

D. Joy Steam Hammer

No 59524

Patented Nov 6, 1866

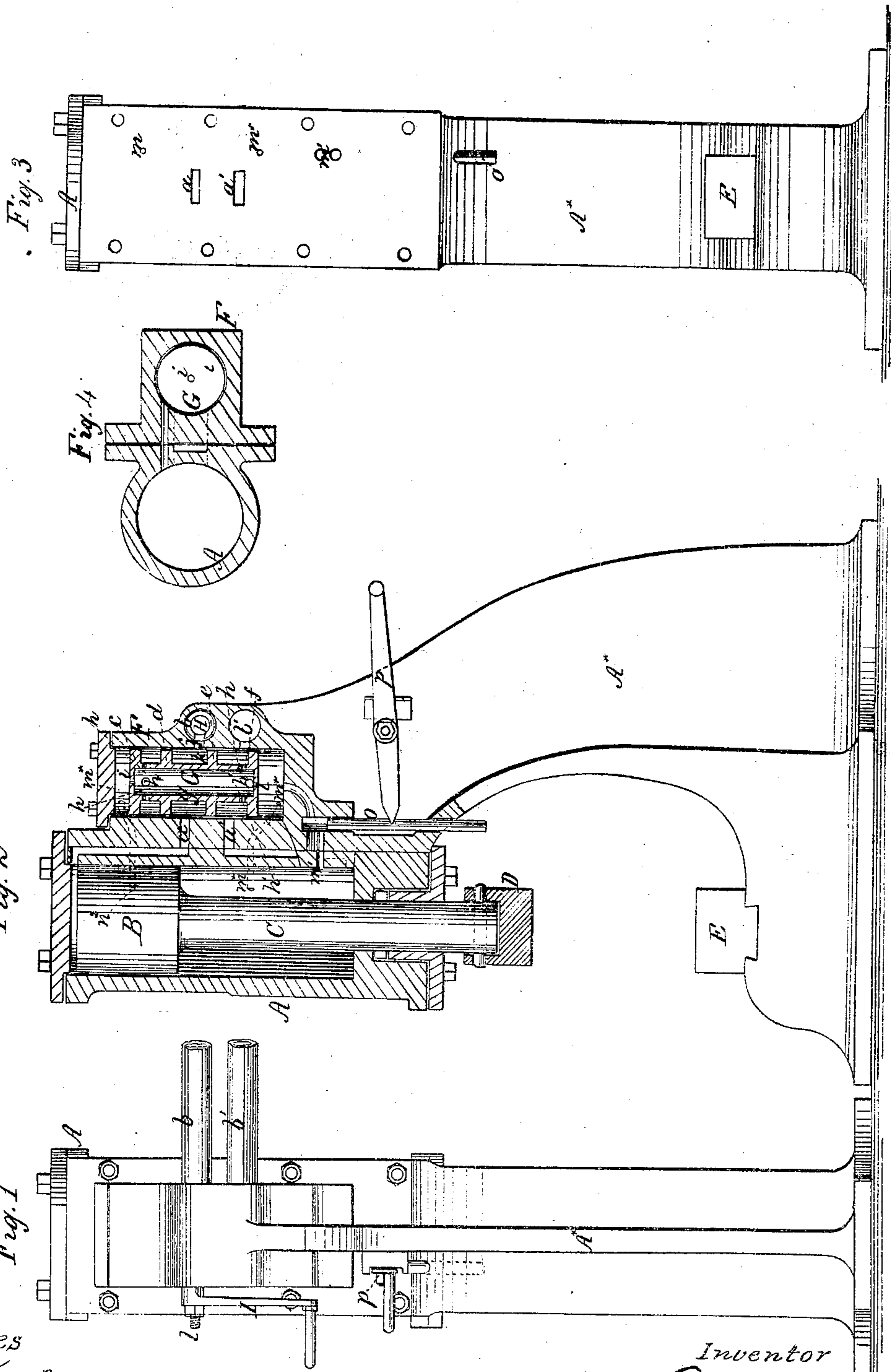


Fig. 2

Fig. 1

Fig. 3

Fig. 4

Witnesses
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IMPROVEMENT IN VALVES FOR STEAM-HAMMERS.

Specification forming part of Letters Patent No. 59,524, dated November 6, 1866.

