

*J Watt*

### Valve Gear for Steam Hammer.

No 52232 -

*Patented Jan. 23. 1866.*

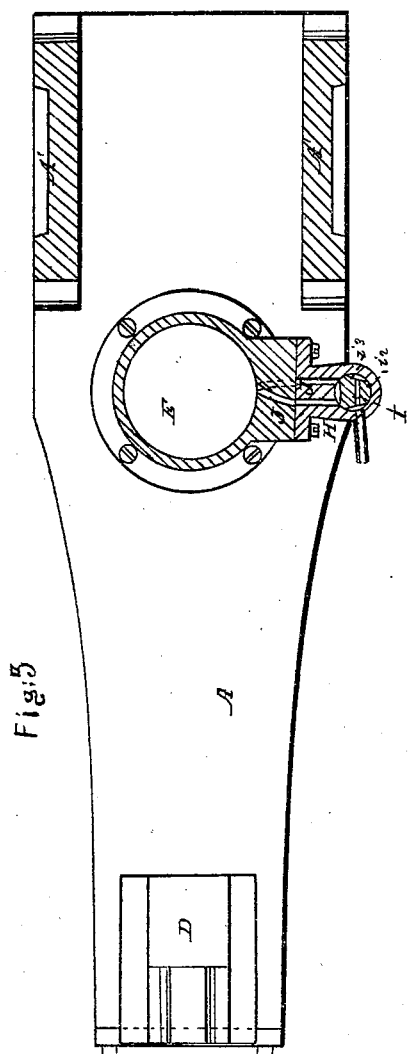
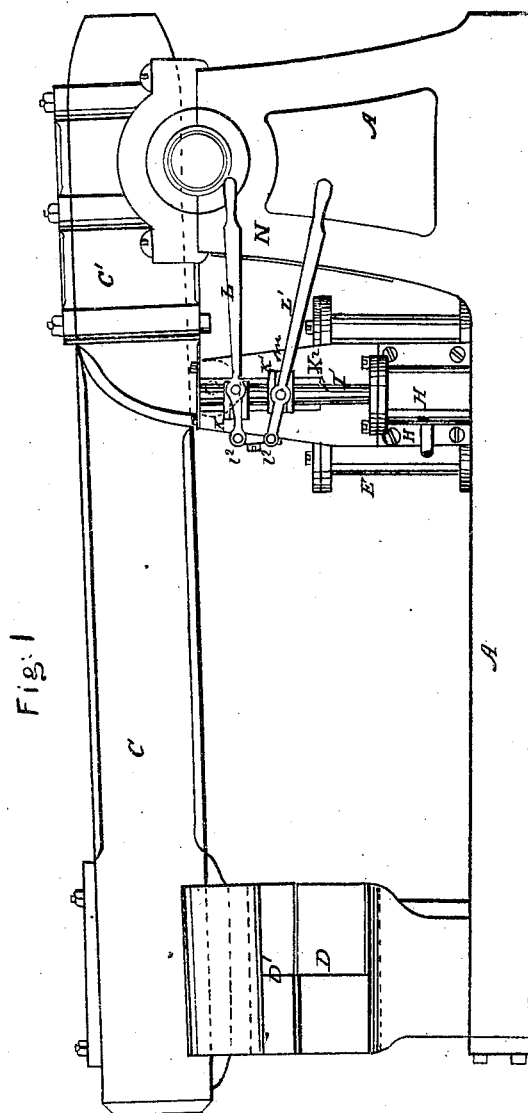


Fig. 5



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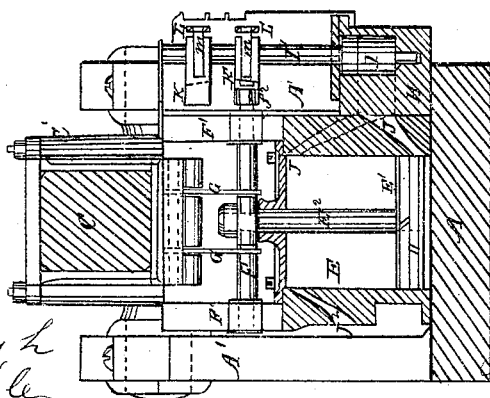


Fig 2

Witnesses:

M. R. Forbes &  
B. H. Munkley

Inventor:

James Watt

# UNITED STATES PATENT OFFICE.

JAMES WATT, OF BUFFALO, NEW YORK.

## IMPROVEMENT IN VALVE-GEAR FOR STEAM-HAMMERS.

Specification forming part of Letters Patent No. 52,232, dated January 23, 1866.

