Feb. 24, 1953

J. J. MUELLER

2,629,583

HYDRAULIC JACK

Filed Oct. 18, 1945

4 Sheets-Sheet 1

Fig. 1.

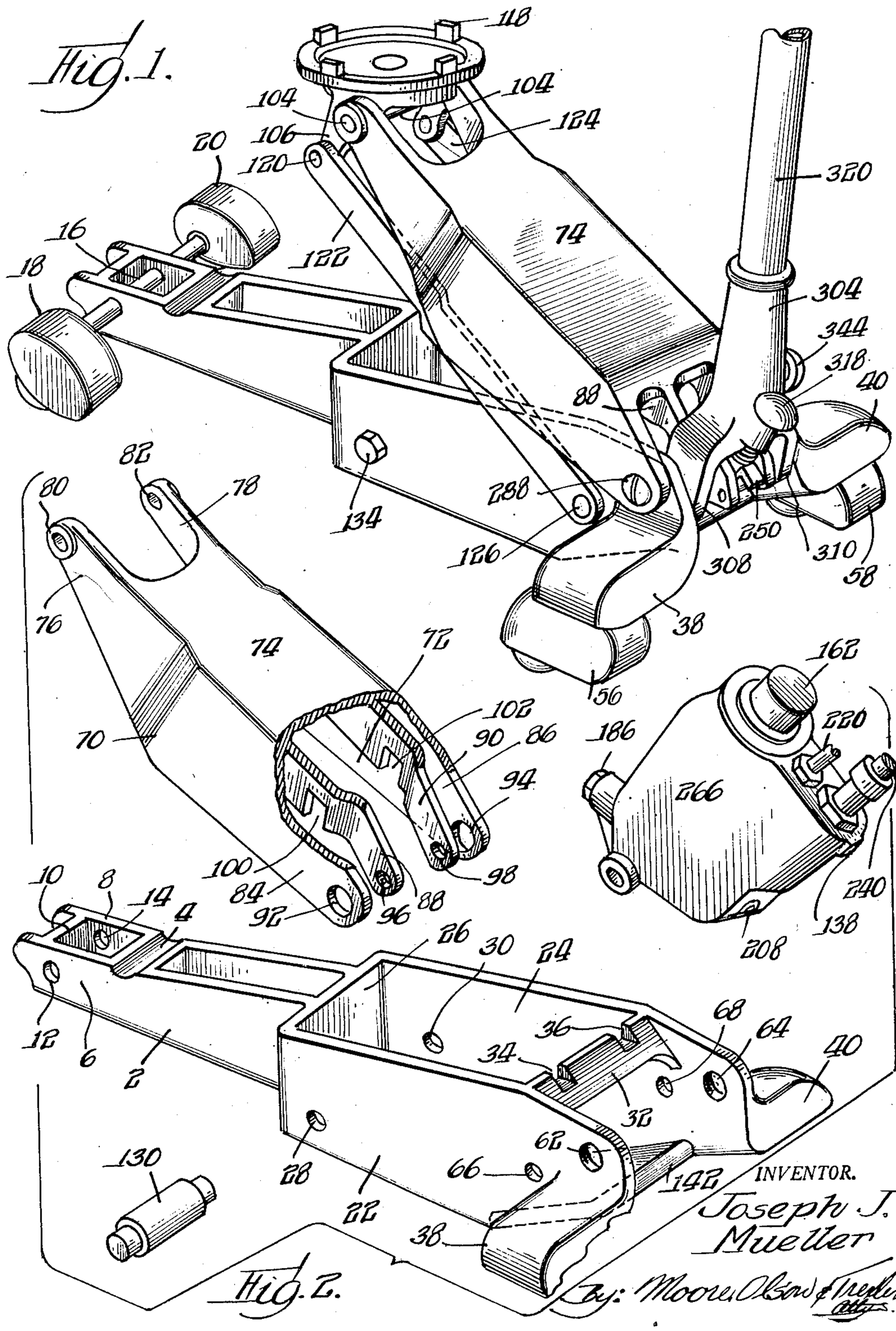


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Fig. 2.

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HYDRAULIC JACK

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Fig. 3.

