(No Model.) 2 Sheets—Sheet 1.

T. H. WATSON.

HYDRAULIC JACK.

No. 302,070. Patented July 15, 1884.

Fig. 1.

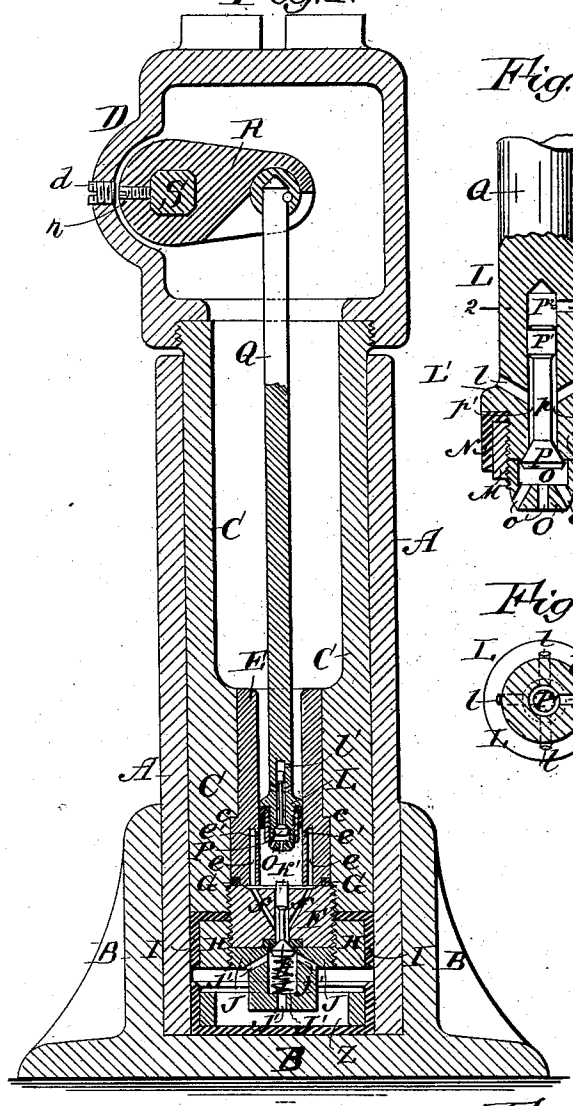


Fig. 5.

Fig. 6.

Fig. 2.

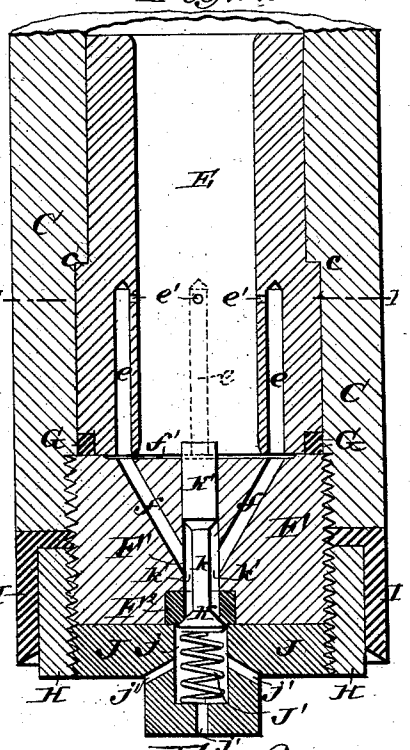


Fig. 3.

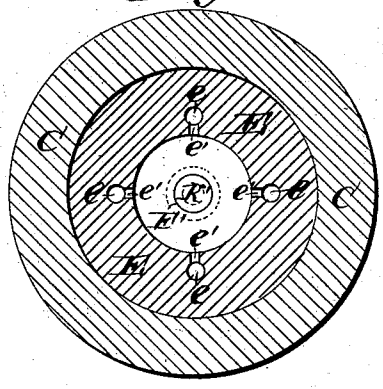
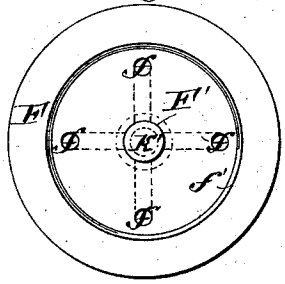


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

T. H. WATSON.

HYDRAULIC JACK.

No. 302,070. Patented July 15, 1884.

Fig. 7.

