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HYDRAULIC JACK

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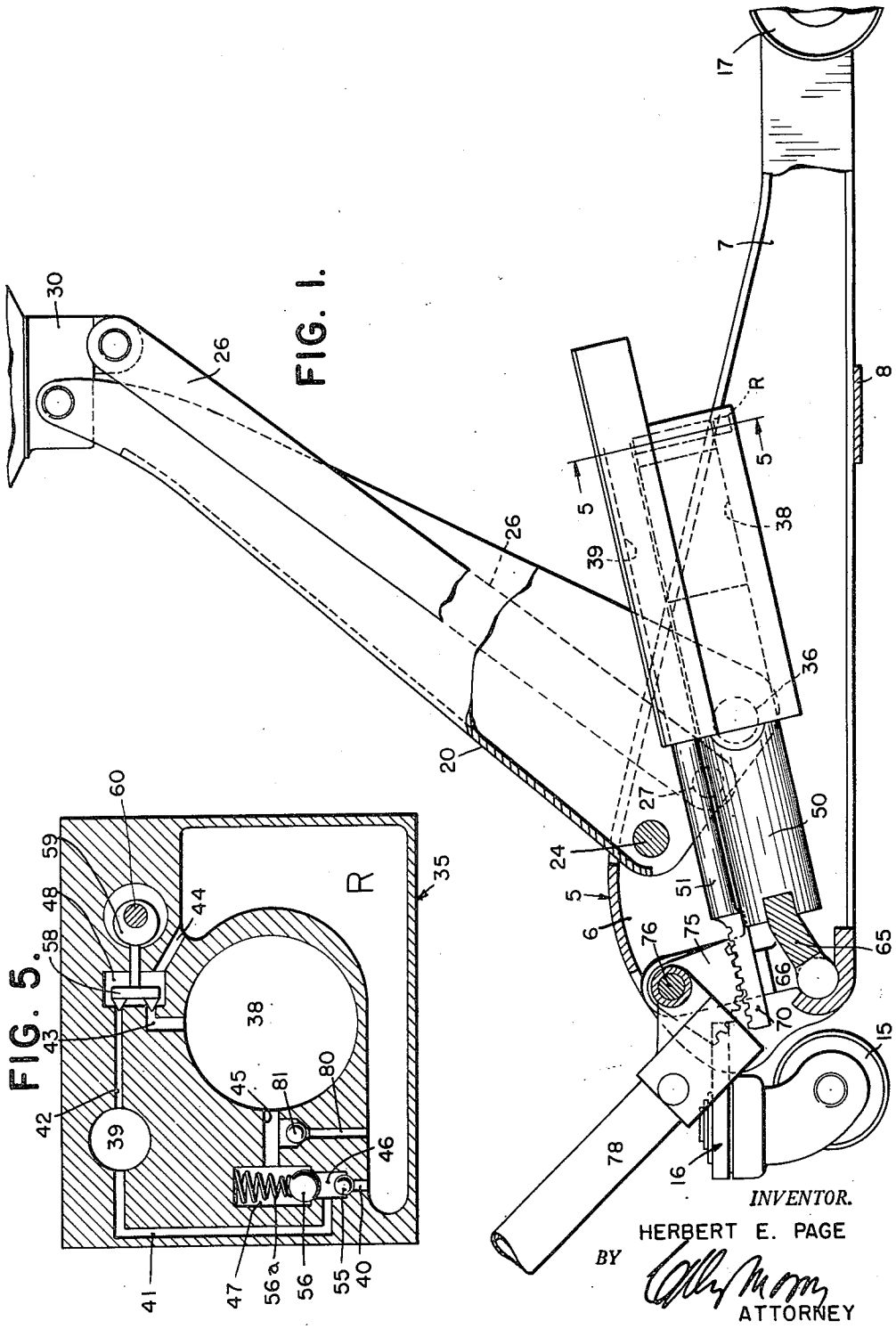

FIG. 1.