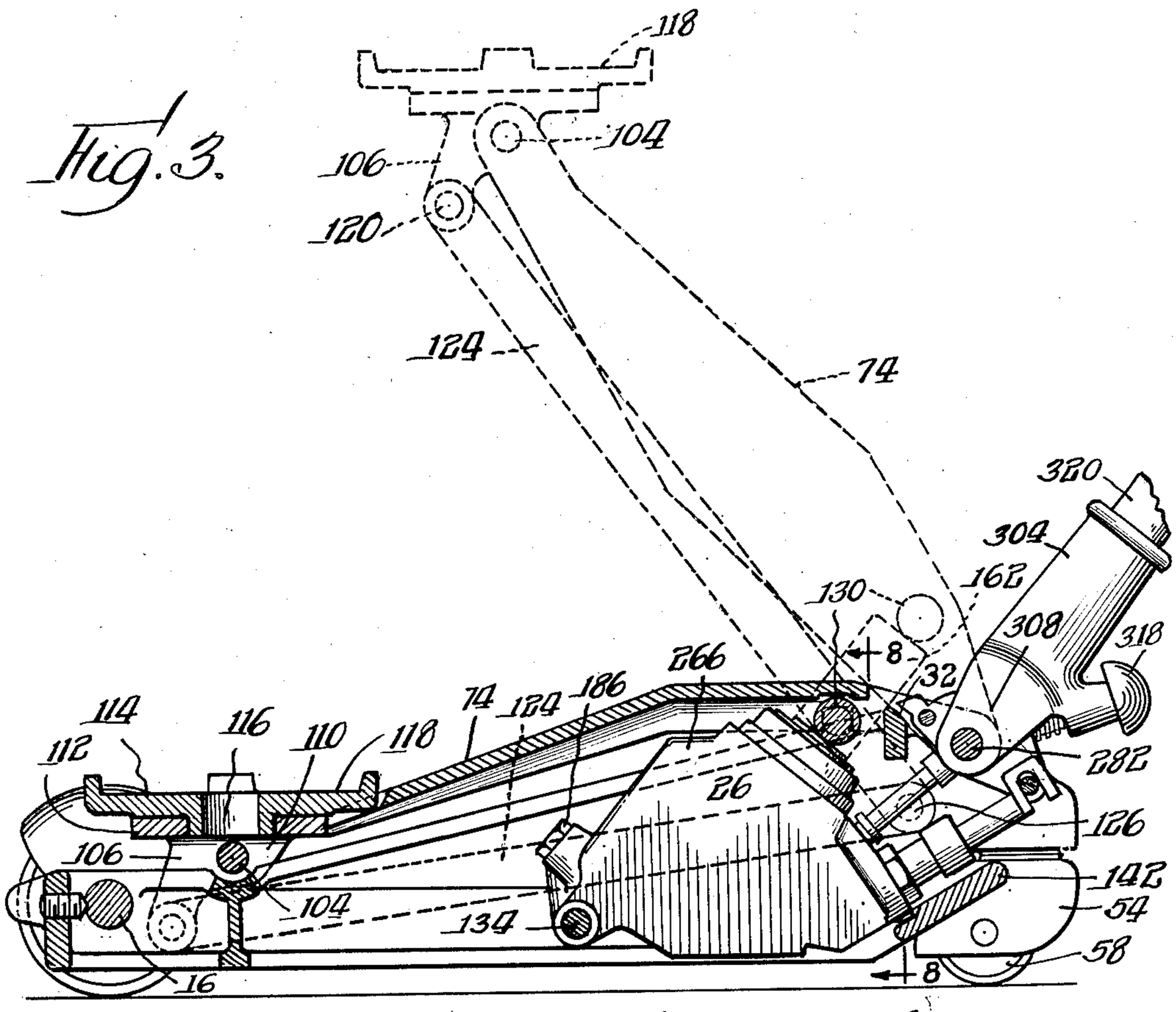
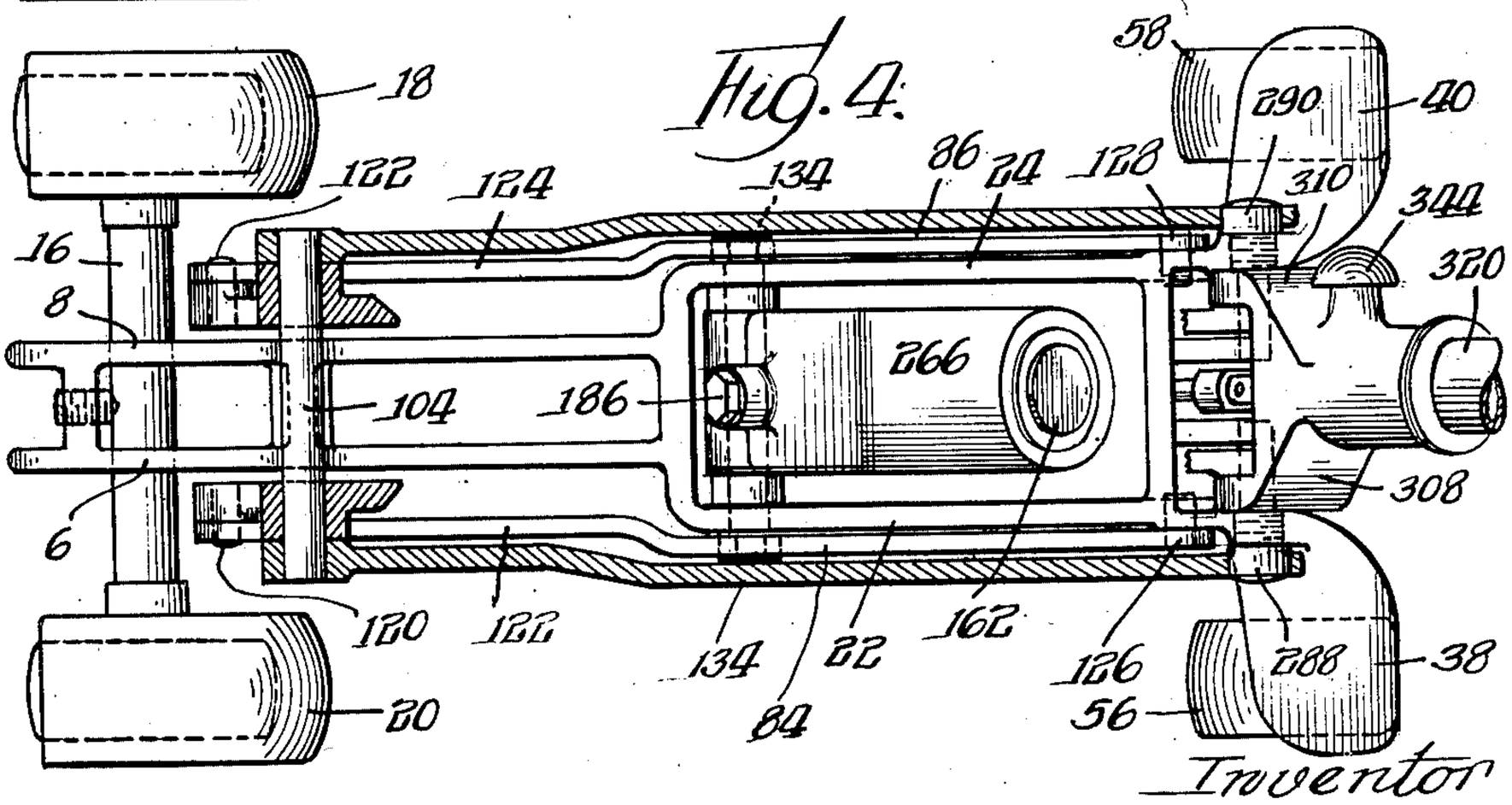



Fig. 4.

