May 14, 1946. H. E. PAGE 2,400,316

VERTICAL JACK

Filed May 22, 1944 2 Sheets-Sheet 1

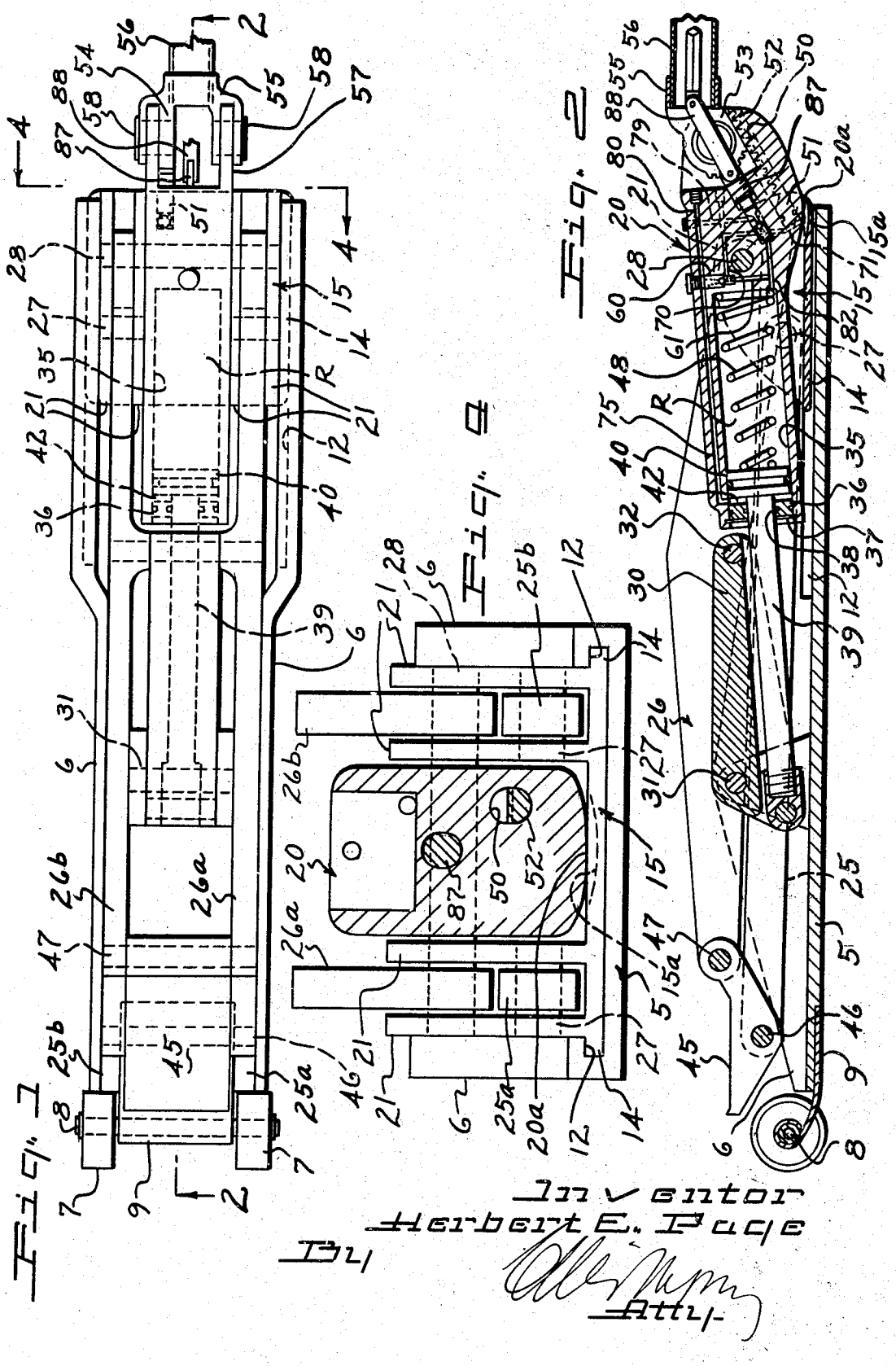


Fig. 1

Fig. 2

Fig. 3

Inventor
Herbert E. Page
By
Atty.

