E. M. DUDGEON.

Hydraulic-Jack.

No. 162,044. Patented April 13, 1875.

Fig. 1.

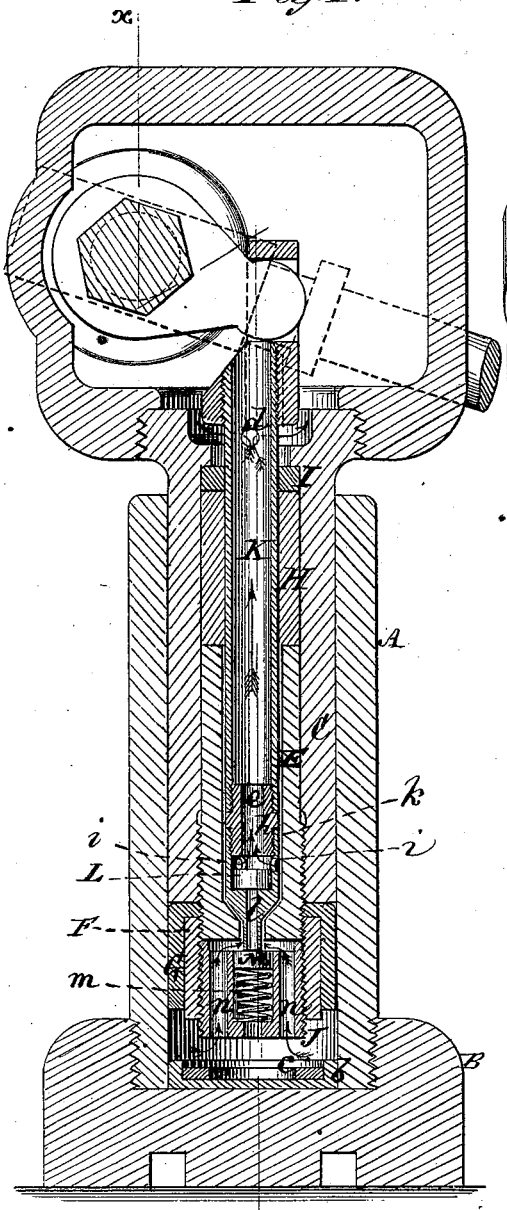


Fig. 2.

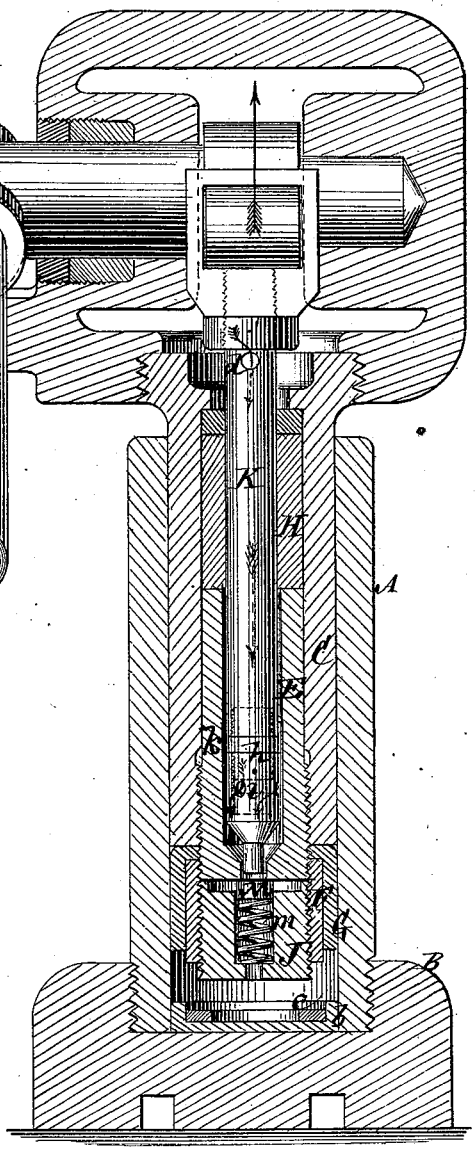
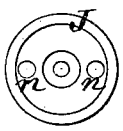


Fig. 3.



Witnesses.
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UNITED STATES PATENT OFFICE.

ENEAS M. DUDGEON, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN HYDRAULIC JACKS.

Specification forming part of Letters Patent No. **162,044**, dated April 13, 1875; application filed December 30, 1874.

To all whom it may concern:

Be it known that I, ENEAS M. DUDGEON, of the city and county of San Francisco, in the State of California, have invented certain Improvements in Hydraulic Jacks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification.

This invention more particularly relates to hydraulic jacks, in which the water to operate the ram is carried by the latter, and the force-pump is contained within the ram, and the water returned, when lowering the jack, to the lifting-head of the ram, to be used over again, as required.

The invention consists, in a combination with the ram, of a tubular-pump plunger contained within the latter, and valves operating to pass the water below the ram by the reciprocating action of said plunger.

Furthermore, the invention consists in certain combinations and constructions of parts whereby the pump-plunger is made to trip the lower valve, to return the water to the upper portion of the ram when lowering the jack; and whereby increased facility is afforded for getting at the working parts, and other advantages are obtained.

In the accompanying drawing, Figure 1 represents a vertical central section of a hydraulic jack, constructed in accordance with my invention, with the lower valve open, and the water as returning to the reservoir. Fig. 2 is a vertical section on the irregular line *x x*, showing the lower valve closed, the water as descending through the pump-plunger to act upon the ram, and said plunger in a rising position. Fig. 3 is a top view of the lower valve-box with its passages.

