3 Sheets—Sheet 1

M. PENNYPACKER.

Hydraulic-Jack.

No. 205,674. Patented July 2, 1878.

Fig. 1

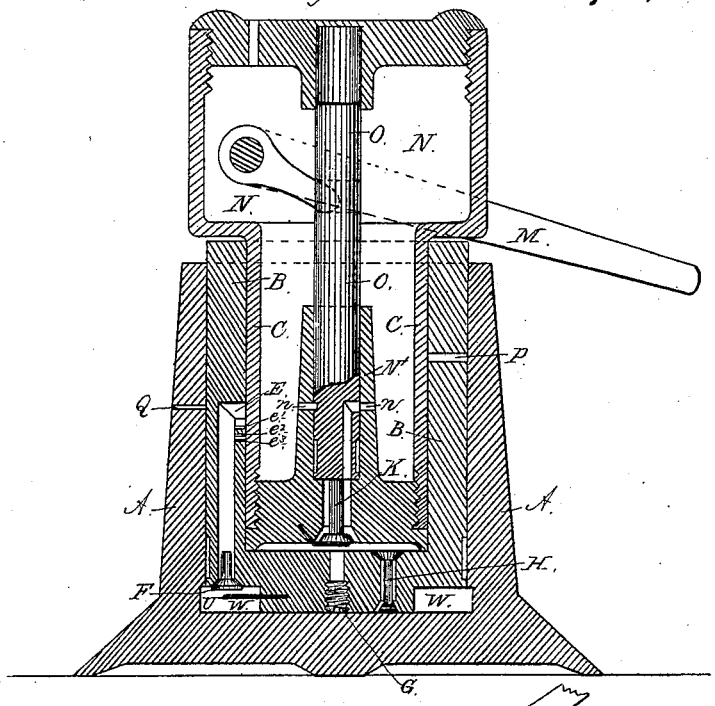
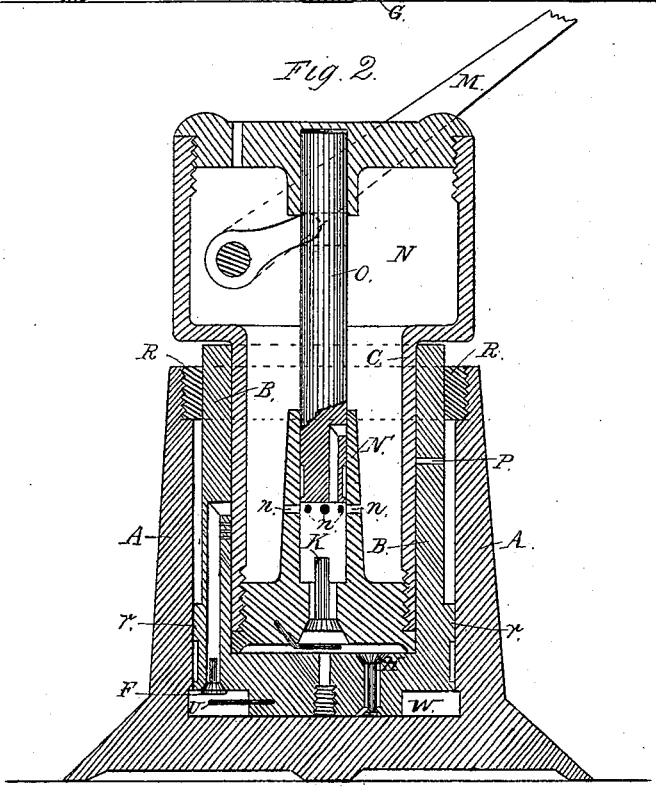


Fig. 2.



