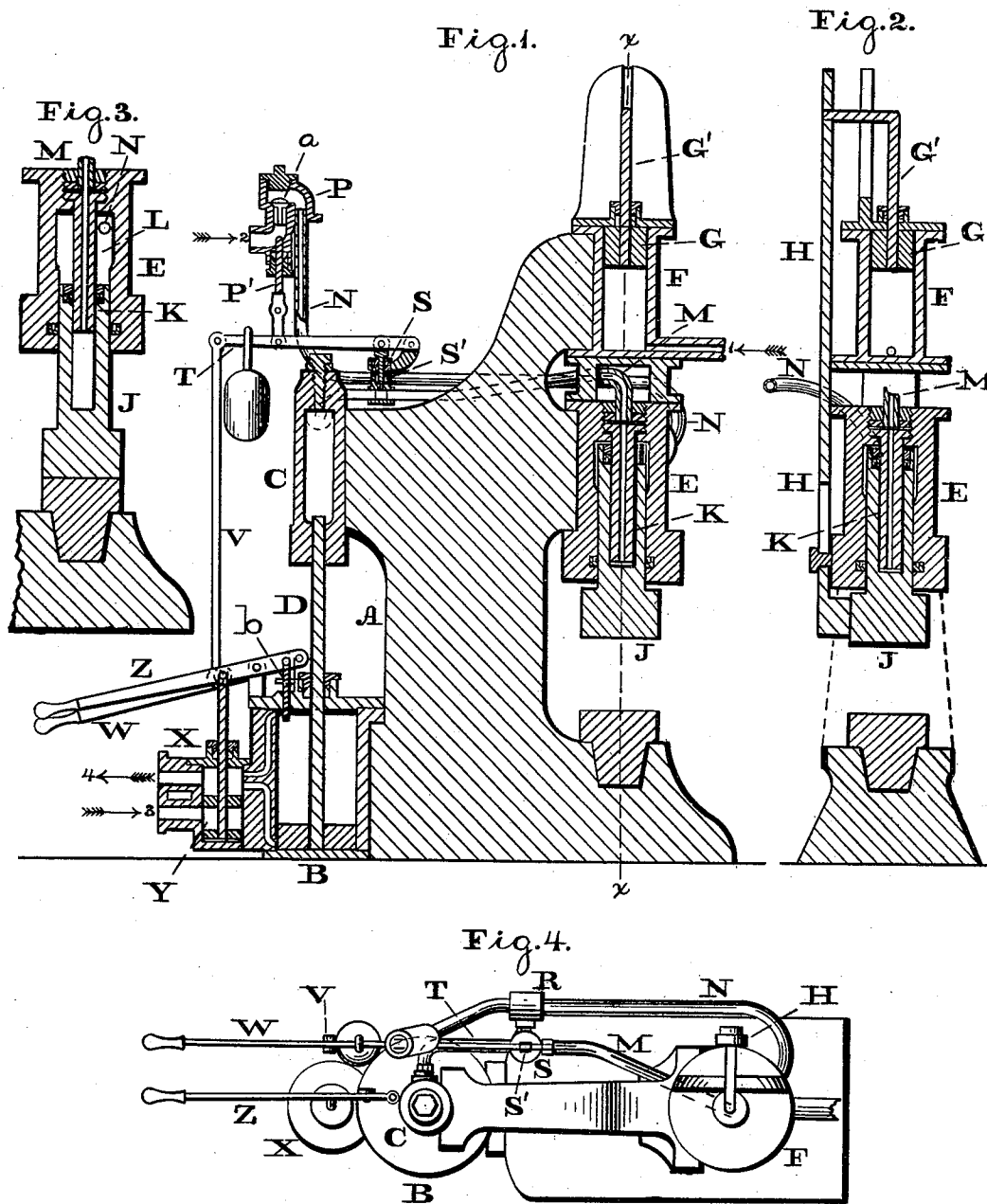


W. B. LEACHMAN.
HYDRAULIC POWER HAMMER.

No. 179,206.

Patented June 27, 1876.



Witnesses:
Lewis F. Brown,
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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM B. LEACHMAN, OF LEEDS, ENGLAND, ASSIGNOR OF ONE-HALF
HIS RIGHT TO GEORGE H. NUSSEY, OF SAME PLACE.

IMPROVEMENT IN HYDRAULIC POWER-HAMMERS.

Specification forming part of Letters Patent No. **179,206**, dated June 27, 1876; application filed
May 19, 1876.

To all whom it may concern:

Be it known that I, WILLIAM B. LEACHMAN, of Leeds, in the county of Yorkshire, England, have invented a new and useful Improvement in Hydraulic Power-Hammers; and I do hereby declare the following to be a clear and exact description of the nature thereof, sufficient to enable others skilled in the art to which my invention appertains to fully understand, make, and use the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal vertical section of the apparatus embodying my invention. Fig. 2 is a transverse section in line *xx*, Fig. 1. Fig. 3 is a view of a portion of Fig. 1, the parts being in a different position. Fig. 4 is a plan or top view.

Similar letters of reference indicate corresponding parts in the several figures.

My invention relates to a hammer, the ram of which exerts a crushing or squeezing action due to hydraulic power, the strokes being quick and powerful, and there is a stroke for the ram or hammer-head from each stroke of the piston.

The invention consists of a two-part ram or hammer-head in combination with a hydraulic cylinder, the water from which is ejected by the piston-rod of the steam-cylinder, said rod acting as a plunger for said hydraulic cylinder. It also consists of a ram operated so as to receive a partial motion, and then a full-power-exerting motion, whereby the work will be squeezed or crushed, the metal will not fly and be wasted, and blows are avoided. It further consists in the combination of mechanism whereby the strokes will be quick and powerful, and there is a stroke for the ram or hammer-head from each stroke of the piston.