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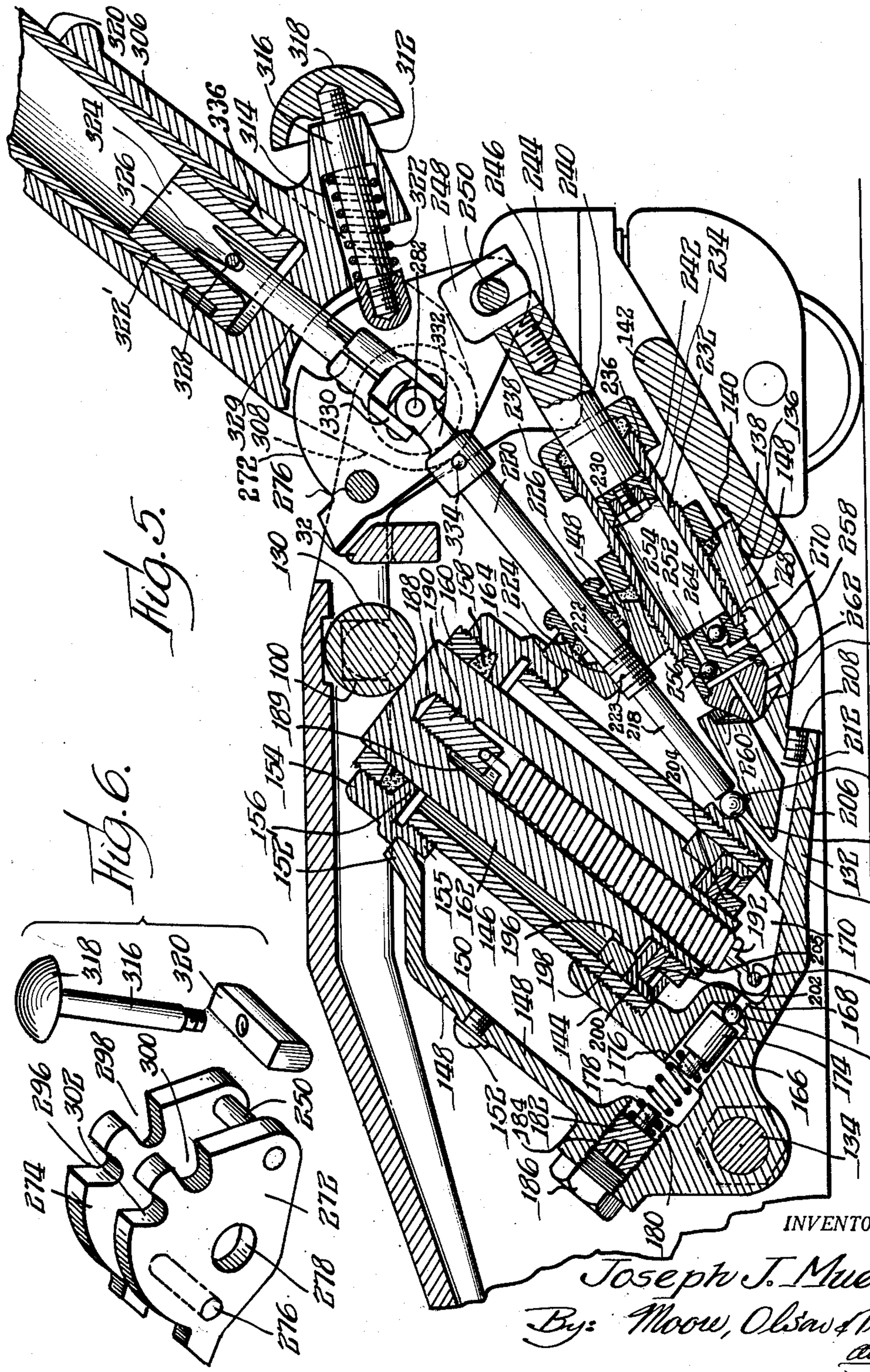

Fig. 5.

Fig. 6.

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HYDRAULIC JACK

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Fig. 7.