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A. W. Galt

INVENTOR:

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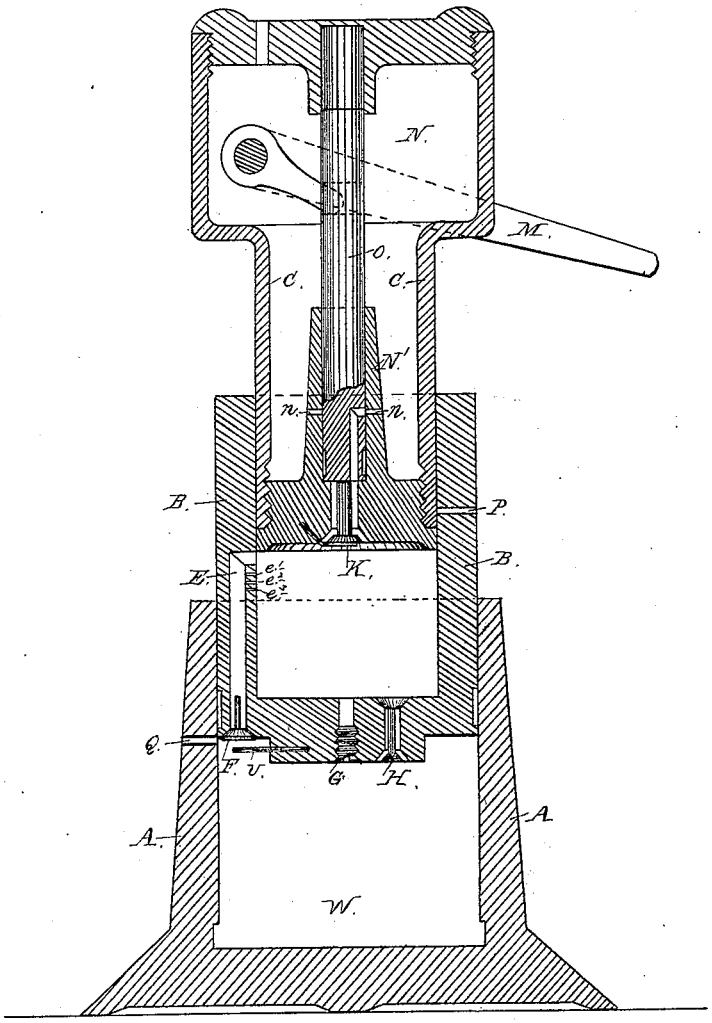
Fig. 3.



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3 Sheets—Sheet 3.

M. PENNYPACKER.

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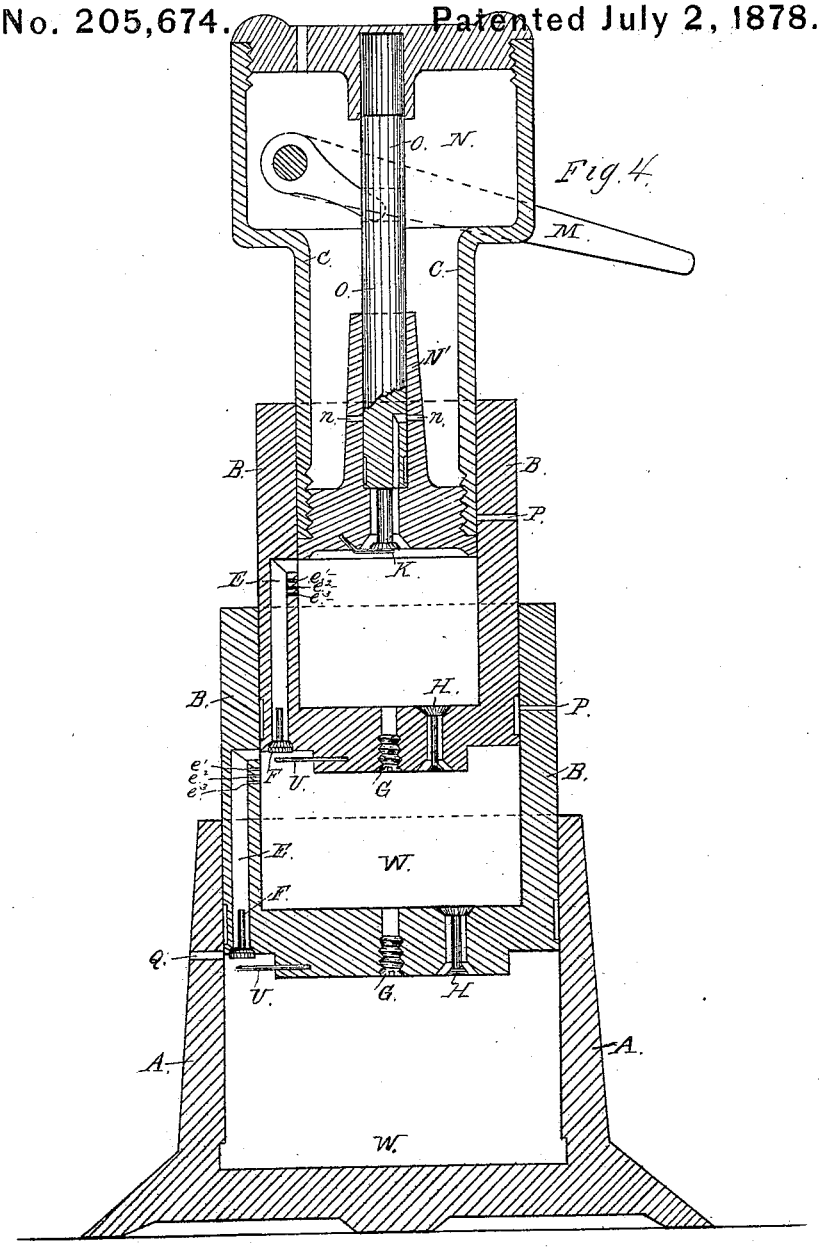