May 14, 1946. H. E. PAGE 2,400,316

VERTICAL JACK

Filed May 22, 1944 2 Sheets-Sheet 2

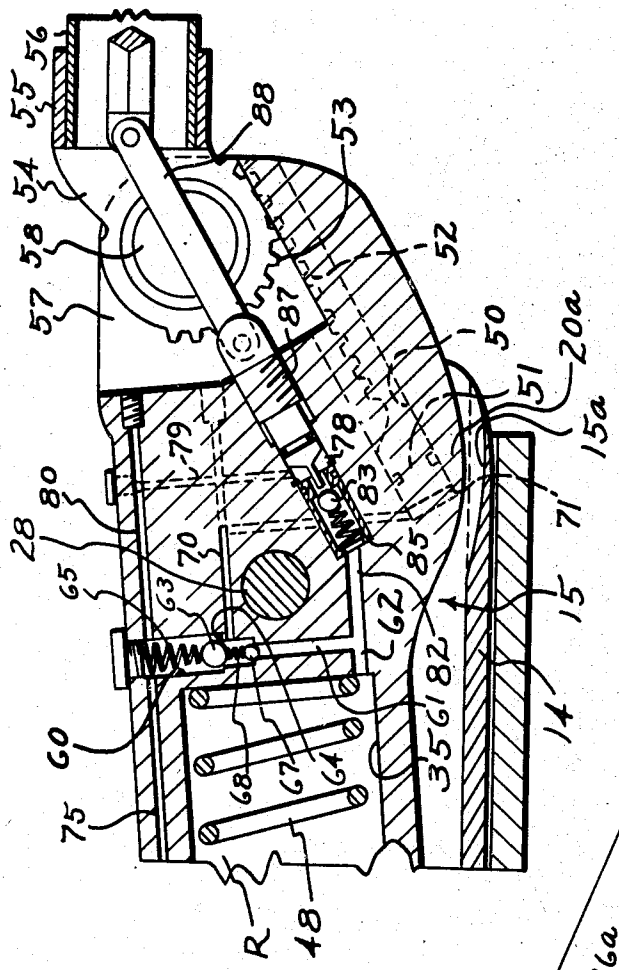


Fig. 5

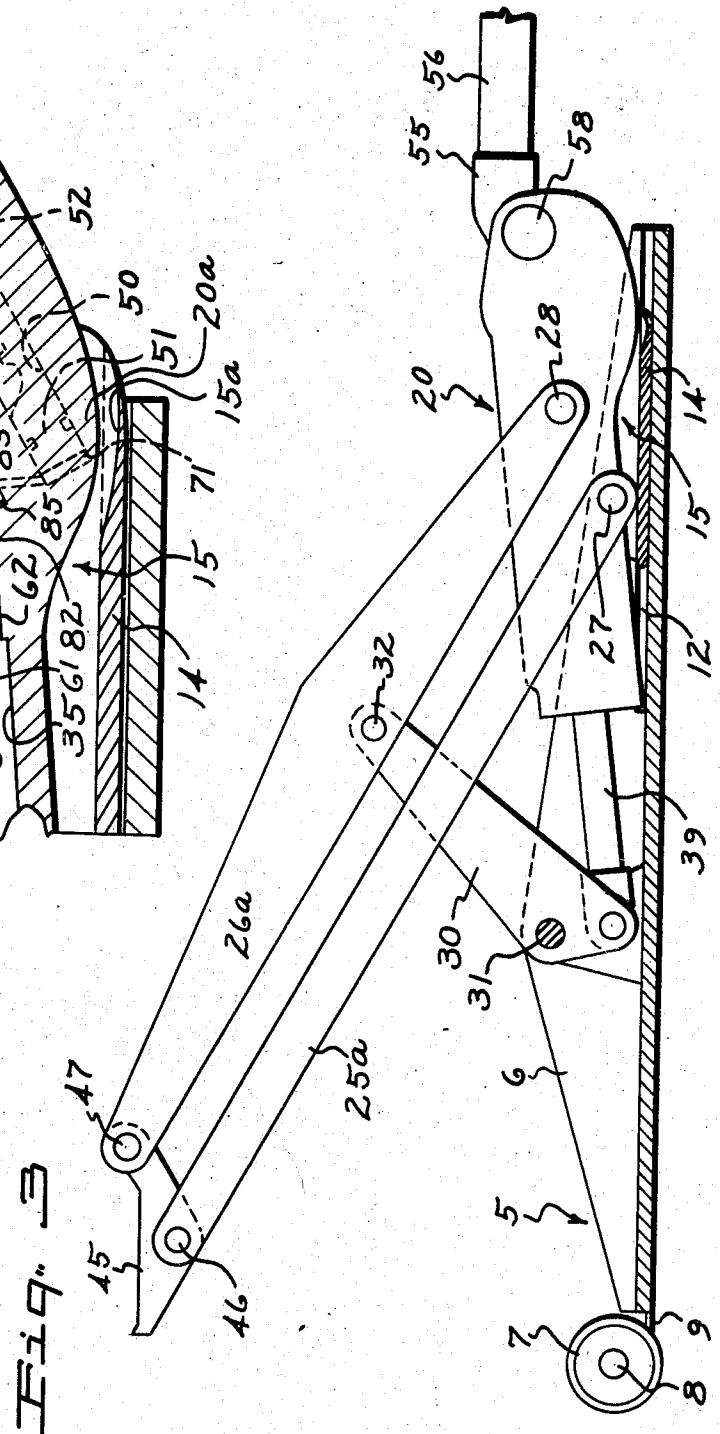


Fig. 3

Inventor
Herbert E. Page
By
Atty.