FIG. 5.

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FIG. 2.

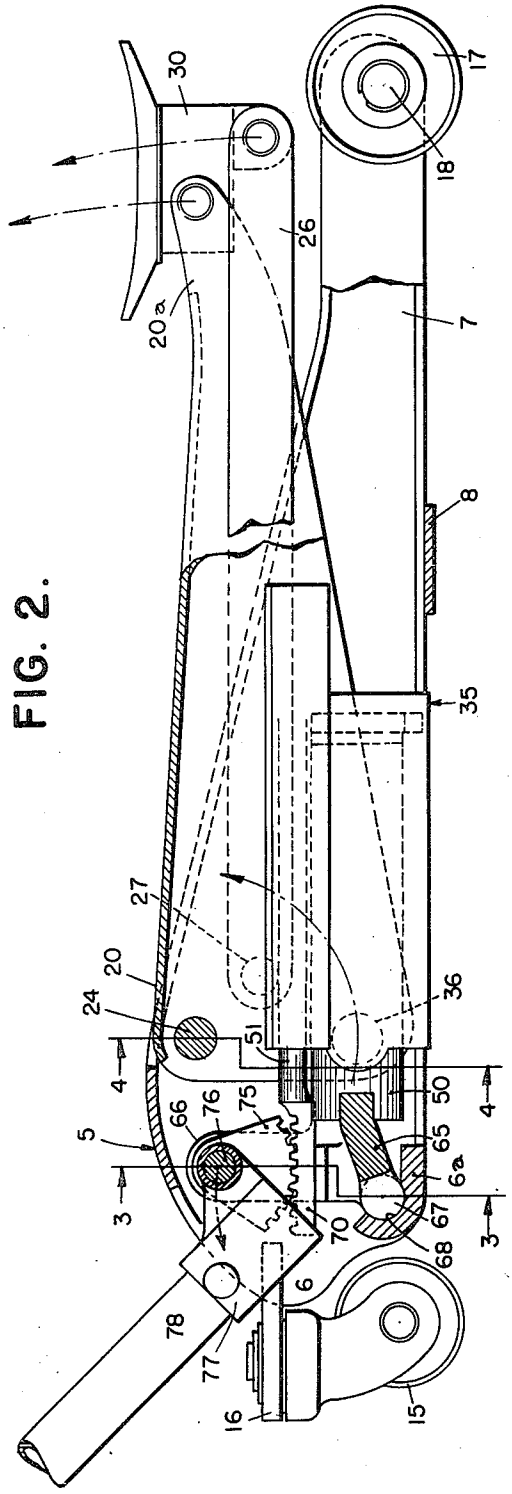


FIG. 4.

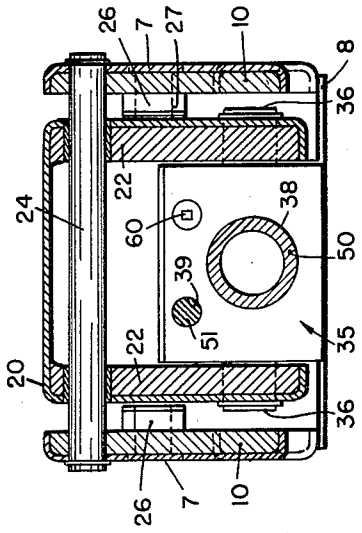
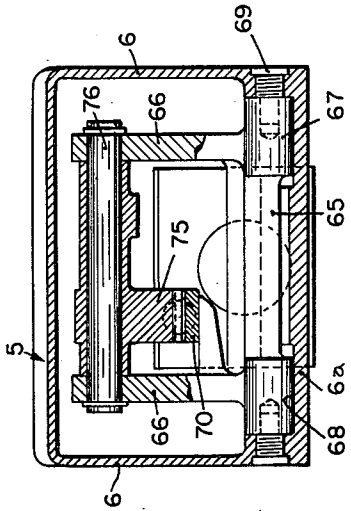


FIG. 3.



