

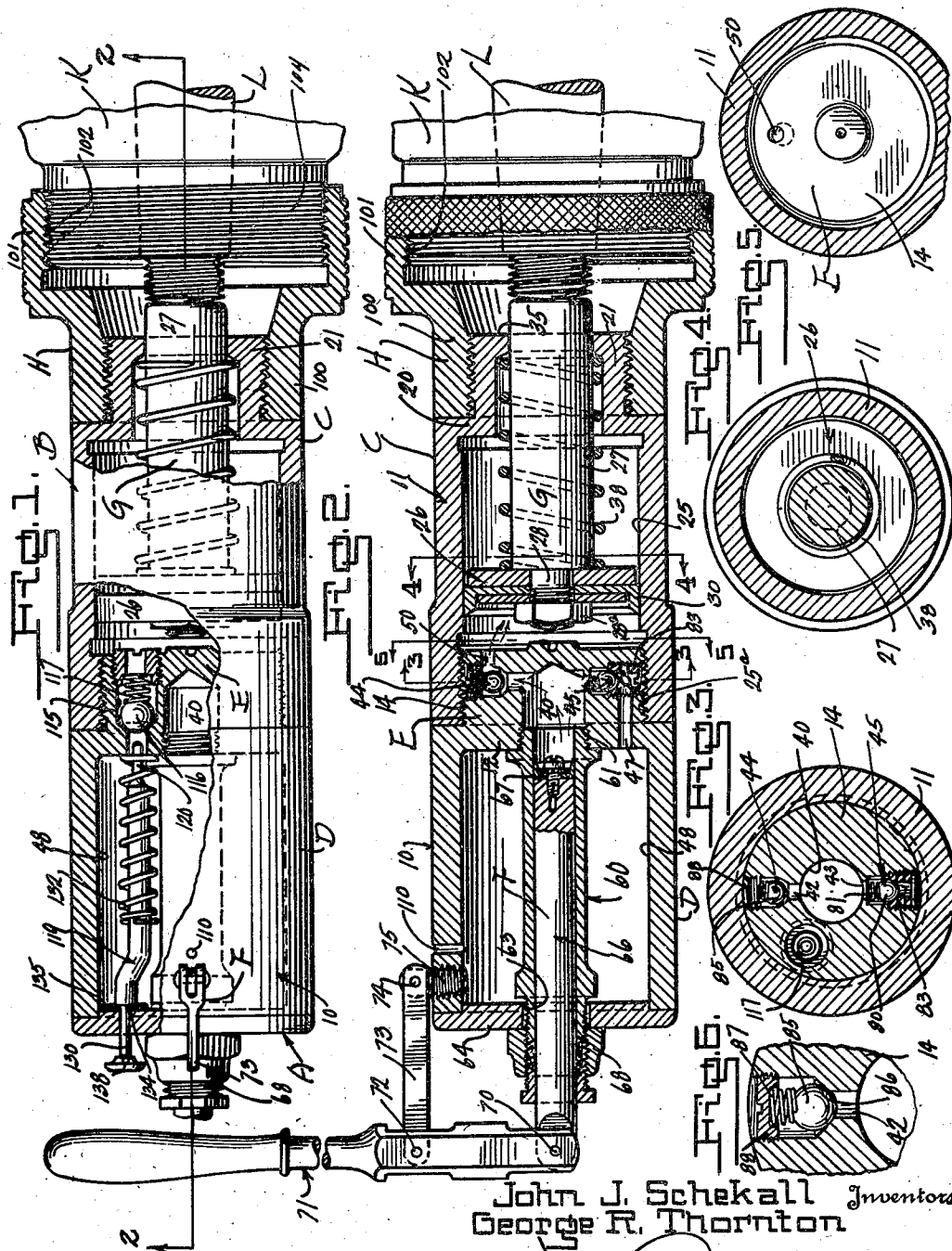
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J. J. SCHEKALL ET AL

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HYDRAULIC GEAR AND WHEEL PULLER

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John J. Schekall Inventors.
George R. Thornton

Amaster and Allwin
Attorneys

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JOHN J. SCHEKALL AND GEORGE R. THORNTON, OF COLORADO SPRINGS, COLORADO.

HYDRAULIC GEAR AND WHEEL PULLER.

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This invention relates to an improved hydraulic gear and wheel puller.

The primary object of this invention is the provision of an improved jack or pulling device embodying a compact and efficient construction whereby gears, wheels, and the like may be pulled with ease from their respective supports; the improved device embodying means to receive different units adaptable for operating upon elements to be pulled from place.

A further object of this invention is the provision of an improved jack for pulling gears and wheels from shafts, spindles, and the like, embodying a compact mechanism for exerting a powerful hydraulic pressure which may be expended in removal of such elements as gears and wheels.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views.

