(No Model.)

# J. WEEKS.

## HYDRAULIC JACK.

No. 330,760. Patented Nov. 17, 1885.

Figure 5:

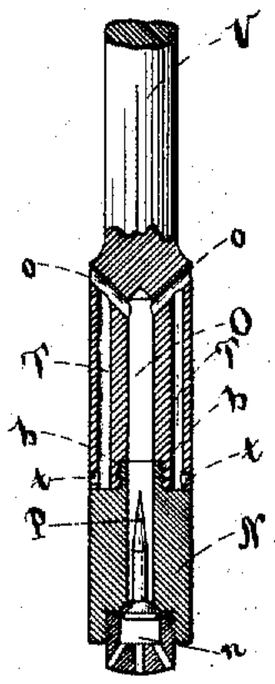


Figure 1:

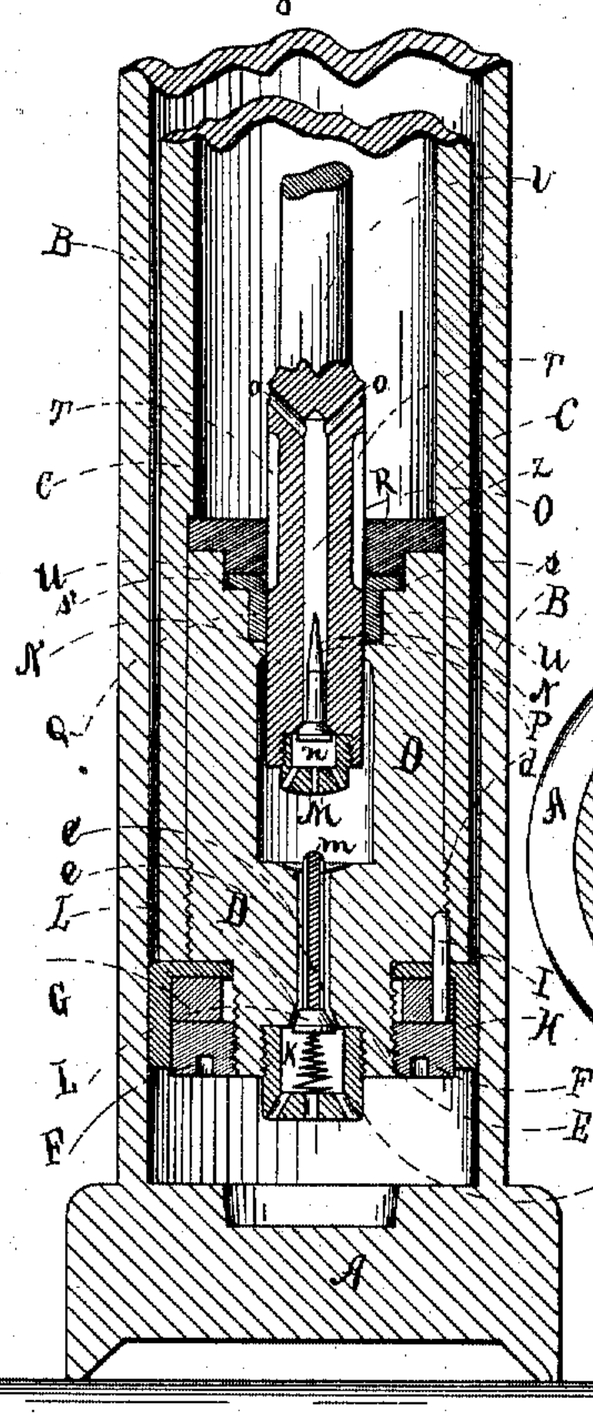


Figure 2:

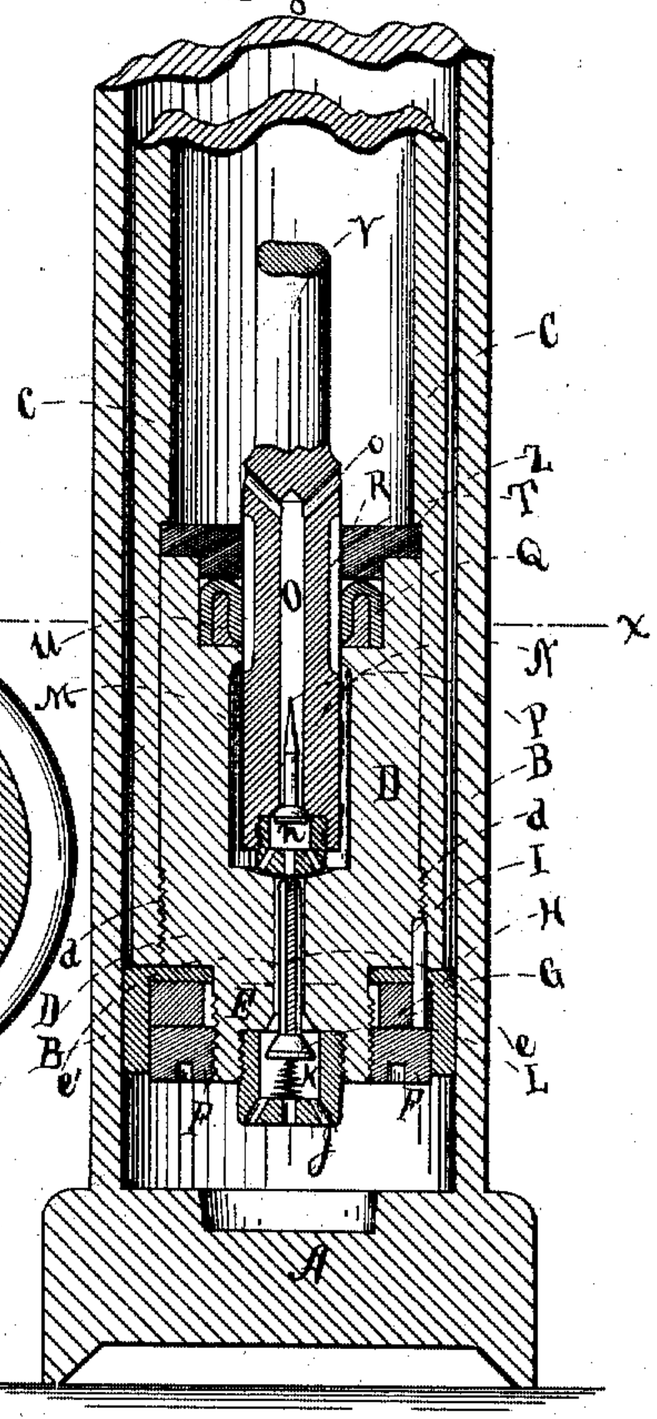


Figure 3

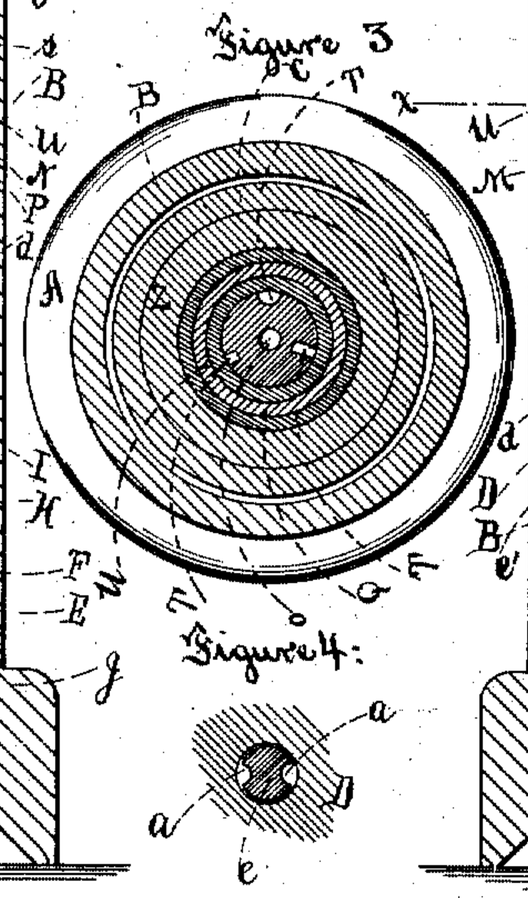


Figure 4:




WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOHN WEEKS, OF NEW YORK, N. Y., ASSIGNOR TO RICHARD DUDGEON, OF SAME PLACE.

## HYDRAULIC JACK.

SPECIFICATION forming part of Letters Patent No. 330,760, dated November 17, 1885.

Application filed June 15, 1885. Serial No. 168,818. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN WEEKS, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a specification.

The invention relates to hydraulic jacks; and it consists in improvements upon the jack invented by myself and Harrison Traver, for which we applied for Letters Patent of the United States on September 26, 1884, Serial No. 144,053.