Patented May 14, 1946 2,400,316

UNITED STATES PATENT OFFICE

2,400,316

VERTICAL JACK

Herbert E. Page, Pasadena, Calif.

Application May 22, 1944, Serial No. 536,656

3 Claims. (Cl. 254—9)

This invention relates to jacks and has for one of its principal objects the provision of a hydraulic jack wherein the lifting saddle, although mounted on a pivoted swinging arm, is raised in a plane substantially perpendicular to the base or bed of the jack, as distinguished from moving about an arc as in the case with conventional jacks.

Another object is the provision of a jack wherein the lifting arm is pivoted to swing relative to a carriage which is movable along the base and wherein means are provided to swing the arm in response to such movement.

A still further object is the provision of a jack operable to move the load forwardly and downwardly after a predetermined substantially vertical lift is accomplished.

My invention thus overcomes the long-standing objections to jacks of the heavy duty type which utilize a lifting arm pivotally secured at one end to a stationary base and which carries the work-engaging saddle at its opposite end, the objection to such structure being that in its load-lifting and lowering operations, the free end of lifting arm necessarily moves about an arc. This is particularly objectionable where the load is of a nature which cannot be swung with the arm and where the base cannot be moved relative to the load to compensate for the arcuate movement of the arm.

While I have specifically mentioned some of the principal objects of my invention, from the following description of a presently preferred embodiment it will be apparent that the invention possesses other features of novelty and utility. For purposes of the following description I shall refer to the accompanying drawings, in which:

Fig. 1 is a top plan view;

Fig. 2 is a longitudinal section taken on line 2—2 of Fig. 1;

Fig. 3 is a view showing the jack in raised position;

Fig. 4 is an end view partly in section, taken on line 4—4 of Fig. 1; and

Fig. 5 is an enlarged fragmentary section.

In the particular embodiment of the invention shown in the drawings, I show a base 5 consisting of spaced sides 6 mounted at the front or left-hand end on rollers 7, which rollers are carried on an axle 8 extending transversely. The axle is mounted between its ends on a resilient arm 9 secured to and extending outwardly from the end of the base. Thus when the jack is under load, the resiliency of the arms 9 permits the base to settle against the floor and then resume its normal position on the rollers after the load is lowered.

At the right-hand end of the base the sides 6 are spaced apart a relatively greater distance than at the opposite end, and in each side adjacent its bottom there is provided a longitudinal groove 12 along which slide the lateral flanges 14 of a carriage 15.

A body 20, containing the pressure-generating mechanism to be described, is mounted between the spaced upright sides 21 of the carriage, having a spherical bottom portion 20*a* which is disposed in but is spaced from the bottom of a recess 15*a* provided in the bottom wall of the carriage.

The jack embodies a pair of lifting arms 25, 26, each comprising parallel members 25*a*, 25*b*, 26*a*, 26*b*, arms 25*a* being pivotally connected by pins 27 to the carriage, and arms 26*a* being pivotally connected to the body and carriage by cross pin 28. An arm 30 is pivotally secured adjacent its lower end between the sides 6 by pin 31 and is pivotally secured at its outer end to arm 26 by cross pin 32.

Body 20 is provided with a cylinder bore 35 which has a closure plug 36 secured in its outer end by a snap ring 37 and is provided with a central opening 38 to slidably pass the rod 39 of a piston 40, there being provided between the piston and plug a pressure chamber 42.

The outer end of the piston rod 39 is pivotally secured to the lower end of the arm 30 at a point spaced below the plane of pivot pin 31, so that when hydraulic pressure is applied to chamber 42, the arm 30 swings upwardly and the body 20 is moved to the left with the carriage 15. Thus the saddle 45, which is pivotally mounted on the free ends of arms 25, 26 by cross pins 46, 47, respectively, is moved in a plane substantially perpendicular to the base—that is, the parts are moved from the position of Fig. 2 to that of Fig. 3.

The portion of cylinder 35 to the right of piston 40 provides a reservoir R for hydraulc fluid, a compression spring 48 being disposed between the inner end of the cylinder and the inner face of the piston 40 to normally urge the piston outwardly of the cylinder.

A pressure-generating cylinder 50, provided in the body, has a pumping piston 51 reciprocally mounted therein, said piston having an operating rod in the form of a rack 52, which rack is

engaged by a pinion 53 formed on one of the bifurcations 54 of a lever 55 operated by handle 56. The bifurcations are pivotally mounted on the end extensions 57 of the body by trunnions 58.