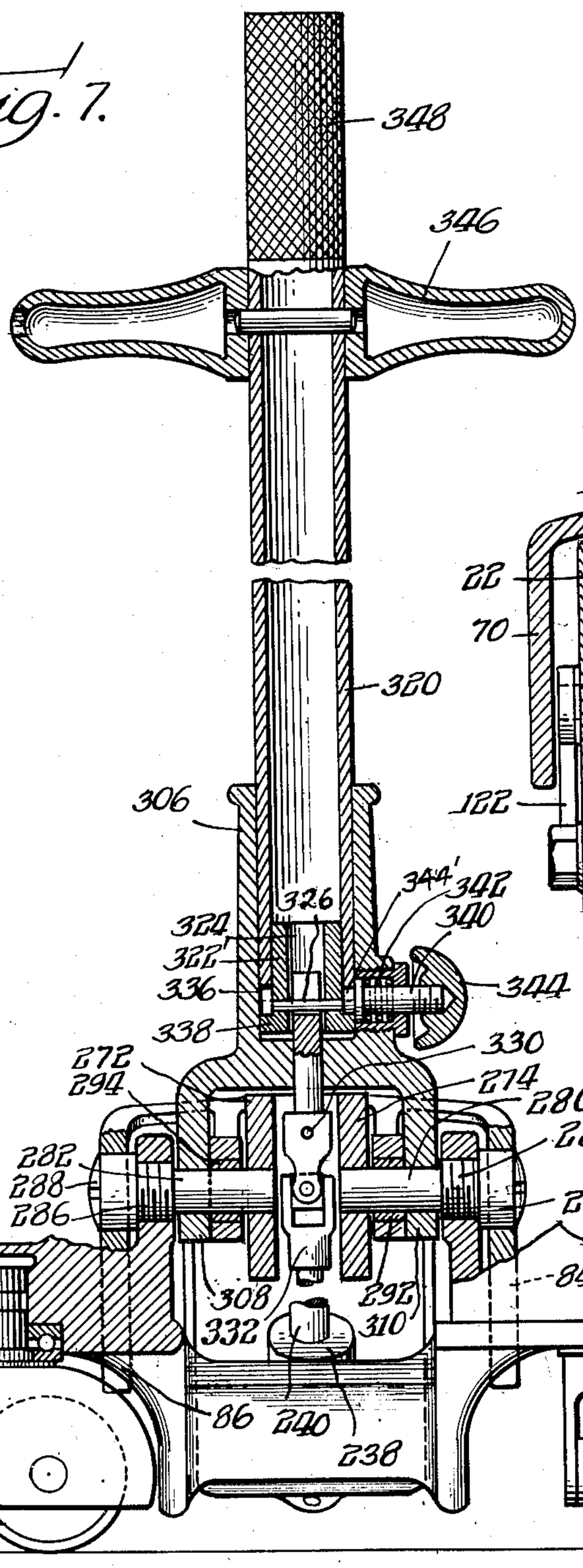
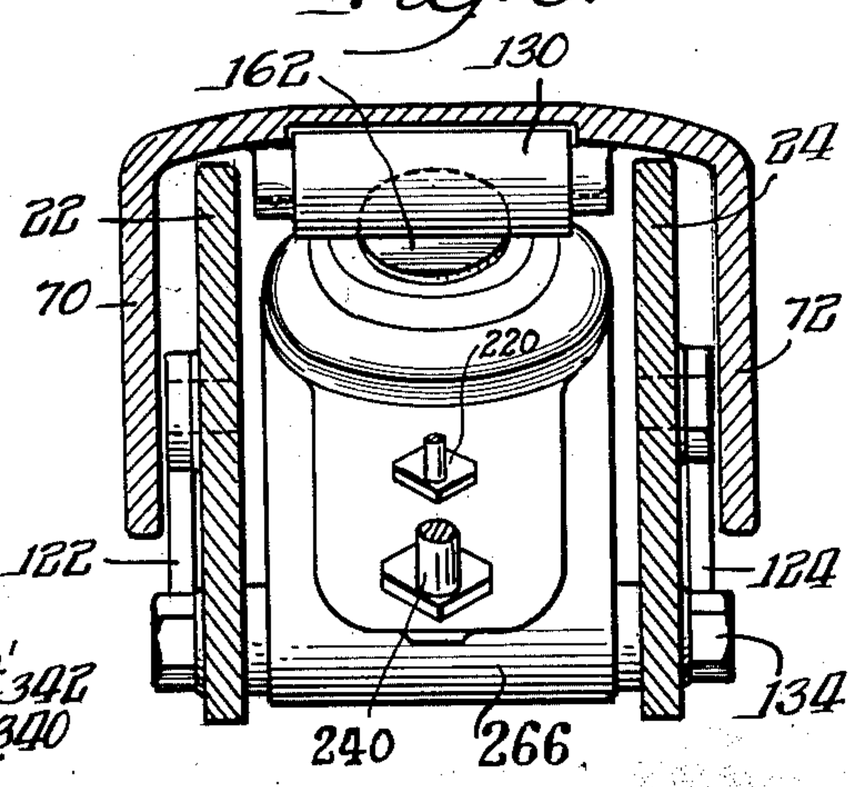



Fig. 8.

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2,629,583

# UNITED STATES PATENT OFFICE

2,629,583

## HYDRAULIC JACK

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Application October 18, 1945, Serial No. 623,011

9 Claims. (Cl. 254—8)

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This invention relates to floor jacks which generally comprise a relatively long, low chassis on wheels or rollers and include a load lifting lever pivotally mounted on the chassis and hydraulically raised to engage and lift the load.

Among the objects of the present invention are to provide such a jack wherein the hydraulic unit is compactly arranged and disposed on the chassis; is demountable as an assembly from the chassis in a simple manner; is conveniently and compactly housed in the chassis for easy accessibility and demountability and convenience of operation; to provide a jack wherein the ram cylinder and ram are arranged in an upwardly inclined position relative to the longitudinal horizontal axis of the chassis and in association with the lifting lever of the jack which is pivoted upon the chassis with respect to the top of the ram whereby a more direct thrust is imparted by the ram to the lifting lever to secure a more effective lift upon operation of the ram and whereby also a shorter jack body or chassis may be provided; to provide an arrangement of hydraulic unit and load lifting member wherein the high pressure pump and the ram cylinder are so related and arranged with respect to the load lifting member as to provide a generally relatively long travel for the high pressure pump piston and thereby eliminate the need for an additional speed pump for getting the load lifting member initially up to the load to be lifted; to provide a floor jack wherein the ram cylinder and ram for contacting the load lifting member, and the high pressure pump cylinder and piston, are arranged in V formation on the chassis for compactness and improved operation, including the provision of a longer travel to the pump cylinder upon operation of the manual actuator; to provide a floor jack wherein the ram cylinder and ram and high pressure pump cylinder and piston are arranged at a relatively acute V-shaped angle on the chassis and wherein the pressure relief valve is disposed intermediate or between the ram cylinder and pump cylinder, and particularly wherein the pump piston and relief valve are operated by a common manual actuator; to provide a floor jack wherein the hydraulic unit is insertable in and removable from one end of the chassis and wherein the ram cylinder and high pressure pump cylinder, and also the relief valve, are located at an angle to the longitudinal axis of the chassis, and particularly wherein the ram cylinder and pump cylinder are disposed in V-shaped formation, inclining upwardly from the horizontal axis of the chassis