The characteristic features of this present invention are, first, liquid-passages for the return of the liquid from below the pump to the reservoir, said liquid-passages being made in the outer part of the piston and distinct from the ingress or feeding water-passage; second, improvements in the packing for the piston, and means of applying it; third, improved construction of the stem of the lower valve.

In the drawings the same letters indicate the same parts in all the figures.

Figure 1 is a vertical central section of the improved jack, showing the position of the parts during the "pumping-up" operation. Fig. 2 is a like section of the jack, showing the position of the parts when the ram is being lowered. Fig. 3 is a horizontal section of a jack constructed as shown in Fig. 2, taken on the line *x x* of that figure. Fig. 4 is a horizontal cross-section of the spindle of the lower valve. Fig. 5 is a vertical central section of a pump-piston, showing a modified method of constructing the return liquid-passages.

A is the base of the jack, which supports the upright cylinder B, as usual.

C is the ram. It fits quite snugly to the bore of the cylinder B.

D is the pump, which screws into the ram C by threads *d*. It is provided with a downwardly-extending projection, E, which is threaded externally, upon which screws the nut F. Immediately above the nut F is a metallic packing-ring, G, which confines the packing H in position. A pin, I, passes through the packing and the packing-ring, and enters a hole bored in the joint between the pump D and the ram C. The pin I is held in position by the nut F. At the lower end of the pump is a small bonnet, J, perforated by a number of holes at its lower part, which is screwed into a recess in the base of the pump. It contains and holds in place a spring, K, which normally tends to seat the valve L, which, with its stem *e*, occupies a hole, *e'*, bored from the lower end of the pump upward to the bottom of the piston-chamber in the pump. The stem of the valve L works freely in the hole *e'*. Instead, however, of being triangular in cross-section, as such stems have heretofore been made, or filed off on opposite sides to allow the liquid to pass by the side of the stem when the valve is unseated, the stem is made as shown in cross-section in Fig. 4—that is to say, the water-passages *a a* consist of deep incisions made in the sides of the stem—said incisions having small area on the surface of the stem. They may be much deeper than shown in the drawings, and much narrower on the surface of the stem. They are continuous from the valve on the lower end of the stem to its upper end.

By this construction the cutting away of the surface of the spindle is avoided, thus leaving a substantially-cylindrical stem, which has almost as great wearing-surface as though the liquid-passages were not cut in it, thereby avoiding the somewhat speedy wearing away of the spindle, which takes place in the old constructions—that is to say, when the spindle is filed off triangular or on two sides, and which results in impairing the accuracy of the reseating of the valve.

The upper end of the stem extends a short distance into the chamber of the pump, as seen at *m* in Fig. 1.

The diameter of the chamber of the pump (marked M) is greater than that of the piston N. Thus the liquid can rise freely around the piston to the upper end of the enlarged chamber.

The piston N has a bonnet, *n*, screwed into a recess formed in its lower end, which is perforated at its lower part, it being very similar to the bonnet J. Its function is to prevent the valve from dropping down into the pump. Within the piston is formed a longitudinal water-passage, O, which communicates,

by passages *o o*, with the reservoir above the piston formed by the upper portion of the ram and in the head of the jack. Within the lower part of the passage O is contained the valve *p*, which has its seat in the lower end of the passage O.

Q is the packing of the piston. It is attached to the sides of the pump, and is confined between the gland R and a shoulder formed on the upper end of the pump. The gland is held in place by a shoulder, *r*, formed in the ram and by the upper end of the pump. The packing may be a U-shaped packing, as seen in Fig. 2, furnished with an expander-ring, *u*, or any other suitable packing; but I prefer a packing of the shape shown in Fig. 1 at *u*, which, being confined between the gland R and a shoulder, *s*, formed on the upper part of the pump, does away with the expander-ring and any special means of confining it in place. It is also a more economical packing than a U-shaped packing. If constructed as shown in Fig. 1, it may be simply dropped into its place in the pump before inserting the pump in the ram, and the gland being placed on top of it. Then all these parts at one operation may be inserted into the ram and pushed up until the threads *d* on the pump engage with the threads in the ram, and then being screwed up tightly, this part of the apparatus is complete.