A lateral bore 60 in the body communicates with a reduced passageway 61, which in turn communicates with the reservoir R through a passageway 62. A valve seat 64 is provided between bore 60 and passageway 61 against which a ball check valve 63 is normally urged by a spring 65. A second check valve 67 seats towards the reservoir in passageway 61, being urged seated by a coil spring 68. A fluid passageway 70 communicates at one end with passageway 61 between check valves 67 and 63 and communicates at its other end with chamber 71 provided between the piston 51 and the inner end of cylinder 50.

A fluid passageway 75 is provided in the body, communicating at one end with chamber 42 and at its other end with bore 60. A pressure release chamber 78 communicates via passageways 79, 80 with bore 60. The discharge end of the chamber 78 communicates with the reservoir through a passageway 82. A ball check valve 83 seats towards chamber 42 in chamber 78, being urged to seated position by a relatively stiff compression spring 85, which spring is of a strength capable of maintaining the ball 83 seated against work-lifting pressure in chamber 42.

For releasing pressure from chamber 42 to lower a load, I provide a valve-actuating member 87 which is threaded into the chamber 78 so that when rotated by the links 88 the inner end of the member 87 engages and moves ball 83 off its seat to permit fluid to return to the reservoir.

By the construction described, it is relatively simple to so proportion the arms that the respective sines of their arcs are such that the saddle will be moved substantially perpendicular to the bed until a predetermined height is reached, after which any further movement will result in the saddle being moved forwardly and downwardly about an arc. The latter function is advantageous inasmuch as it enables a load to be lifted substantially vertically to the desired height—say, for loading on a car or truck—after which it may be moved forwardly and downwardly to be deposited thereon.

In operation, the device is placed so that the saddle 45 is positioned under the load and the handle 56 is oscillated to operate the pumping piston 51. On each suction stroke fluid is drawn into chamber 71 from the reservoir past valve 67 and on each pressure stroke the fluid is forced under pressure into chamber 42 past valve 63, causing the arms 25, 26, 30 to be moved as before described to lift the saddle perpendicular to the bed. When it is desired to lower the load, the valve-actuating member 87 is operated to unseat ball 83 to allow return of the fluid from chamber 42 to the reservoir. Ball 83 and spring 85 also serve as a safety means to prevent overload of the jack—that is, the spring 85 may be made of a strength only sufficient to withstand a pressure in chamber 42 great enough to lift the maximum load of which the jack is safely capable. Thus if such load is exceeded, the spring 85 will yield and permit ball valve 83 to open and release the excess pressure.

I claim:

1. A jack comprising a bed, a body movable longitudinally of the bed, a work-lifting arm pivotally mounted at one end on the body to swing relative thereto, a work-engaging saddle pivotally mounted on the free end of the arm, a second arm pivotally secured at one end to the bed and pivotally secured at its other end to the work-lifting arm, and means operatively associated with the body to move the latter longitudinally of the bed whereby to move the saddle in a plane substantially perpendicular to the bed, said last-named means comprising a cylinder carried by the body, a piston reciprocally mounted in the cylinder and providing in conjunction therewith a pressure chamber, a piston rod secured at one end to the piston and extending through the chamber, means connecting the other end of the rod to the second arm, and fluid pressure-generating means communicating with the chamber.

2. A jack comprising a bed, a body movable longitudinally of the bed, a work-lifting arm pivotally mounted at one end on the body to swing relative thereto, a work-engaging saddle pivotally mounted on the free end of the arm, a second arm pivotally secured at one end to the bed and pivotally secured at its other end to the work-lifting arm, and means operatively associated with the body to move the latter longitudinally of the bed whereby to move the saddle in a plane substantially perpendicular to the bed, said last-named means comprising a cylinder carried by the body, a piston reciprocally mounted in the cylinder and providing in conjunction therewith a pressure chamber, a piston rod secured at one end to the piston and extending through the chamber, means connecting the other end of the rod to the second arm at a point spaced below the point at which the second arm is pivotally secured to the bed, and fluid pressure-generating means communicating with the chamber.

3. A jack comprising a bed, a carriage mounted to slide longitudinally of the bed, a cylinder secured to the carriage, a lifting arm having its inner end pivotally secured to the carriage, a second arm pivotally secured adjacent its inner end to the bed and pivotally secured at its outer end to the lifting arm, a piston in the cylinder and forming therewith a pressure chamber, a piston rod secured at its inner end to the piston and secured at its outer end to the inner end of the second arm and fluid pressure-generating means communicating with the pressure chamber, said carriage and piston being movable towards each other in response to pressure in the chamber.

HERBERT E. PAGE.