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with the relief valve disposed centrally of the V-shaped space therebetween and operable from the same actuator that operates the pump piston; to provide an improved arrangement of ram cylinder, ram and spring means for returning the ram to lowered position when the relief valve is opened; to provide an improved arrangement of pressure overload valve for returning the liquid back to the reservoir when the pressure in the ram cylinder exceeds a predetermined maximum whereby to prevent breakage; to provide an improved construction for bolting the hydraulic assembly onto the chassis; to provide an improved arrangement of alternate connection between the handle socket manual actuator and the hydraulic pump piston for actuation from both horizontal and vertical reciprocations of the actuator; to provide these and other objects of invention, as will be apparent from a perusal of the following specification when taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of the floor jack;

Figure 2 is a view showing in perspective the various parts of the jack;

Figure 3 is a side view, partly in section, of the jack;

Figure 4 is a plan view;

Figure 5 is an enlarged sectional view of the hydraulic unit of the jack;

Figure 6 is a view of the actuating sector;

Figure 7 is a view partly in section, looking from the front of the jack, the section being taken through the connection between the actuating handle and the pivoted actuating sector; and

Figure 8 is a view taken on the line 8—8 of Figure 3.

Referring now to the drawings, the jack comprises a chassis which, as shown in detail in Figure 2, includes a long casting or body having a relatively narrow portion 2 provided with a transversely disposed trough portion 4 and integral, forwardly extending, spaced, parallel arms 6 and 8 braced by a transverse wall 10. The two arms 6 and 8 are provided with registering bores 12 and 14 to receive a front axle 16 on the extreme ends of which are mounted the rolls or wheels 18 and 20. The body 2 extends rearwardly in the opposite direction to provide wider spaced parallel side walls 22 and 24 braced by a transverse wall 26. Walls 22 and 24 have registering bores 28 and 30. In addition the walls 22 and 24 are formed with an integral upper transverse wall 32 adjacent its rear end. The

top of wall 32 is provided with the spaced notches 34 and 36 in which depending portions are received when the lifting arm is in lowered position. In addition, walls 22 and 24 are provided with oppositely and outwardly extending wings 38 and 40 and with a lower transverse interconnecting web or wall 142 which latter forms one of the supports for the hydraulic unit as hereinafter described.

As seen in Figure 7, the undersurfaces of the wings 38 and 40 are each provided with borings for the reception of rotatable bearings 48 and 50, each bearing in turn being formed with an annular groove to receive the end of a screw to hold the bearings in place while permitting rotation thereof. Each bearing carries a forked head 52 and 54. Each such head carries a caster or wheel 56 and 58. Ball bearings 60 ensure rotation of the bearings in the wings. In addition, the arms 22 and 24 are provided with spaced holes 62 and 64, and 66 and 68.

The load carrying lever is shown in perspective in Figure 1 as comprising an elongated body having spaced side plates and a flat top 74. The front of this lever is provided with spaced, forwardly projecting arms 76 and 78 each bored as at 80 and 82, and the rear end is formed with spaced pairs of rearwardly projecting arms 84 and 86, and 88 and 90. The outermost pair 84 and 86 are formed with registering bores 92 and 94 which also register with the bores 96 and 98 on the inner pair, and the undersides of the inner pair are notched as at 100 and 102. The outer ends of the inner pair of arms 88 and 90 are slightly inwardly offset, as seen in Figure 2.

The outer bores 80 and 82 of the arms 76 and 78 of the load carrying lever receive a pin 104 and a pair of links 106 and 108. A load carrying saddle 110 is mounted by means of the pin 104. This saddle has an upper surface 112 centrally bored to receive the preferably circular load holder 114 which has a central circular depending boss 116 to engage in the bore of the surface 112. The upper surface of the load holder 114 is suitably configured as at 118 to hold the load.

The links 106 and 108 are bored to receive pivotal pins 120 in turn pivotally connecting with elongated links 122 and 124. The other ends of these links pivot as at 126 and 128, see Figure 4, to the bores 66 and 68 respectively of the chassis sides 22 and 24, see Figure 2. This link 122 with its pivotal connections cooperates with the raising and lowering of the load raising lever 74 to maintain the load support 118 horizontal.

The underside of the load raising lever 74 carries the roller 130 rotatably mounted thereon and in position to be contacted by the outer end of the ram of the hydraulic unit. The bearings for the roller are mounted in the slots 100 and 102, see Figure 5.

The hydraulic unit is best shown in Figure 5. It comprises a housing 132 provided at one end with a bore to receive a pivotal pin 134 which passes through the two registering bores 28 and 30 of the chassis. The pin is held by a nut and a lock washer or other suitable fastener so that the unit may be detached from the chassis and preferably may swivel or pivot about the pin 134 so that it may be held by one bolt 134. It is not necessary that the swivel or pivot action be present. This power unit casting comprises a casting or housing 132 that is provided with suitable bores for the ram cylinder, pump cylinder, relief valve, overload relief valve, reservoir and



conduits for the liquid of the hydraulic system.

The power unit casting is provided with a wall portion 136 having a shoulder 138 that lies against a machined seat 140 formed on an integral wall 142 of the chassis. Thus the machined seat 140 and the pivotal pin 134 passing through the opposed registering bores 28 and 30 of the spaced side members 22 and 24 of the chassis form means for pivotally supporting the power unit from the chassis. This forms a simple, flexible, quick detachable mounting for the power unit. This housing 132 is generally hollow. At its base it is provided with an annular, substantially central well 144 threaded internally to receive the ram cylinder sleeve 146. In addition there is a wall 148 of the housing spaced from the well 144 to provide a liquid reservoir 150. This wall 148 has an opening closed by a filler plug 152. The outer portions of the annular walls 152' receive an anular cap 154 which has an annular shoulder internally threaded to screw onto threads on the outer external wall of the ram cylinder 146. This cap 154 in turn is formed with an annular shoulder 156 and a central thread to receive packing 158 and a threaded ring 160 through which moves the ram 162. Cap 154 also has an annular projection 164 that seats against the outer face of the casting wall 152 so that the entire mounting of the ram cylinder on the housing may be drawn tight by the threads interengaging.