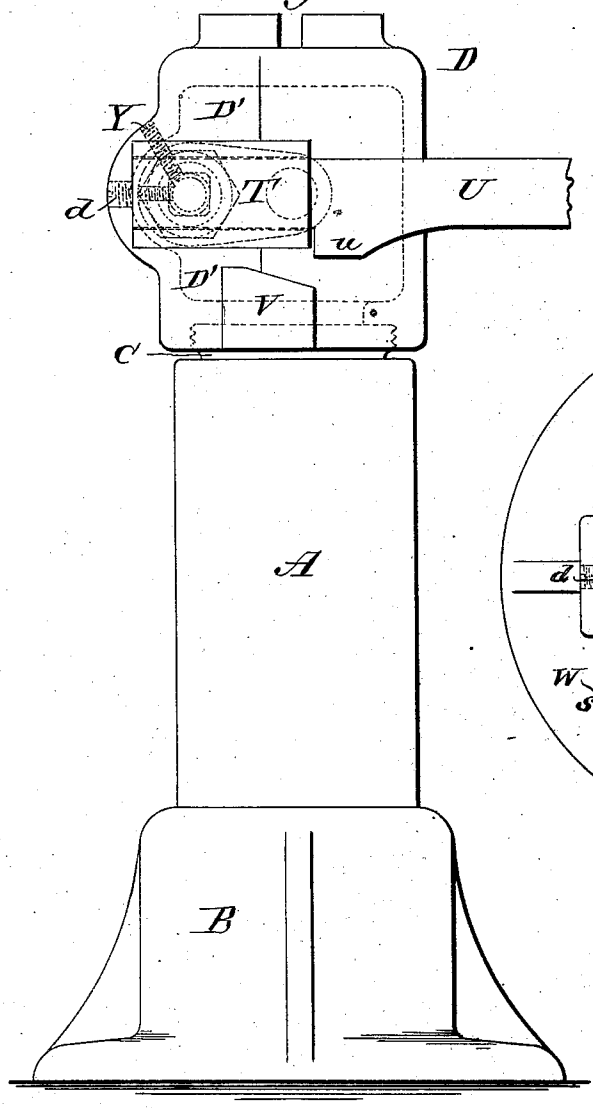


Fig. 8.

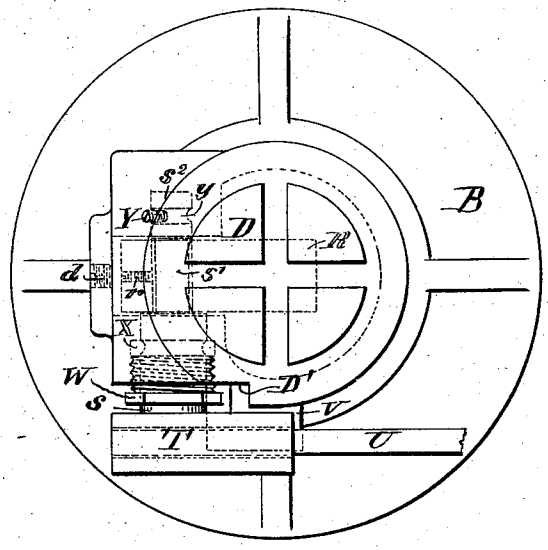
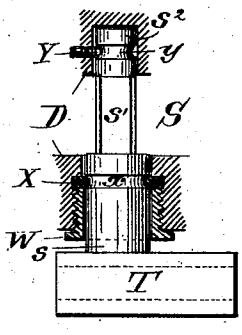


Fig. 9.



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UNITED STATES PATENT OFFICE.

THOMAS H. WATSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND FRANCIS H. STILLMAN, OF SAME PLACE.

HYDRAULIC JACK.

SPECIFICATION forming part of Letters Patent No. 302,070, dated July 15, 1884.

Application filed December 26, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. WATSON, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a full, clear, and exact description.

The object of this invention is to provide a simple and effective hydraulic jack which may safely be worked by unskilled labor, and is constructed for easy access to its parts for cleaning, repair, or renewal.