Figure 1 is a fragmentary view, partly in section, showing improved details of the hydraulic jack in position for pulling a wheel from its axle spindle.

Figure 2 is a longitudinal sectional view taken substantially on the line 2—2 of Figure 1.

Figures 3, 4, and 5 are transverse sectional views taken substantially on their respective lines in Figure 2 of the drawing.

Figure 6 is an enlarged fragmentary view, partly in section, showing check valve means for controlling the pressure fluid.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate the improved jack, which may comprise a housing construction B consisting of the cylinder casings C and D having compartments separated by partition means E; the casings C and D respectively having piston means G and fluid compressing means F therein. A unit H may be detachably associated with the casing portion C for gripping the element K which is to be removed from its associated support L.

The housing B comprises the casing portions D and C, which are preferably of cylindrical formation, the same respectively including the cylindrical bodies 10 and 11. The body 10 of the casing portion D at the

forward end thereof is provided with a wall 12, comprising part of the partition means E, preferably integral with the body 10, and projecting in a reduced externally screw threaded shank 14 from the forward end of said portion D; the rear end of the casing body 11 being internally screw threaded at 25^a for detachably receiving the screw threaded shank 14, as shown in Figure 2 of the drawing.

The body 11 of the casing portion C at the front end thereof is provided with a wall 20, from which extends an externally screw threaded hollow shank 21. The casing portion C in the body 11 thereof forwardly of the partition means E is provided with a compartment 25, which slidably receives therein a piston 26, comprising part of the means G; the piston 26 having associated therewith a ram or plunger stem 27, which is provided with a reduced screw threaded shank 28 at the rear end thereof on which the piston 26 is received and bolted as by nut 28^a. The piston 26 is of the usual construction comprising a flexible cup packing 30 between metal washers, so that when in position the extreme rear end of the screw threaded shank 28 projects rearwardly beyond the rearmost edges of the piston 26, to engage the partition E and prevent any contact of the casing cup 30 therewith. The plunger stem 27 extends axially through the compartment 25 and through the shank 21, projecting at its forward end beyond the forward face 35 of the shank 21, as shown in Figure 2 of the drawing. A coiled compression spring 38 is coiled about the plunger stem or ram 27, engaging in the screw threaded shank 21 at one end and at the other end engaging the facing washer of the piston 26, as shown in Figure 2, to normally exert pressure on the piston and force the same towards the partition E.

Referring to the construction of the partition E a passageway 40 is provided through the wall 12 and partly into the screw threaded shank 14, terminating in the shank 14 and therein having lateral ducts 42 and 43 communicating therewith, and extending therefrom in diametrically opposed directions. These passageways 42 and 43 are enlarged in the shank 14, to receive check valve structures 44 and 45 respectively. The partition E is provided with a duct 47 extending from the compartment 48 in the casing portion D to the valve construction 45 for the

purpose of controlling fluid flow from the compartment 48 into the passageway 40. At the front of the partition E a duct 50 is provided, leading from the compartment of the casing portion C between the partition E and piston 26 to the valve construction 44; the latter of which regulates admission of the fluid under back pressure from the piston compartment 25 thru the passageway 40 of said partition E.

An inner cylinder 60 is provided axially within the compartment 48, having an end 61 thereof screw threaded into the end of the passageway 40 immediately facing the compartment 48; the cylinder 60 being hollow and of elongated tubular formation, and at its rear end extending through an opening 63 in the rear wall 64 of the casing portion D, as shown in Figure 2. This inner cylinder 60 comprises part of the means F, and it slidably receives therein a fluid compressing plunger 66, of rod-like formation, having packing 67 at the forward end thereof, and at its rearward end said plunger 66 extending thru a suitable stuffing box 68 which may be supported on the rear screw threaded end of the inner cylinder 60, which projects through the opening 63 exteriorly of the wall 64 of the casing portion D.

The operating plunger 66 of the means F is pivoted at its rear end at 70, to the lower end of a substantially vertically disposed operating lever 71; the latter being pivoted at 72, intermediate its ends, to the rear end of a pivoted link 73; the link 73 at its forward end being pivoted at 74 to a detachable screw support 75 which is detachably screw threaded in the body 10 of the casing portion D, at the top thereof.