The well portion 144 of the casting is formed with a plurality of ports and liquid passages. There is a relatively large bore 166 formed transversely in the bottom portion of the wall 144 which has its outer end opening onto the reservoir 150 and has its central portion bored as at 168 to cause the interior of the bore 166 to connect with the interior 170 of the well 144. A ball valve 172 and a plunger 174 are located in this bore 166. The plunger 174 has a reduced extension 176 around which fits a coiled spring 178. The opposite end of this spring surrounds a centralized projection 180 on a threaded plug 182 screwed into a bore 184 formed in wall 148 and registering with bore 166. An adjustable nut 186 permits adjustment of the tension of the spring to seat valve 172 to close port 168. This spring may thus be set to yield at a predetermined pressure within the ram cylinder and thus permit the liquid to return to the reservoir.

The ram 162 is uniquely constructed. Centrally it is provided with an elongated central bore 189 which extends substantially to, but short of, the outer end of the ram as at 188. A short portion of this end of the bore is internally threaded to receive a screw plug 190, the inner end of which is perforated to receive one end of a coiled spring 192. The spring 192 lies longitudinally within the bore 189 and the lower end of the spring is anchored to the inner wall of the well as at 194 so that the spring constantly tends to return the ram within the cylinder. In addition the inner end of the ram is shouldered as at 196 to receive a ring 198 and a flexible gasket 200. This latter is clamped in position by a ring disk 202 and threaded retainers 204 that screw onto a threaded tubular extension 205 of the cylinder 162.

In addition, the casting wall 132 is drilled as at 206 to provide a relatively long liquid conduit, the outer end of which opens onto the outer wall of the casting and is closed by a screw plug 208. Radiating in spaced relation from this longer conduit 206 are two branch conduits 210 and 212. Branch conduit 210 joins the main

conduit 206 at a point relatively close to the well 170 whereas branch conduit 212 joins conduit 206 relatively close to the end plug 208. Conduit 210 terminates in a valve seat 214 which is the relief valve seat. This valve seat is controlled by the ball valve 216. When this ball is off its seat the conduit 210 communicates with the reservoir 150. A rod 218, the same being an extension of a rod 220, controls the position of the ball 216 on the valve seat 214. To accomplish this the inner end of the rod portion 220 is threaded as at 222 to engage threads 223 in the intermediate portion of the housing 148. This latter portion is provided with an opening threaded as at 224 to receive a packing and a threaded plug 226, which plug and packing are perforated to receive the extension rod 220. The turning of this extension rod 220 will cause the threaded portion thereof 222 to move relatively to the threads 223 to advance or retreat the rod 218 and hence control the position of the ball relative to the seat 214. The means for rotating the rod 220 will be hereinafter disclosed.

The conduit 212 terminates in a conical seat 228 which also connects with the reservoir 150. The wall 148 of the housing is provided with an additional threaded bore 230, the central axis of which bore is in registration with the central axis of the conduit 212. This bore receives an elongated sleeve 232 threaded externally to engage the threads 230. Sleeve 232 is provided with an intermediate hexagonal portion 234 and an outer threaded portion 236 over which threads an apertured cap 238 through which the piston 240 is adapted to reciprocate. The piston 240 carries on its inner end a suitable packing 242 rigidly fastened thereto in the manner well known in the art. The outer end of the piston has a threaded hollow bore 244 to receive a threaded stud 246 the outer end of which is provided with a yoke 248 engaging over a pin 250 which pin is mounted upon a sector-like portion shown in perspective in Figure 6 and which will be hereinafter described. Mounted in the outer end of the high pressure pump cylinder 232 is a metallic valve cage 252 provided with internal conduits, there being a conduit 254 controlled by a ball valve 256 which in turn opens into a countersunk portion 258 which forms a passage leading to a central conduit 260 in a conical shaped cap 262 that makes a press fit with the annular lower portion of the ball valve cage 252. This conduit 260 in turn communicates with the conduit 212 hereinbefore mentioned. An additional conduit is formed in the ball valve cage 252 comprising the enlarged conduit 264 provided with a valve seat controlled by the ball valve 269. The base of this conduit 264 communicates with a lateral conduit 270 which communicates with the reservoir 150.

Means is provided for actuating the high pressure pump piston 240 and also the relief valve actuator 220 and 218 from a point remote from the chassis. In the present instance this is accomplished by means of a pivoted sector shown in perspective in Figure 6. This sector comprises two triangular spaced apart plates 272 and 274 suitably held together by spacing pins 276 and 250. These plates 272 and 274 have registering bores 278 to receive pins 280 and 282, see Figure 7, about which pins the sectors are adapted to pivot. The pins 280 and 282 in turn are threaded as at 284 and 286 into the holes 62 and 64, see Figure 2, of the chassis. These pins in turn have turnable heads 288 and 290. The pins also pass through bearing sleeves 292 and 294 formed in the openings 96 and 98 of the arms 88 and 90 of the lifting element 74, see Figure 2. In addition thereto the heads 288 and 290 pass through registering openings 92 and 94, see Figure 2, in the lifting element 74, to form a pivot therefor.



The mechanism for operating the relief valve actuator 220 lies between the plates 272 and 274 as clearly shown in Figure 7. In addition, the peripheries of the discs 272 and 274 are provided with registering notches 296, 298, 300 and 302 which are adapted to form a locking notch for a locking device hereinafter described. In addition there is a handle socket 304 which has a socket portion 306 and a pair of arms 308 and 310 which pivot on the pins 280 and 282. This socket portion 304 is in turn provided with a lateral extension 312 which is bored as at 314 to receive a locking pin 316 carrying the handle 318 on its outer end and threadedly receiving a locking key 320. A coiled spring 322 normally maintains the locking key in outwardly pressed position to engage the socket and the socket and locking key 320 are removed by pulling outwardly and thence laterally shifting the socket to the next notch and then releasing the handle. This changes the relation between the socket 306 and the plates 272 and 274.