The invention consists in certain improvements in the pump-cylinder, whereby the back-flow passages for the liquid are removed from the face, against which the plunger or piston acts, and also in improved arrangements of the valves of the ram and the pump-plunger, and also in an improved contrivance of the shaft on which the plunger-rod arm is fixed, and relatively with the head of the jack, whereby provision is made for easy, effective, and guarded action of and access to the valves; and the invention consists, also, in various constructions and combinations of parts of the jack, all as hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical sectional elevation of my improved jack. Fig. 2 is a like view, enlarged, of the lower end of the ram. Fig. 3 is a sectional plan view on the line 1 1, Fig. 2. Fig. 4 is a plan view of the lower valve-plug and valve. Fig. 5 is a vertical sectional elevation of the pump-plunger, drawn to the scale of Fig. 2. Fig. 6 is a sectional plan view on the line 2 2, Fig. 5. Fig. 7 is a side elevation of the jack, with the working-lever partly broken away. Fig. 8 is a sectional plan view of the jack; and Fig. 9 is a detail plan view of the shaft and lever-socket, with parts of the head in section.

The letter A indicates the main cylinder of the jack, which is supported on any suitable base, B.

C is the ram, which is screwed into the head D, and together forming the liquid-reservoir of the jack.

E is the pump-cylinder, made either in one piece with the ram or separately therefrom. If separately made, as shown, the cylinder E is fitted up into the ram with a shouldered joint at *c*, to limit the rise of the cylinder E, when the lower valve-plug, F, is screwed into the lower end of the ram, a packing, G, being fitted between parts E F for a tight joint.

Upon the lower portion of plug F is screwed the internally-threaded ring H, for confining the ram-packing I, and for receiving inside the screw plug or bonnet J of the ram, which is screwed up tightly against the lower face of plug F, to form a lock to bind parts E, F, G, H, and I firmly to the foot of the ram, but so as to permit their ready removal. The plug F is centrally bored at F′, to receive the lower valve, K, the stem K′ of which is reduced in size, as at *k*, for free passage at *k′*, either way, of the forcing-liquid when the valve is open. The valve-head has free play in a chamber, *j*, of bonnet J, into which chamber passages *j′* lead from the space in cylinder A below the ram; and the valve-plug F has passages *f* opening into the bore F′ and diverging upward, to communicate with passages *e*, formed in the walls of the pump-cylinder E, and outside of or behind the bore of the cylinder in which the plunger L works. Passages *e′* connect the bore of cylinder E with the passages *e*, *f*, *k′*, *j*, and *j′*, all being controlled by the valve K, which is normally forced upward by a spring, J′, in chamber *j*, to be seated against the lower face of plug F, or against a removable seat, F², fitted therein, as shown. I form a depression, *f′*, in the top face of plug F, to establish free circulation between passages *f* and the bore of the pump-cylinder, and through passages *f e*, should they fail to register perfectly with each other. The valve-stem K′ has considerable length of bearing in the plug F, for the best action of the valve, the stem normally projecting above the plug to be struck by plunger L, to lower the ram, as hereinafter described. The plunger L is or may be enlarged by a shoulder, L′, forming a projection or stud, L², which is ex-

ternally screw-threaded to receive the internally screw-threaded ring M, by which the packing N is held to place. The ring M also receives the externally-threaded bonnet O, chambered at *o* for play of the valve P, and having passages *o'*, opening from chamber *o* to the bore of the cylinder E. The valve P has a stem, P', which is reduced at *p*, forming passages *p'*, which connect with passages *l*, opening into the bore of cylinder E above the plunger-head. A lateral passage, *l'*, opening into the bore P^2 for the valve-stem P', permits free escape of air or liquid from above the valve-stem head to facilitate free upward play of the valve in closing. The bonnet O acts against the plunger-head to lock the parts M N firmly to place, also permitting their ready removal when required. The plunger-rod Q connects pivotally to the rock-arm R, which has preferably a square or angular fit upon the shaft S, which carries at its outer end a socket, T, for the working-lever U, which has a projection, *u*, on one side or edge, to strike against a stud or stop, V, fixed on head D, when the jack is lifting.

To make provision for removing the shaft S, with its lever-socket T, without taking the jack apart for repacking the shaft, I make the shaft with the round bearing portion *s* next the socket T, the smaller square or angular portion *s'* to receive and fit arm R, and the still smaller end portion s^2, parts $s\ s^2$ being suitably journaled in the head D. This head has a screw-plug, *d*, which may be removed for charging the jack with the forcing-liquid, and for access to a set-screw, *r*, passing through the arm R for binding it firmly to the shaft S. At the side next socket T the head D is recessed, as at D', to afford space for the gland W, which is threaded into head D, and forms part of the bearing for portion *s* of shaft S, which latter may be annularly grooved at *x* to receive the packing X, which is forced into the groove by screwing up the gland, and serves to lock or aid in locking the shaft against endwise movement in the head, and closely packs the shaft against escape of the forcing-liquid; and as further and a principal means to prevent endwise movement of the shaft S, a screw-pin, Y, is passed through the head and engages by its point an annular groove, *y*, in part s^2 of the shaft, as indicated in dotted lines in Fig. 8, and in full lines, Fig. 9. Any suitable packing, Z, secures a tight joint at the base of the main cylinder A.

