ is also a relatively easy and inexpensive operation. And since flat steel plates of relatively short length are cheaper and more readily obtained than longer ones I have found it expedient, where the runways are to be, for example fifteen feet long, to use plates seven and one half feet long and, after they have been flanged and beaded, to weld two such formed plates together end to end as illustrated by the weld line 53 in Fig. 6. The reenforcing effect of channel arms 45 and angle bars 49′ to which the formed runway plates are welded, as hereinbefore described, adds sufficient strength and rigidity to make this practice entirely satisfactory.

Having thus illustrated and described an embodiment of my invention, what I claim and desire to secure by United States Letters Patent is as follows:

1. An automobile servicing lift comprising a stationary cylinder with a closed bottom and open top for vertical mounting in the earth and having an outwardly projecting flange adjacent its open end, a tubular plunger-bearing cage fitting into the cylinder from its open end and having an outwardly projecting flange to lie upon the flange of the cylinder, said cage having a lower plunger-bearing adjacent its lower end and an annular packing-seat slightly below its upper end, the internal diameter of said packing seat being substantially greater than that of the plunger-bearing, a removable upper bearing for fitting within the upper end of the cage and having an outwardly projecting upper flange to lie upon the flange of the cage, compressible packing located in the cage between the packing-seat and the upper bearing, means for immovably clamping together the flanges of the cylinder, bearing cage and upper bearing, a plunger-piston mounted for vertical and rotary movements in the bearing cage, an automobile supporting superstructure carried on the upper end of the plunger-piston, and means whereby fluid pressure may be exerted between the cylinder and plunger-piston to elevate the latter.

2. An automobile servicing lift comprising a closed-bottom open-top cylinder for vertical mounting in the earth, said cylinder having an outwardly projecting flange adjacent its open end; a bearing cage fitted within the upper end of the cylinder, said cage having a tubular body with an outwardly projecting flange at its upper end, an inwardly projecting annular lower bearing at the lower end of the body, an inwardly projecting annular packing seat intermediate the ends of the body, the internal diameter of the lower bearing being less than that of the packing seat, and a removable upper bearing of the same internal diameter as the lower bearing, said upper bearing having a shoulder fitting within the upper end of the cage body and an outwardly projecting flange to engage the flange of the body; compressible packing located between the packing seat and the shoulder of the upper bearing; means for rigidly clamping together the flanges of the cylinder, cage body and upper bearing to compress the packing between the packing seat and the shoulder of the upper bearing and provide two rigid bearings with the packing intermediate; a plunger-piston mounted for axial and rotary movements in the bearing cage; an automobile supporting superstructure carried on the upper end of the plunger-piston; and means whereby fluid pressure may be exerted between the cylinder and plunger-piston to elevate the latter.

3. An automobile servicing lift comprising a stationary cylinder having an open top and closed bottom and adapted for vertical mounting in the earth, a cage fitted within the cylinder and attached thereto to provide a rigid lower plunger-bearing, a ring rigidly attached to the upper end of the cylinder to form a rigid upper plunger-bearing, a packing located between the upper and lower rigid bearings, a plunger-piston mounted for rotary and vertical movements in said bearings and supported rigidly laterally thereby, an automobile supporting superstructure carried by the plunger-piston, and means whereby fluid pressure may be exerted between the cylinder and plunger-piston to elevate the latter.

4. An automobile servicing lift comprising an automobile supporting superstructure, a plunger-piston carrying the superstructure, a stationary cylinder in which the plunger-piston may move up and down and rotate on its axis, a bearing cage for the plunger-piston, said cage lying within and being rigidly attached to the cylinder and providing a rigid lower plunger-bearing for the plunger-piston to guide and laterally support the same, a ring rigidly attached to the cylinder adjacent its upper end to form a rigid upper bearing for the plunger-piston, compressible packing interposed between the plunger-piston and cage intermediate said bearings, and means whereby fluid pressure may be exerted between the cylinder and plunger-piston to elevate the latter.

5. An automobile servicing lift comprising a stationary cylinder having a closed bottom and

open upper end, a plunger-piston for the cylinder, an upper and lower bearing for the plunger-piston, said bearings being spaced relatively far apart and both being rigidly associated with the cylinder, packing surrounding the plunger-piston intermediate the bearings, an automobile supporting superstructure carried by the piston, and means whereby fluid pressure may be exerted between the cylinder and plunger-piston to elevate the latter.

6. An automobile servicing lift having a stationary cylinder, a reciprocable and rotary plunger-piston mounted therein and rigidly braced laterally by two spaced bearing members which are rigidly anchored to the cylinder, a compressible packing engaging the plunger-piston intermediate the bearings, and an automobile supporting superstructure carried by the plunger-piston.

7. A vehicle lift, comprising in combination, a casing imbedded within the ground, a plunger mounted for reciprocation therein, spaced members providing rigid upper and lower bearings for the plunger, packing means between the members, means carried by the plunger for engaging the lower bearing to limit the upward movement of the plunger, and said lower bearing being selectively removable through the top of the casing to permit withdrawal of the plunger from the casing through the top end thereof.

8. A vehicle lift, comprising in combination, a casing imbedded within the ground, a plunger mounted for reciprocation therein, spaced members providing bearings for the plunger, and packing means for the plunger disposed between the members each of said bearings being removable through the top of the casing, while the plunger is positioned therein.

9. In a lifting device, the combination with a casing, of a plunger reciprocable therein, a bearing member disposed between the plunger and casing, means for connecting the lower end of the member to the casing, the bearing when connected to the casing being adapted to engage the plunger and to limit the outward movement thereof, and when disconnected from the casing being adapted to be withdrawn from the casing and to permit withdrawal of the plunger from the same end of the casing.

10. An automobile servicing lift comprising elevating mechanism; a pair of spaced substantially parallel and rigid vehicle supporting rails, each rail being of channel shape with a relatively wide web to receive and support the wheels of a vehicle and a flange along each edge of the web, one of said flanges being at least twice as deep as the other and the shallower flange being of inverted U shape; and means for connecting the rails to the elevating mechanism with the webs of the rails substantially horizontal and with the deeper flanges to the inside of the lift and the shallower flanges to the outside thereof.

11. An automobile servicing lift comprising elevating mechanism; a pair of spaced substantially parallel and rigid vehicle supporting rails, each rail being of channel shape with a relatively wide web to receive and support the wheels of a vehicle and a pair of flanges along the edges of the web, one of said flanges being at least twice as deep as the other and substantially perpendicular to the web and the other flange being of inverted U shape; and means for connecting the rails to the elevating mechanism with the webs of the rails substantially horizontal and with both flanges extending upwardly, the deeper flange being to the inside of the lift and the shallower flange to the outside thereof.

PETER J. LUNATI.