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Patented Dec. 7, 1948

2,455,440

UNITED STATES PATENT OFFICE

2,455,440

HYDRAULIC JACK

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Application March 10, 1945, Serial No. 582,032

4 Claims. (Cl. 254—2)

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This invention has to do with improvements in hydraulic jacks, having as one of its major objects the provision of an improved construction embodying novel means for maintaining the pumping piston and pumping piston actuating mechanism in true axial alinement during all stages of operation.

In conventional hydraulic jacks, the pump actuating mechanism—that is, the actuating lever—is pivotally mounted on the frame of the jack, while the lifting mechanism body carrying the pumping piston for generating pressure as well as the work piston or ram, is mounted on the frame by separate pivotal means and is also mounted to swing with the lift arm. As a result of such construction, the body carrying the lifting mechanism moves in consonance with movement of the lifting arm, thus moving out of alinement with the means which operatively connects the lever to the pumping piston. The result of such construction is that misalinement occurs which interferes with proper operation and often results in damage, such as bending of the pumping piston.

I overcome those long-existing difficulties by pivotally connecting the pump actuator unit, not to the frame, but to a member which is rigidly carried by the lifting mechanism. Additional more specific advantages will appear from the following description of a presently preferred embodiment of the invention shown in the annexed drawings wherein:

Fig. 1 is a side elevation partly in section, showing the lifting arm raised;

Fig. 2 is a section similar to Fig. 1 but showing the lifting arm lowered;

Fig. 3 is a section on line 3—3 of Fig. 2;

Fig. 4 is a section on line 4—4 of Fig. 2; and

Fig. 5 is a section on line 5—5 of Fig. 1.

In the drawings I show a frame 5 which, at the point of the cross section of Fig. 3, is rectangular in cross section but terminates at its rear or left-hand end in spaced parallel sides 6 between which is secured a bottom cross member 6a, and terminates at its front or right-hand end in spaced parallel sides 7 connected by a bottom plate 8. At and adjacent the point of the section of Fig. 4 the sides 7 carry reinforcing plates 10. A conventional caster 15 is pivotally carried by a bracket 16 secured to the frame and the front end of the frame carries the usual pair of rollers 17 mounted on an axle 18 in the usual manner.

The lifting mechanism is comprised of a lifting arm 20 which is channel-shaped in cross section at the point of the section of Fig. 4, but terminates at its front or right-hand end in spaced parallel arm portions 20a. The lifting arm at the point of Fig. 4 carries reinforcing plates 22 and is pivotally connected to the frame by cross pin 24 so as to swing between the positions of Figs. 1 and 2. A pair of stabilizing arms 26 are pivotally connected to the frame by trunnions 27, and arms 20a and 26 are pivotally connected at their outer ends to a saddle member 30, so that as the arms are raised or lowered the saddle at all times remains horizontal.

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The body 35 of a hydraulic unit forming a part of the lifting mechanism is mounted between and pivotally connected to the side portions of the arm 20 by trunnions 36, the body providing a work piston cylinder or chamber 38, a pumping piston cylinder or chamber 39, a fluid reservoir R and ports 40, 41, 42, 43, 44, as well as valve members 46, 47, 48. A work piston or ram 50 is mounted in cylinder 38 and a pumping piston 51 is mounted in cylinder 39.

Communication between ports 40, 41 is controlled by ball check valve 55 in chamber 46 seating towards the reservoir, and communication between ports 41 and 45 is controlled by a spring-loaded check valve 56 seating towards cylinder 39. For releasing pressure from cylinders 39, 38 through ports 42, 43, 44, I provide a double pointed valve 58 adapted to open and close ports 42, 43 simultaneously as the cam 59 is rotated. The cam is mounted on a shaft 60 which extends through the left-hand end of the body.