The socket 306 is provided with an elongated tubular sleeve 320 within the lower end of which is force fitted a shorter sleeve 322' having a central hollow portion 324, and likewise having a transverse recess to receive a locking pin 326. This locking pin is adapted to engage in the cavity between the bifurcations 328 on an elongated pin 329 which is rigidly connected to one unit of a universal 330 which in turn is universally pivoted to the other unit 332 of the universal and which portion is fixed to the rod 220 of the actuator. The pin 326 freely disengages from the notch in the rod 329 when the handle is removed from its socket 306. Means is provided for locking the extension sleeve 320 to the handle socket 306. As shown in Fig. 7, this comprises an annular groove 336 formed between the end of the sleeve 320 and a shoulder 338 on the sleeve 322. This notch is engaged by the inner end of a pin 340 which pin is formed in a bore in the handle socket 306 and is normally spring pressed inwardly by means of a collar on the pin 340. The pin 340 is provided with a head 344 which when pulled outwardly against the tension of the spring 342 withdraws the locking stud 344' from the notch 336 so that the handle extension 320 may be removed from the socket 306.

The outer end of the handle extension 320 is provided with the outwardly extending handles 346 for oscillating the handle and in addition the outer end of the handle is provided with a turnable serrated extension 348 to permit the turning of the extension 320. When the handle is oscillated, the sector-like plates 272 and 274 will oscillate about their central pivots and by means of the pin 250 carried by these plates the high pressure pump piston 240 is reciprocated in its cylinder to transfer the hydraulic fluid from the high pressure pump piston into the ram well 170. In accomplishing this the liquid is forced past the ball valve 256, the passageway 258, and thence into the central opening 260, thence into the bore 212 which connects with the passageway 206 which in turn connects to the area 170, in one direction of the movement of the piston, while in the other direction the liquid is sucked

from the reservoir 150 past the ball valve 264 into the high pressure pump piston.

By turning the handle 320 by means of the pin 326 and the slot 328 on the extension rod 329 and the universals 332 and 334, the rod 220 is likewise turned and by engagement of the threads 222 in their threaded opening 224 the rod actuator 218 is likewise turned to either move the ball 216 onto the relief valve seat or to release the same. If released, the liquid from the high pressure ram cylinder will then pass through the valve seat 214 back into the reservoir. When the ball is on its seat the liquid is held in the ram cylinder.

Obviously the invention is not limited to the specific details of construction disclosed herein but is capable of other modifications and changes which do not depart from the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a hydraulic jack, the combination of a relatively low elongated chassis having opposed spaced side frames having registering openings and means carried by and disposed across said side frame members and located in spaced relation from and rearwardly of said registering openings in the chassis and forming a transversely disposed seat for said power unit and a spaced seat, a hydraulic unit having a bore for a pivotal pin, a pivot pin passing through the registering openings of the side frames of the chassis and the hydraulic unit for pivotally mounting the hydraulic unit with respect to the spaced seat of the chassis, said unit having a corresponding seat adapted to rest on said seat, said unit including a ram cylinder and ram and a high pressure pump cylinder piston and a relief valve actuator, said ram cylinder and ram and high pressure pump cylinder and relief valve actuator being inclined rearwardly and with respect to the longitudinal axis of the chassis, an oscillatable actuator oscillatably mounted on the extreme rear upper portion of said chassis and having a detachable connection with the high pressure pump piston for reciprocating the latter, a handle socket for actuating said actuator, said handle socket having a member therein turnable with respect to the socket and connected to the relief valve actuator for operating said valve.

2. A hydraulic unit for a jack comprising a relatively low elongated chassis provided with a hollow interior and formed with parallel side walls and a bottom seat, the side walls spaced from said seat being provided with registering apertures, said hydraulic unit comprising a housing provided at one portion with a transverse bore, a pin passing through said transverse bore and through the bores of the sides of said chassis for pivotally mounting the housing in said chassis, said housing having a cooperative seat for resting against the seat of the chassis whereby said housing is detachably mounted to said chassis, said housing including a ram cylinder and ram and a manually actuated hydraulic piston and cylinder for operating the ram, and an elongated lever overlying the top of said chassis and overlying the top of said hydraulic unit, one end of said lever carrying a load lifting saddle and the other end of said lever having pivotal openings, said chassis having additional registering openings, and a pin passing through said additional registering openings on said lever, said lever having an intermediate anti-friction member adapted in collapsed position to overlie the free end of the ram of said hydraulic unit when the lever is in collapsed position.



3. In a hydraulic jack, the combination comprising a chassis, a housing mounted thereon, said housing including a reservoir and providing a ram cylinder well, a ram cylinder mounted in the well, a ram in the ram cylinder, a high pressure pump cylinder disposed at an angle to the longitudinal axis of the ram cylinder, a piston in said cylinder, a lateral conduit formed in the housing and interconnecting the ram cylinder and high pressure pump cylinder, said ram cylinder and high pressure pump cylinder being disposed in substantially V-shaped formation and inclined upwardly to the longitudinal horizontal axis of the chassis, the passage interconnecting the ram cylinder and pump cylinder including a branch passage disposed intermediate the longitudinal axis of the ram cylinder and high pressure pump cylinder, said latter passage including a relief valve seat, a valve on said seat, and a longitudinal rod-like actuator extending from said valve and projecting externally of the housing for controlling said valve, said actuator being disposed intermediate the longitudinal axes of the ram cylinder and pump cylinder, said housing and ram well having registering openings formed therein disposed normal to the longitudinal axis of the ram cylinder and interconnecting the reservoir and the well of the ram cylinder, said last mentioned conduit including a valve seat, a valve on said seat and a control member for said valve including a coiled spring, and adjusting mechanism mounted in the housing opposite said last named seat and operable from the exterior of said housing for controlling the adjustment of said spring.