*To all whom it may concern:*

Be it known that I, JAMES WATT, of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Steam-Hammers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure I is a side elevation of same; Fig. II, a cross-section through steam-cylinder, and Fig. III a horizontal section, also through steam-cylinder.

This invention relates to an improvement in the valve-gear and valve of helve steam-hammers; and it consists, first, in the combination of devices operating the valve directly by the movement of the piston by making the valve-stem parallel thereto and providing it with two radial arms, said arms being adjustable on the valve-stem by means of an arrangement of levers and acted upon by an arm or roller moving with the piston, the length of stroke or points of taking and cutting off steam being regulated at pleasure by changing the position of said radial arms up or down on the valve-stem; second, in a cylindrical valve, forming a bearing equal, or nearly so, to the valve-face diametrically opposite the same, and opening a communication through the valve, so that the steam-pressure may be equal on each side thereof, and the valve thereby be balanced.

Letters of like name and kind refer to like parts in each of the figures.

A represents the bed-plate; A', pillow-blocks; C, helve; C', husk and trunnion; D, anvil-block; D', hammer-head. E represents the steam-cylinder; E', piston; E<sup>2</sup>, piston-rod; F, cross-head; F', cross-head slides; G, connections of cross-head with helve. H represents a cylindrical valve-chest cast on or bolted to the steam-cylinder, with its axis and that of the valve parallel to that of the cylinder. H' represents the steam-pipe. I represents the cylindrical valve, and I' the valve-stem. J represents the steam-port opening from the valve-chest into the bottom of the steam-cylinder, and J' the exhaust-port opening into the top of the steam-cylinder from the valve-chest, and J<sup>2</sup> exhaust-passage communicating from the top of the steam-cylinder with the atmosphere.

K K' are radial arms on the valve-stem I', they being movable longitudinally thereon, but laterally held by a feather, K<sup>2</sup>, on the valve-stem. The upper one, K, is beveled or chamfered on its under side, presenting a surface inclined to the valve-stem in one direction, and the lower arm, K', is beveled on its upper side in the same direction.

The cross-head F is extended beyond the slide F' and carries a friction-roller, f<sup>2</sup>. In the upward movement of the piston and hammer this roller strikes the upper arm, K, and, acting on its inclined surface, moves the valve to cut off the supply of the steam from the steam-cylinder and open the exhaust-port and allow the hammer to fall. The downward or falling movement of the hammer and piston causes the roller to strike the inclined surface of the lower arm, K', and throw the valve back and admit steam to the cylinder below the piston and raise the hammer for the next blow.

It is evident that to increase or diminish the length of stroke of the piston and lift off the hammer and consequent force of the blow it is simply necessary to change the position up or down, as the case may be, of the arm K on the valve-stem. Raising the arm up gives an increased stroke, since the roller f<sup>2</sup> will travel farther before striking the arm K and cutting off steam. In a like manner, moving the arm K down shortens the stroke by causing the roller to strike the arm at an earlier part of the stroke. The position of the lower arm, K', is regulated by the thickness of the metal being worked, and must be changed as the thickness varies—that is raised as the thickness increases and lowered as it decreases—its position always being such that the roller f<sup>2</sup> will strike and move J before striking the metal between the hammer and anvil. These movements of the arms K K' are effected by the levers L L', having their fulcrums at one end, as shown at l<sup>2</sup>, and connecting each with its arm by a jointed stud, m, the moving end of the levers working on a notched segment, N, which holds them in any position in which they may be placed. The jointed studs m permit the lateral vibration of the arms while holding them against any longitudinal movement on the valve-stem.

This valve-gear is very simple and compact and gives the most perfect control over the movements of the hammer.

The blow may be changed instantly from one extreme to the other, or any number of continued uniform blows may be obtained. The movements are all quick and positive and obtained without the intervention of any complicated mechanism. The balancing of the valve, which is a most important object to obtain, is effected in an equally complete and simple manner by giving it a bearing against the chest opposite the ports, as shown at  $i^2$ , and making an opening or passage,  $i^3$ , through from one side to the other, so that the steam may pass through and press equally on both sides thereof.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. The beveled arms K K', made adjustable on the valve-rod, and the tappet-arm or roller  $f^2$ , in combination with the piston-rod, for the purpose of operating the steam-valve, substantially as described.

2. Giving the cylindrical valve I a bearing,  $i^2$ , against the valve-chest opposite the ports, in combination with the passage  $i^3$  through the valve, to produce a balanced valve, as described.

Witnesses:

JAMES WATT.

GEO. W. WALLACE,

W. H. FORBUSH.