In operating the jack, it is first charged with liquid, preferably spirits, the ram being down. The lever U is placed in socket T, with its projection *u* downward, to strike against a stop, V, on the head D, to limit the downstroke of plunger L, and prevent its opening the passages *e'* while the jack is lifting by a rise of the ram caused by the reciprocations of the lever. On the upstroke of the lever U the plunger-valve P will open by the weight of the liquid, which will escape through passages *l p' o o'* to the bore of the pump-cylinder E, and on the downstroke of the lever valve P will close, and the liquid will be forced through passages *f'*, *f*, *k'*, *j*, and *j'* to the main cylinder A, for lifting the ram with a power proportionate to the areas of the plunger or piston L, and the ram. To lower the ram, the lever U is reversed in socket T, or placed with projection *u* upward, so that the socket will strike the stop, and the plunger L may then be abnormally lowered until below passages *e'*, and the bonnet O strikes the stem K' and opens valve K, thereby affording free upward flow of the liquid, through ample passages *j'*, *j*, *k'*, *f*, *f'*, *e*, and *e'* above the plunger, into the hollow body of the ram, which is allowed to fall quickly, thereby economizing time in preparing for the next lift, and the spring J' seats valve K after the rise of the plunger.

Some of the advantages of my invention may be named as follows: By forming the back-flow passages *e* behind the bore of the cylinder E, instead of along the face of the bore, as heretofore made, the plunger works much more smoothly and tightly, and without cutting or tearing of its packing, while every necessary freedom of back-flow is allowed for a quick fall of the ram. The ram may be lifted from the cylinder A, and its bonnet J and ring H removed to renew the packing I and regrind the valve-seat or valve K, and plug F may also readily be removed to renew packing G, and when the shaft S is to be withdrawn the set-screws *r* and Y, if either or both are used, are loosened, and gland W turned back, which loosens the packing X from the groove *x*, (if the groove *x* is employed,) whereupon the shaft may be partly drawn out from the head without leaving its bearings, to permit socket T to be swung down clear of the face of projection V, for carrying the plunger-head sufficiently below the foot of the cylinder E to permit easy access to the parts for repair or renewal of the packing and valve N P without taking the jack apart, as formerly required.

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

1. A hydraulic jack having the back-flow passages *e* within the walls thereof, and lateral openings *e'* leading from the interior to the passage *e*, said lateral openings being below the upper end of the piston-head in its normal stroke, whereby the back-flow of the liquid is prevented until the piston-head is forced below said lateral openings, substantially as set forth.

2. The combination of the ram C, provided with a pump-cylinder having vertical passages *e* within its walls, and lateral apertures *e'* at the upper ends of said passages opening into the pump-cylinder, with the plug F, screwing into the ram below the pump-cylinder, and provided with a valve and passages communicating with said passages *e*, substantially as set forth.

3. The combination, with the ram C, pump-cylinder E, and valve-plug F, of the packing G, substantially as shown and described.

4. The combination, in a hydraulic jack, of the ordinary reversible lever U, socket T, and stop-lug V, with arm R, the shaft S, journaled in the head D, and provided with an annular groove, *y*, and a screw or pin, Y, passing from the outside of the head to the said groove, whereby when the said screw is removed the shaft may be moved laterally and the socket allowed to pass the lug, thereby allowing the lower end of the piston to be projected beyond the end of the pump-cylinder.

5. A hydraulic jack provided with a pump-cylinder and a screw valve-plug beneath the same, in combination with the piston secured to an arm, R, shaft S, carrying said arm, and provided with an annular groove and a screw or pin passing through the head into the groove, whereby when the screw-plug is removed and the screw or pin loosened the shaft S may be moved laterally and the arm turned downward to force the end of the piston beyond the end of the pump-cylinder, substantially as set forth.

6. In a hydraulic jack, the combination of the head D, recessed at D′, with the shaft S and the gland W, whereby the gland may be operated without removing the shaft, as set forth.

THOMAS H. WATSON.

Witnesses:

EDGAR TATE,

ALFRED H. DAVIS.