Referring to the valve mechanism 45, the same includes a ball valve 80, spring urged at 81 downwardly onto the seat of a detachable sleeve plug 83; the plug 83 being provided with apertures leading into a central passageway over which the ball valve 80 may seat to close the same. The apertures may communicate with the duct 47, as shown in Figure 2, and the ball valve 80 permits fluids to enter the passageway 40 from the duct 47 and prevents counter-flow. The valve construction 44, as shown in Figures 2 and 3 of the drawing, comprises a ball valve 85, adapted to seat on a tapered seat 86 over the duct or passageway 42; the same being urged by spring 87. A detachable plug 88 holds the spring 87 and ball valve 85 in place for limited movement and the function of the ball valve 85 is of course to close the passageway 42 to permit raising of the ball against spring pressure by reason of fluid pressure existing in the passageway 40 to force the fluid through the duct 50 into the piston compartment 25, and preventing its return flow. Both of the plugs 83 and 88 are detachable from their screw

threaded openings at the external screw threaded periphery of the partition shank 14, as shown in Figure 2 of the drawing.

The shank 21 of the casing portion C is adapted to receive any of several units suitable for attachment to different types of wheels or gears or like objects to be pulled or removed. In the present instance the unit H is particularly well adapted to be used on the hubs of conventional automobile wheels, for removal thereof, and to this end the unit H includes a screw threaded sleeve 100, having a passageway internally screw threaded for detachably receiving the shank 21 therein. Furthermore the unit H includes the article gripping sleeve or body 101, provided with an internal screw threaded socket 102 therein for receiving therein the external screw threaded hub 104 of the element K, which in the instance shown may be the rear wheel of an automobile.

In operation the unit H is properly assembled on the object K to be removed, and applied upon the forward end of the housing B. The compartment 48 of the casing portion D receives a liquid. The plunger 66 is reciprocated within the inner cylinder 60 by reason of oscillation of the handle or lever 71, and upon rearward movement of the plunger 66 it is quite apparent that the ball valve 80 will be lifted, incident to the suction in the passageway 40 for the drawing of the liquid from the compartment 48 through the duct 47 and past the valve structure 45 into the passageway or compartment 40. Upon the instroke of the plunger 66, that is forwardly towards the piston mechanism G, the liquid drawn into the compartment or passageway 40 will be placed under pressure, and the check valve 45 will of course snap shut upon its seat and prevent the forcing of the liquid back into the compartment 48. The outlet for the compressed liquid of course is through the duct 42; the same lifting the valve ball 85 through the duct 50 into the piston compartment 25 to the rear of the piston 26. The compressed liquid operates on the piston 26 forcing the same forwardly and the forward end of the ram or plunger stem 27 engaging the end of the spindle or shaft L. It is quite apparent, since the unit H connects the element K to the housing B, and as the powerful force is acting on the piston construction G tending to force the same forward, that the wheel or element K may be withdrawn from its supporting shaft or element L.

In order to permit the liquid to pass from the compartment 48 into the piston compartment, without creation of a vacuum in the compartment 48, a vent duct 110 may be provided in the top of the body 10, as shown in Figure 2 of the drawings, and

this vent duct may be properly calibrated to prevent easy exit of the pressure fluid, which may be glycerine or other viscid substance.

5 In order to release the compressed liquid and return it from the compartment 25 back to the supply compartment 48, an eccentric duct 115 is provided thru the partition E, as is shown in Figure 1, in which a
10 seat is provided upon which a ball valve 116 seats by action of the spring 117, to normally prevent backflow or return of compressed fluid from the piston compartment 25 into the supply compartment 48. A release plunger or member 119 is reciprocally
15 supported on the casing portion D, supported at its forward end 120 and extending into the duct 115, just rearwardly of the valve 116, and at its opposite end 130 extending through the rear wall 64, as shown
20 in Figure 1. A spring 132 is provided, to normally urge the release plunger 119 away from the ball valve 116; the action of the spring 132 being limited by engagement of a shoulder 134 on the stem against a washer
25 135, as shown in Figure 1. The outer or rearmost end of the plunger 119 has a finger engaging head 138 thereon, which the operator presses to move the plunger 119
30 inwardly and counter to action of the spring 132 so that the end 120 may engage the ball valve 116 and unseat the same and permit the compressed liquid to pass or return to the compartment 48, and in this
35 connection the liquid is aided by spring action on the piston 26, as is readily apparent from Figures 1 and 2 of the drawing.

40 From the foregoing description of this invention it is apparent that a novel hydraulic jack for the pulling of wheels has been provided, which is of a compact and simple nature, and which is adaptable to various units for the pulling of a wide variety of devices, such as gears, automobile
45 wheels, and the like.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit
50 of the invention or the scope of the claims.

We claim:

1. In a hydraulic jack a housing including a pair of compartments therein separated by a partition, a piston slidable in one
55 of said compartments, a ram connected with said piston extending thru the end of said housing at the opposite side of the piston from the partition, the other compartment being adapted to receive a supply of liquid,
60 a cylinder having a compartment, said cylinder having support on said partition, plunger means for the cylinder, said partition having ducts from each of said compartments of the housing to said cylinder
65 compartment, and check valve means for the

ducts to permit the liquid under action of the plunger means to be drawn from the liquid supply compartment to the cylinder and then forced into the piston compartment to act on the piston.