4. In a hydraulic jack, the combination comprising a relatively low elongated chassis having registering apertures at one end forming pivotal axes, pivotal pins disposed in said apertures, an elongated lifting lever carrying a load carrying saddle at one end and pairs of apertured arms at the opposite end, said arms registering with the pivotal axes of the chassis and pivoting about said pivotal pins, a hydraulic unit mounted in said chassis and including a ram and ram cylinder and a high pressure pump and pump cylinder disposed in substantial V-shaped formation with their axes inclined upwardly with respect to the horizontal longitudinal axes of the chassis, said hydraulic unit including a relief valve and a relief valve actuator disposed in the V-shaped space between the ram cylinder and the pump cylinder, an actuator for the high pressure pump piston including an oscillatable sector disposed with its pivotal axis provided with openings pivotally mounted on the pivotal pins of said chassis for oscillation thereabout, said oscillatable actuator having a connection with the high pressure pump piston and a handle adjustably connected to said actuator for oscillating the same, said handle including a relatively turnable extension, and a universal connection operatively connected to said extension and to the relief valve actuator, including a universal joint, said universal joint having its major axis registering with the axis of the pivotal pins.

5. A hydraulic unit for a jack comprising a relatively low elongated chassis provided with a hollow interior and formed with parallel side walls or frames and a transverse bottom seat, the side walls at spaced points from said seat being provided with registering apertures, said hydraulic unit comprising a housing provided at its

forward portion with a transverse bore, a pin passing through said transverse bore and through the bores of the side walls of said chassis for pivotally mounting the housing in said chassis, said housing having a cooperative seat for resting against the seat of the chassis whereby said housing is detachably mounted to said chassis, said housing including a ram cylinder and ram and a manually actuated hydraulic pump piston and cylinder for operating the ram, said cylinder ram and pump piston and cylinder being disposed in inclined relation relative to a horizontal longitudinal axis of the chassis and disposed facing the rear of the chassis, and an elongated load lifting lever overlying the top of said chassis and overlying the top of said hydraulic unit, the forward end of said lever carrying a load lifting saddle and the rear end of said lever having pivotal openings, said chassis having additional registering openings, and a pivot pin passing through said registering openings on said chassis and on said lever, said lever carrying on its underside, spaced from but near its rear end, an intermediate anti-friction member adapted in collapsed position to overlie the free end of the ram of said hydraulic unit when the lever is in collapsed position.

6. In a hydraulic jack, the combination comprising a relatively low, elongated chassis, a hydraulic unit mounted thereon including a ram cylinder and ram and a high pressure pump cylinder and piston disposed in substantially V-shaped relation with their longitudinal axes inclined upwardly with respect to the longitudinal horizontal axis of the chassis, a pressure relief valve disposed between the ram cylinder and high pressure pump cylinder, and an elongated rigid actuator threadedly passing through a portion of the housing of the hydraulic unit between the ram cylinder and the pump cylinder for actuating the pressure relief valve, said actuator extending externally of the housing, a load lifting lever pivotally mounted at the rear of the chassis on an axis passing through the central axis of the elongated pressure relief actuator, a pump oscillating handle pivotally connected to the chassis at said pivotal connection of said load lifting lever, said handle having a portion turnable with respect to the handle and an extension from said turnable portion having a universal connection with the outer end of the pressure relief elongated actuator, said universal connection pivoting about the pivotal connection of said load lifting lever and said pump actuator.

7. A hydraulic jack comprising a chassis, a hydraulic unit having a power driven piston slidably mounted therein, said power unit being pivotally mounted on said chassis, a seat formed on said chassis and spaced from said pivotal connection to receive the rotatable end of said power unit, means pivotally mounted on said chassis for operating said power piston, a load lifting lever pivotally connected to said chassis, and an anti-friction member interposed between the outer end of said power piston and said lever, the pivotal connection between said lever and said chassis being disposed rearwardly of said anti-friction member in all positions of said lever, said seat being adapted to support said hydraulic power unit when said power piston is imparting an upward thrust to said load lifting member.



8. A hydraulic jack comprising a chassis, a hydraulic unit having a power driven piston slidably mounted therein, said hydraulic unit being pivotally mounted on said chassis, a seat formed on said chassis and spaced from said pivotal connection to receive said hydraulic unit, means pivotally mounted on said chassis for operating said power piston, a rotatably actuated pressure relief valve positioned in said hydraulic unit, an elongated actuator for said valve including a universal joint and having a portion disposed concentrically within said piston operating means, a load lifting lever pivotally connected to said chassis, and an anti-friction member interposed between the outer end of said power piston and said lever, the pivotal connection between said lever and said chassis being disposed rearwardly of said anti-friction member in all positions of said lever, said seat being adapted to support said hydraulic power unit when said power piston is imparting an upward thrust to said load lifting member.

9. A power hydraulic unit for a hydraulic jack comprising a housing providing a reservoir and a ram cylinder well, a ram cylinder mounted in said well, a ram in said ram cylinder, a high pressure pump cylinder mounted in said housing, a piston in said pump cylinder, a lateral conduit formed in the housing and interconnecting said ram cylinder and pump cylinder, said ram cylinder and pump cylinder being disposed in angular relation and said pump cylinder being inclined to the longitudinal horizontal axis of said housing when the housing is mounted in a jack, the passage interconnecting said ram cylinder and pump cylinder including a branch passage disposed intermediate the longitudinal axis of said ram cylinder and pump cylinder, said last mentioned passage including a relief valve seat, a valve on said seat, a longitudinal rod-like actuator extending from said valve and projecting externally of said housing for controlling said valve, said housing and ram well having registering openings formed therein interconnecting the reservoir and the well of said ram cylinder, said last mentioned opening in said ram well including a valve seat, a valve on said last mentioned seat, a control member for said last mentioned valve including spring means, and adjusting mechanism mounted in the housing wall opposite said last named valve seat and operable from the exterior of said housing for controlling the adjustment of said spring means.

JOSEPH J. MUELLER.


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