Referring to the drawings, A represents the frame of the apparatus, on a side or portion of which there is supported a steam-cylinder, B, above which is arranged a hydraulic cylinder, C, the piston-rod of the steam-cylinder B projecting into said hydraulic cylinder C, and acting as a plunger therefor. On another side or portion of the frame A there is supported a hydraulic cylinder, E, above which is arranged steam-cylinder, F. Steam will be admitted

from the boiler into the cylinder F, (see arrow 1,) so as to act against the lower side of the piston G of said cylinder F, and to the piston is connected a rod, G', to whose upper end is attached by a cross-head a connecting bar or rod, H, which passes outside of the cylinder and is secured at its lower end to the ram J. Within the hydraulic chamber E there is a ram, K, consisting of a tube whose diameter is less than the diameter of the chamber E, so that a space, L, exists between the ram K and the chamber E. A portion of the ram J is hollow or chambered, and in the same the ram K is fitted after the manner of a telescopic joint. M represents a water-pipe, which communicates with the bore of the ram K and with the hydraulic cylinder C, and N represents a water-pipe which communicates with the hydraulic cylinder E and with a valve, P, to which water is passed from a tank or other place of supply. (See arrow 2.) To the pipe N is connected a connecting T, as shown at R, which joins a valve, S, communicating with the pipe M. T represents a lever, to which is connected at one end the stem S' of the valve S, and at or near the other end the stem P' of the valve P. The valve P is provided with a check or release valve, *a*, which will be lifted or opened by the upward movement of the stem P' and closed by the back or return pressure of the water in the pipe N. To the lever T there is also connected a rod, V, which is attached to a hand-lever, W, whose axis is on the frame A or head of the cylinder B, or elsewhere. Adjacent to the cylinder B is a steam-chest, X, within which is a slide-valve, Y, to whose stem is connected a hand-lever, Z, for operating said valve Y. Through the upper head of the cylinder B there passes a tappet-rod, *b*, which is connected to the lever Z, and so arranged as to be struck by the piston-head of the cylinder B on the upward motion of the piston.

The operation is as follows: The position of parts, when the apparatus is at a state of rest, is as shown in Figs. 1 and 2. The lever Z will be raised so that steam will enter at arrow 3, the lower port of the steam-cylinder B, and partially raise the piston thereof, whereby the rod D, acting on the water in the cylinder

C, forces the water through the pipe M into the ram K, thus causing the ram J to descend onto its work, which rests on the bed or anvil-block. The downward movement of the ram J creates a vacuum in the cylinder E, thereby lifting the valve *a*, and drawing the water through the valve P and pipe N into said cylinder E, the space L thus being filled with water under partial pressure. The operator now lifts the lever W, which raises the valve-stem S', and the piston of the cylinder B rising to its full extent, the water passing from the cylinder C through the valve S, T-connection R, and pipe N, exerts its greatest pressure on the ram J, and consequently on the work, the action thereon being that of crushing or squeezing, instead of blows. When the piston-head of the cylinder rises to its full extent, it strikes the tappet-rod *b*, thus moving the lever Z, reversing the slide-valve, and permitting the exhaust steam to escape, as shown by the arrow 4, Fig. 1. The piston-head then falls by its own gravity. In order to return the ram J to its former position, the operator lifts the lever W so as to lift the valve *a*, and steam acting on the piston-head of the cylinder F raises said head, which, being connected to the ram J raises the latter also, whereby the water in the space L rushes back through the pipe N into the tank or place of supply. The valve S being opened, water fills the cylinder C, and the parts are in position for repetition of the operations.

It will be noticed that steam for the cylinder F may be taken from the boiler through a valve or not, as desired, the pressure of the steam being only sufficient to lift the ram J, which it does when the hydraulic pressure is removed from said ram.

It will be seen that I obtain quick strokes, great power, and reliably a stroke for the ram or hammer-head from each stroke of the piston.

As the work will not be subjected to blows, the apparatus does not require heavy and expensive foundations, the metal will not fly,

and be wasted, as it is crushed or squeezed, instead of being struck with blows, as ordinarily.

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

1. The piston-rod D of the steam-cylinder extended into the hydraulic cylinder C, in combination with the two-part ram J K, substantially as and for the purpose set forth.

2. The piston-rod D of the steam-cylinder B, extended into the hydraulic cylinder C, and the ram in the hydraulic cylinder E, in combination with the pipe M, communicating with said hydraulic cylinder C and the bore of said ram, substantially as and for the purpose set forth.

3. The ram, in combination with a hydraulic cylinder and pipes, whereby it first receives a partial motion, and then a full-power-exerting motion, substantially as and for the purpose set forth.

4. The ram formed of parts J K, fitted to each other telescopically, in combination with the hydraulic cylinder E, substantially as and for the purpose set forth.

5. The ram J with the hydraulic cylinder E and the communicating-pipe N, in combination with the ram K, projecting into the ram J and the pipe M, substantially as and for the purpose set forth.

6. The ram of the hydraulic cylinder E, in combination with the piston G of the steam-cylinder F, and the connecting bar or rod H, substantially as and for the purpose set forth.

7. The hydraulic cylinder C and the hydraulic cylinder E with its ram, in combination with the pipes M N, valves P S, lever T, and connection R, substantially as and for the purpose set forth.

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Witnesses:

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