2. In a hydraulic jack a housing including a pair of compartments therein separated by a partition, a piston slidable in one of said compartments, a ram connected with
70 said piston extending thru the end of said housing at the opposite side of the piston from the partition, the other compartment being adapted to receive a supply of liquid,
75 a cylinder having a compartment, said cylinder having support on said partition, plunger means for the cylinder, said partition having ducts from each of said compartments of the housing to said cylinder
80 compartment, check valve means for the duct to permit the liquid under action of the plunger to be drawn from the liquid supply compartment to the cylinder and then
85 forced into the piston compartment to act on the piston, spring means normally acting on the piston to force the same towards the partition, and a release valve to permit
90 retroverting of the liquid from the piston compartment of the housing to the liquid supply compartment.

3. In a hydraulic jack the combination of a pair of cylindrical casing portions, means
95 to detachably connect the same including a partition separating the compartments of said cylinders, a piston operating in one cylinder, a ram on said piston for extension
100 from said piston cylinder at an end thereof, a detachable article engaging unit at said end of the piston cylinder from which the ram extends, an inner cylinder supported in
105 the other cylinder which does not receive said piston, said inner cylinder having a compartment, a pump plunger reciprocally extending into said inner cylinder and
110 exteriorly of the housing, a lever device associated with the housing and pump plunger for reciprocating the pump plunger in the inner cylinder, check valve means associated
115 between the inner cylinder and the compartments of the first mentioned cylinders for pumping fluid from one of said cylinders into the piston cylinder to act on the
120 piston, and means for releasably retroverting the operating fluid from the piston cylinder to the other of the first mentioned cylinders.

4. In a device of the class described an elongated hollow housing having a transverse compartment between the ends thereof
125 subdividing the same into a pair of compartments at opposite sides of the partition, a piston slidable in one of the compartments, a ram on the piston extending from the adjacent end of the housing, an inner cylinder
130 within the other compartment, a pump plunger slidable in said inner cylinder and

extending from the end of the housing opposite the ram end thereof, lever means connected with the housing and plunger for operating the latter to reciprocate the same
 5 in the inner cylinder, the partition having a compartment therein in which the cylinder inlets, the partition furthermore having ducts extending from its compartment into both compartments of said housing, check
 10 valve means operating in said ducts to permit withdrawal of fluid from the one compartment of the housing upon reciprocation of the plunger in the inner cylinder to draw the fluid into the inner cylinder and then
 15 pass the same thru the duct into the piston compartment of the housing

5. In a device of the class described an elongated hollow housing having a transverse compartment between the ends thereof
 20 subdividing the same into a pair of compartments at opposite sides of the partition, a piston slidable in one of the compartments, a ram on the piston extending from the adjacent end of the housing, an inner cylinder
 25 within the other compartment, a pump plunger slidable in said inner cylinder and extending from the end of the housing opposite the ram end thereof, lever means connected with the housing and plunger for
 30 operating the latter to reciprocate the same in the inner cylinder, the partition having a compartment therein in which the cylinder inlets, the partition furthermore having ducts extending from its compartment into
 35 both compartments of said housing, check valve means operating in said ducts to permit withdrawal of fluid from the one compartment of the housing upon reciprocation

of the plunger in the inner cylinder to draw the fluid into the inner cylinder and then
 40 pass the same thru the duct into the piston compartment of the housing, a check valve in the partition normally seated by pressure of the fluid in the piston compartment of the housing, and a releasing device operated
 45 from exteriorly of the housing to unseat the last mentioned check valve to permit retroverting of the fluid from the piston compartment to the other compartment of the housing.
 50

6. In a hydraulic jack the combination of a pair of cylindrical casing portions, means to detachably connect the same including a partition separating the compartments of
 55 said cylinders, a piston operating in one cylinder, a ram on said piston for extension from said piston cylinder at an end thereof, a detachable article engaging unit at said end of the piston cylinder from which the ram extends, an inner cylinder supported in
 60 the other cylinder which does not receive said piston, said inner cylinder having a compartment, a pump plunger reciprocably extending into said inner cylinder and exteriorly of the housing, a lever device associated with the housing and pump plunger
 65 for reciprocating the pump plunger in the inner cylinder, and check valve means associated between the inner cylinder and the compartments of the first mentioned cylinders for pumping fluid from one of said
 70 cylinders into the piston cylinder to act on the piston.

JOHN J. SCHEKALL.
 GEORGE R. THORNTON.