The water-passages which return the liquid from below the pump to the reservoir above are seen at T. There may be as many of them as desired, but I prefer two at least, preferably three. They are simple incisions cut into the exterior of the piston, and may be of any desired shape, three different forms being shown in cross-section in Fig. 3. I prefer to cut them narrow on the surface, so that the packing will not squeeze into them, and give them the desired capacity (more or less, as preferred) by increasing their depth. These water-passages are of such length and are so located in the piston that when the piston is depressed to its greatest downward position the passages T will engage with the enlarged part of the pump-chamber at one end and with the reservoir above the gland R at the other end, as seen in Fig. 2.

One of the principal improvements possessed by this invention over the said invention of Weeks and Travers consists in these passages, because by their invention the single longitudinal passage O through the piston served both to pass the liquid downward for pumping up the ram, and also to pass it back for lowering the ram. If, therefore, any obstruction should get into this single passage O, the flow of the liquid back to the reservoir might be stopped and it be impossible to lower the load or to release the jack without the aid of another jack to lift the load off from the first one, and this has been found to be not an unfrequent difficulty, because jacks are very often opened, for various reasons, by the men composing wrecking-gangs and bridge-gangs, &c., on railroads, and they, not being aware of the importance of retaining the liquid free from foreign matter, allow such matter to get into the jack, and since the liquid passes with considerable force from below the pump to the reservoir above it, under the pressure of a heavy load, these particles of foreign matter are apt to get jammed tightly into the passage O and stop the operation of the jack. By the present improvement this will be impossible, because, there being more than one passage, if one should become clogged the other or others would act. Moreover, when clogged, the external passages are much more easily freed from impediments than an internal passage, especially as proper tools for doing such work are not usually present outside of the machine-shops. It must be distinctly understood, however, that the present invention is not limited to more than one passage T.

The piston-rod V extends upwardly, and is operated by a lever and crank-shaft or any equivalent device, as usual in hydraulic jacks.

In Fig. 5 is shown another method of forming the liquid-passages T. They are bored from the lower end of the piston upwardly just within the wall of the piston. Then transverse openings *t* are bored in laterally at the proper points to intersect them, and the lower end of the passages are then securely plugged up in any desired manner. Instead, however, of boring the holes clear through the piston from its lower end, the piston may be made in two parts threaded together, as at *b*. Thus the holes may be bored through that part only of the piston in which they are desired.

The operation is as follows: By working the lever, as usual, the adjustment of the parts being such that the lower ends of the passages T do not come below the packing Q, the liquid at each upstroke passes downward through the passages *o* O and valve P into the chamber of the pump M, and at each downstroke it is forced through the passage *l'* in the side liquid-channels, *a a*, depressing the valve L, and into the space below the pump, thus forcing the ram upwardly by hydrostatic power. This pumping operation is continued until the ram, bearing its load, has been raised to the desired height. Then by depressing the piston as far as it will go the bonnet *n* strikes the upper end, *m*, of the spindle of the lower valve and forces that valve off of its seat, and at the same time the lower ends of the liquid-passages T are brought into connection with the upper end of the enlarged pump-chamber. Thus the liquid will flow back again under the pressure of the load through the valve L, passages *a a* in the spindle, through the enlarged pump-chamber to and through the passages T to the reservoir above the pump.

The details of construction are not essential to this invention, since it will be apparent to

any one familiar with such matters that they may be altered and still the invention be embodied.

I claim—

1. In a hydraulic jack, the combination of a piston formed with liquid-passages T, cut in the wall thereof, and a longitudinal liquid-passage through the piston, closed with a valve at its lower end, and a pump, D, formed with an enlarged chamber, and a packing for the piston, said packing being attached to the pump and bearing against the piston, substantially as and for the purposes set forth.

2. In a hydraulic jack, the combination of a packing, Q, resting against a shoulder formed on the pump and confined between the said shoulder and a gland, R, placed above it, the pump and the ram being provided with a thread, *d*, and a piston having water-passages T cut in its outer wall, and a longitudinal water-passage through the piston, closed with a valve at its lower end, substantially as and for the purposes set forth.

3. In a hydraulic jack, a piston formed with liquid-passages T cut in its outer wall and a longitudinal liquid-passage through the piston, closed by a valve at the lower end, and a pump, D, formed with an enlarged chamber, and a packing for the piston attached to the pump and bearing against the piston, in combination with a downwardly-opening valve located at the base of the pump-chamber, the stem whereof extends into the pump-chamber, and provided with liquid-passages formed in the stem, substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 11th day of June, A. D. 1885.

JOHN WEEKS.

Witnesses:

HARRISON TRAVER,

WM. E. MACDONOUGH.