A is the cylinder of the jack, arranged to screw into a bed, B, and provided with a base-cupped packing, *b*, having an interior ring, *c*, or any other suitable packing may be used. This cylinder A it is preferred to construct of cast-steel or cast-iron, or other metal. C is the outer shell of the ram, which may be of cast-steel, and is connected at its upper end, by screw-joint or otherwise, with the combined water-reservoir and lifting-head forming part of the ram. E is a pump-barrel arranged concentrically within the lower main portion of the outer shell C of the ram, and screwing within and through the bottom end of said shell. A cylindrical screw-coupling or jam-nut, F, arranged within a cup-packing, G, at the bottom of the ram, serves to connect the valve-box J to the pump-barrel E and compresses the packing G upon its seat at the end of the ram. The pump-barrel E is packed at its top by a collar or sleeve packing, H, arranged between the top of the barrel and a packing-ring, I, the turning of the barrel within the shell C serving to adjust the sleeve-packing H. K is the pump-plunger, which is hollow, and which is arranged to reciprocate up and down within the ring I, the packing H, and the barrel E. The hollow pump-plunger K is in communication at its top, or by an upper side opening, *d*, or both, with the reservoir or water-head, and is provided with a valve, L, near its bottom, arranged, when raised, to close an aperture, *e*, in a coupling, *h*, connecting sectional constructions of the lower portion of the hollow pump-plunger; said valve also then incidentally, but not necessarily, closing side apertures *i*, which communicate with the lower chamber *k* of the pump-barrel. This space or chamber *k* is extended downward round the lower end of the pump-plunger K, and is in communication with the upper space of the valve-box J. When the valve L is depressed, it incidentally, but not necessarily, closes a contracted aperture, *l*, in the extreme lower end of the pump-plunger K, which end is free to play loosely through the bottom of the pump-barrel.

The valve-box J contains the lower valve M, which, when the pump-plunger K is ascending, closes the aperture in the lower end of the pump-barrel E, as shown in Fig. 2, said valve being thus closed by the pressure of the fluid beneath it, assisted, it may be, by a spring, *m*. The spaces above and below said valve-box are connected by one or more through-passages, *n*.

In the ordinary operation of the pump-plunger—that is, when the jack is lifting—said plunger at close of its descent does not come in contact with the valve M to depress it or keep it open; but when it is required to lower the jack and return the water to the

head, then said plunger has a slightly-extended downstroke or position given it, to keep the valve M away from the opening in the bottom of the pump-barrel, and so that it only closes the aperture *l* in the plunger, as represented in Fig. 1. This makes the lower valve M operate as an egress-valve, to return the water below the ram up the apertures *n*, up around the lower end of the pump-plunger to the chamber *k*, and from thence through the openings *i* and above the valve L, to and through the upper portion of the pump-plunger, into the lifting-head of the ram. In this way the plunger acts direct upon the lower valve when it is required to lower the jack, and said valve then closes the bottom of the pump-plunger, so that water cannot pass from below to act on the under side of the top valve L. When the jack is lifting, however, then the lower valve M, when rising, closes the lower end of the water-passage or chamber *k*, and a perfect and alternate action of the valves L and M, in connection with the passages *i*, *k*, *l*, and *n* is obtained, by the reciprocating action of the plunger to lift the ram, as required.

To thus vary the length of the downstroke of the pump-plunger, it is proposed to construct its operating-lever with a collar, which, when the jack is engaged in lifting, comes in contact with a stop on the head, so that the pump-plunger does not strike the valve M; but when it is required to lower the jack, then said lever is slightly drawn out of its socket, so that the collar is free of the stop, thereby allowing the pump-plunger an increased descent. The socket, as in other hydraulic jacks, is attached to a rock-shaft working through the side of the lifting-head, and is provided with a toe for operating the pump.

By means of the hollow or tubular pump plunger and valves and passages, as described, great compactness, simplicity, and durability are obtained, and a most effective action of the ram is produced. Thus, the pump-plunger may be as readily packed as that of any force-pump, and only a small plunger need be employed, by reason of the water space or passage *k* forming the lower portion of the bore of the pump. The plunger itself is made to trip the lower valve. The fluid is restricted from coming in contact with the sides of the cup-leather or packing, and by the construction of parts, as shown, and the fit of the screw-coupling or jam-nut F, both over the lower valve-box J and pump-barrel E, by means of a continuous thread, which also serves to connect the pump-barrel with the shell C of the ram, the greatest facility is afforded for getting at the several working parts and valves, when necessary, for repair or otherwise. Either leather or Babbitt metal cone-packings may be used in the ram, as desired.

I claim—

1. The combination, with the ram, of a tubular pump-plunger, contained within the ram, whereby the operating fluid is passed through said plunger to opposite ends of the ram, as required.

2. The combination, with the hollow pump-plunger K and pump-barrel E, within the ram, of the valves L M, the pump chamber or space *k*, and the apertures or passages *e i l n*, substantially as specified.

3. The hollow pump-plunger K, constructed to extend below or through the bottom of the pump-barrel, in combination with the lower valve M, essentially as and for the purpose herein set forth.

4. The combination of the lower valve-box J, with its valve M and one or more passages *n*, the nut or screw coupling F, the packing G, the pump-barrel E, and the shell C of the ram, essentially as described.

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Witnesses:
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