Fig. 4.

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UNITED STATES PATENT OFFICE.

MATTHIAS PENNYPACKER, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HYDRAULIC JACKS.

Specification forming part of Letters Patent No. **205,674**, dated July 2, 1878; application filed March 15, 1878.

To all whom it may concern:

Be it known that I, MATTHIAS PENNYPACKER, of Philadelphia, in the State of Pennsylvania, have invented a certain new and Improved Hydraulic Jack, of which the following is a specification:

My invention consists, first, in constructing a hydraulic jack with a plurality of plungers, fitting one within the other, and connected by one or more ducts in such a manner that the inner plunger and the intermediate cylinder in which it works will act as a pump to apply the pressure to the chamber beneath said intermediate cylinder.

The invention further consists in making the communication between the inner and outer plungers through a series of small openings at different elevations, so that the capacity of the said communication will be graduated automatically by the rise and fall of the inner plunger, and the vibration of the plunger occurring at each stroke of the pump will be lessened.

The invention further consists in constructing a hydraulic jack with a plurality of concentric rams or plungers, and with a removable plug in the bottom of the outer one, so as to provide for the application of the water-pressure directly to the bottom of the outer ram when required for very heavy lift.

In the accompanying drawing, Figure 1 is a vertical section of a jack with two concentric rams, embodying the preferred form of my invention, the rams being down. Fig. 2 is a vertical section of a similar jack, with the addition of a check-ring. Fig. 3 is a vertical section of the jack shown in Fig. 1, but with the rams elevated. Fig. 4 is a vertical section of a jack with three concentric rams, showing their elevated position.

A represents the chambered base of the jack, which is bored for the reception of a sleeve, B, which, in the illustration given in Figs. 1, 2, and 3, is a cup-shaped cylinder. C represents the ram proper, fitting within the sleeve B.

In Figs. 1, 2, 3, and 4, E represents an outlet communicating from the interior of the sleeve B down through the wall of the same to a chamber, W, beneath it. The said outlet is closed by a check-valve, F, opening downward, and limited in its motion by a pin, V e^1 e^2 e^3 are a series of smaller holes communicating with the port E at different heights. O is a pump-plunger, of a construction common in this class of devices. The plug G in the bottom of the sleeve B in Fig. 1 may be removed, as shown in Fig. 2, when it is desired to apply the water-pressure directly to the bottom of the sleeve B, so as to lift with greater force. N is the interior water-chamber of the ram, and *n* an opening connecting said chamber with the pump-cylinder N′ beneath the plunger O when the latter is elevated. K is a check-valve in the bottom of the ram C, guarding the opening through which water is forced by the plunger O. H is a check-valve, opening upward, and permitting the return of water from beneath the sleeve B when the ram is lowered. M is the customary lever for working the plunger O. Q is a safety-opening through the wall of the base A. P is a safety-opening through the wall of the sleeve B.