The outer end of the work piston carries a bracket 65 which has upright sides 66 and trunnions 67 journaled in bearings 68 provided by the bottom frame member 6a, the trunnions being rotatively held in position by the inner unthreaded ends of screws 69 threadedly mounted in the frame. The outer end of the pump piston presents a rack portion 70.

A pinion member 75 is mounted between and pivotally attached to sides 66 by shaft 76 and carries an integral socket member 77 within which is secured the bottom end of a pumping lever 78.

On each suction stroke of the pumping piston fluid is drawn from the reservoir past valve 55 into cylinder 39 and on each pressure stroke the fluid is forced from cylinder 39 past valve 56 against the pressure of its spring load and into cylinder 38 to move the body away from the inner end of the piston 50. As the arm is thus raised, the piston 50 and the body 35 swing about the trunnions 67, but inasmuch as the actuating lever and its pinion 75 are carried by the bracket rigidly

attached to piston 50, no misalinement of those parts can occur.

To lower the lifting arm, cam 59 is rotated by means not shown out of engagement with ports 42, 43, permitting fluid in cylinders 38, 39 to pass to the reservoir through port 44.

While I have described a rack and pinion connection between the pumping lever and pumping piston, it will be understood that other well-known types of operative connections may be substituted for the rack and pinion, the only requisite being that the actuating mechanism be pivotally carried by the piston 50 or the body 35.

I claim:

1. In a hydraulic jack having a frame, a lifting arm pivoted to the frame to swing about an arc relative thereto, a pivoted hydraulic pressure actuated unit operatively connected to the arm to swing therewith relative to the frame about its pivot in the same direction and in a corresponding positioned arc as said arm, said unit having a pressure generating piston presenting a rack member on its outer end portion, and piston actuating means comprising a pinion rotatably carried by the unit for operative engagement with the rack, and a lever pivotally mounted on said unit and operatively connected with the pinion.

2. In a hydraulic jack having a frame, a lifting arm pivoted to the frame to swing about an arc relative thereto, a hydraulic pressure actuated unit pivoted as hereinafter defined and having a body pivotally attached to the arm to swing therewith relative to the frame about its pivot in the same direction and in a corresponding positioned arc as said arm, a work piston reciprocably mounted in the body and pivotally secured at its outer end to the frame, a pressure generating piston reciprocably mounted in the body parallel to the work piston, a bracket rigidly carried by the work piston and actuating means pivotally carried by the bracket for operative engagement with the pressure generating piston.

3. In a hydraulic jack having a frame, a lifting arm pivoted to the frame to swing about an arc relative thereto, a hydraulic pressure actuated unit pivoted as hereinafter defined and having a body pivotally attached to the arm to swing therewith relative to the frame about its pivot in the same direction and in a corresponding positioned arc as said arm, a work piston reciprocably mounted in the body and pivotally secured at its outer end to the frame, a pressure generating piston reciprocably mounted in the body parallel to the work piston and having a rack member on its outer end portion, a bracket rigidly carried by the work piston, a shaft journalled in the bracket, a pinion secured on the shaft and having operative engagement with the rack member and a lever operatively connected to the shaft.

4. In a hydraulic jack having a frame, a lifting arm pivotally mounted on the frame to swing relative thereto, a hydraulic pressure actuated unit pivoted as hereinafter defined and having a body pivotally secured to the arm to swing therewith relative to the frame about its pivot in the same direction and in a corresponding positioned arc as said arm, said body presenting a pair of parallel piston chambers and a fluid reservoir, a work piston reciprocably mounted in the first of said chambers, the outer end of the work piston rigidly carrying a bracket and being pivotally secured to the frame, a pressure generating piston reciprocably mounted in the second of said chambers, actuating means pivotally carried by the bracket and having operative connection to the pressure generating piston, valve controlled means in the body operative in response to actuation of the pressure generating piston to pass fluid from the reservoir into the second chamber and thence under pressure to the first chamber, and valve controlled means for releasing fluid from the first chamber to the reservoir.

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