In the modification shown in Fig. 2, the outlet Q is dispensed with and a check-ring, R, is applied, which arrests the upward motion of the ram by the contact of the shoulder *r* at its lower end.

The pumping devices M O are not peculiar or of my invention. If preferred, the pump may be located in the base of the jack. By the introduction of additional sleeves, as illustrated in Fig. 4, the jack may be extended in height to any desired extent.

The operation is as follows: Water being forced out of the interior of the jack-chamber N to the space beneath it, the jack is raised until the water reaches the small holes e^1 e^2, &c., which communicate with the port E. This admits a pressure of water into the chamber W, which acts with increased force due to the greater area of the outer ram B. Before the jack C reaches its highest position within the sleeve B, or in case the small holes e^1 e^2, &c., become stopped, the main opening of the outlet E will be uncovered; but ordinarily the small openings suffice to admit the necessary pressure beneath the sleeve and maintain the proper relative positions of the two rams B and C. The sleeve B is thus raised until the opening Q is uncovered, allowing the escape of water and limiting the elevation of the sleeve. In

like manner the uncovering of the opening P limits the motion of the jack C within the sleeve B.

It will be observed that the small plunger or ram C rises first until water-pressure reaches the chamber W beneath the sleeve, and that in lowering the small ram C descends first, owing to the smaller area. The pressure on the inner ram C diminishes according to the thickness of the annular ram B and the number of sleeves employed.

One pump serves to raise all the rams or to lower them, all their relative motions being automatic. The small ram can be raised or lowered alone, or both can be raised together.

While pumping, the inner ram or small plunger moves up and down with each stroke of the pump. To obviate this, I have drilled small pin-holes a^1 and a^2 below the main hole in the sleeve. These pins-holes, being too small to admit the water to the large chamber as fast as it is pumped, cause the jack to rise and maintain it in that position while the water is being forced through to the lower chamber. The large hole is put above, as a safety measure, should any of the small holes stop up. I have also drilled another hole in the sleeve still further up this hole. This hole passes entirely through the walls of the sleeve; it is intended as another safety-outlet in case all the other holes (openings to lower chamber) should get stopped up.

When more than two rams are used, as in Fig. 4, the openings are the same in each, causing them to rise in succession, and diminishing the rise per each stroke of the pump in accordance with the number of rams. The pressure also decreases in the same proportion.

The pressure on the small chamber, being greatest, keeps the check-valve H down until the pressure is relieved upon its top. Then the pressure below causes it to rise, permitting the return of the water from the large chamber to the small chamber, and through the pump-plunger to the receiver or the jack-head. It is evident that while the pressure is the greatest in the small chamber it will keep the check-valve closed, and as long as the jack does not strike the bottom of the sleeve the jack can be raised and lowered without affecting the sleeve in any manner, provided the jack is not raised above the opening on the sleeve or is not lowered all the way down.

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

1. A telescopic hydraulic jack made up of a plurality of plungers, fitting one within the other, and constructed with tight heads and one or more duts, E, whereby the inner plunger and the intermediate cylinder in which it works constitute a pump to apply pressure through said duct or ducts to the chamber beneath the said intermediate cylinder, as explained.

2. The concentric rams B C, connected by a duct, E, communicating with the interior of the lower or out ram at a point remote from the bottom, so as to transfer pressure from one to the other after the inner ram has been raised, substantially as set forth.

3. The combination, with the inner ram C, of an outer ram, B, provided with a series of connecting-ducts, e^1 e^2, at different heights, in order to graduate the pressure between them, as set forth.

4. A hydraulic jack constructed with two or more concentric rams, B C, and with a removable plug, G, in the bottom of the outer one, to provide for applying the pressure directly to the base of the outer plunger when required.

MATTHIAS PENNYPACKER.

Witnesses:

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