To all whom it may concern:

Be it known that I, DAVID JOY, of Middlesbrough-on-Tees, England, have invented a new and useful Improvement in Steam-Hammers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a rear elevation of this invention. Fig. 2 is a vertical central section of the same. Fig. 3 is a front elevation of the same when the cylinder is detached. Fig. 4 is a transverse section of the cylinder and valve-chest.

Similar letters of reference indicate like parts.

This invention relates to a steam-hammer the cylinder of which is similar to that of an ordinary steam-engine, the piston having a reciprocating motion given to it by the pressure of a column of steam or other fluid admitted alternately at the top and bottom of the piston by suitable passages.

The admission of the steam or water to the cylinder is regulated by a valve composed of four pistons, which connect with each other by means of a tubular stem. Said pistons, instead of being moved by tappets and eccentrics, are actuated by the pressure of the steam or water itself, the ingress and egress of which is regulated by a suitable cock or valve. The plug of this cock is operated either by hand or by the action of the engine, and it is so arranged that it can be adjusted in its seat for the purpose of regulating the effective area of the ports, and consequently the speed of the engine. The length of the stroke of my engine is regulated by an adjustable piston and apertures leading to the lower portion of the cylinder, whereby the time when the valve changes can be adjusted at pleasure.

A represents a cylinder, which is bored out to receive the piston B. The cylinder is placed in a vertical position, and from the piston extends the rod C through a stuffing-box in the lower head of the cylinder. On the end of the piston-rod the hammer D is secured, which is intended to act on articles placed on the anvil E. The motion of the piston in the cylinder is produced by the action of steam, (or water

or other fluid, if desired,) which is admitted and exhausted alternately through ports *a a'*. These ports extend from the valve-chamber F to the opposite ends of the cylinder, similar to the ports of an ordinary steam-cylinder, and the steam or other fluid is admitted through a pipe, *b*, and it exhausts through a pipe, *b'*. The valve-chamber F is bored out round to receive the piston-valve G, which moves freely in the same, being provided with a ground or packed joint, as may be desirable. Said piston-valve is provided with four heads, *c d e f*, two at the ends and two between, as clearly shown in Fig. 2 of the drawings, and the rod or shank *g* connecting these heads is hollow, and provided with small apertures *h h'* between the heads *c d* and *e f*, and with holes *i* passing through the heads *c* and *f*. Through these holes and the tubular shank *g* the two ends of the valve-chamber are made to communicate with each other, and the pressure on both ends of the valve is equalized. The heads *c d e f* of the valve are so disposed that by moving the valve in its chamber the supply and exhaust pipes *b b'* are alternately brought to communicate with the ports *a a'*—for instance, in the position which the valve *g* occupies in Fig. 2, the port *a* receives steam or water through the annular space *x* between the heads *d e*, and the port *a'* exhausts through the annular space between the heads *e f*. If the valve is moved down so as to bring the port *a'* between the heads *d e* and the port *a* between the heads *c d*, the cylinder takes water or steam through the port *a'*, and it exhausts through the port *a*, which in that case communicates with the exhaust-pipe *b'* through the holes *h* between the heads *c d*, the tubular shank *g*, and the holes *h'* between the heads *e f*.

The supply of steam or water to the valve-chamber and to the cylinder is regulated by a stop-cock, H, which is set by means of a lever, I. Said stop-cock is fitted into the supply-pipe so as to take steam or water from the end, and it is provided with a rectangular slot, *j*, through which the steam or water passes into the valve-chamber whenever the slot *j* or any portion thereof coincides with a slot, *k*, in the valve-chest cover. A screw and nut, *l*, serve to adjust the cock H in a longitudinal direction, so that the effective area of the slot *j* is enlarged or diminished, and the quantity of steam or

water or other fluid can be regulated at pleasure.

The lever I is set by hand, or it may be made self-adjusting by any suitable contrivance—such, for instance, as a pneumatic lever—whereby the supply of steam or water to the cylinder can be made to regulate itself according to the force of the blows. The motion of the valve is effected by the action of the steam or other fluid itself, which passes from the cylinder, through channels *m m'*, to the upper or lower part of the steam-chest. These channels are so situated that when the piston is in its highest position it will cover the channel *m*, the channel *m'* being open, until the piston has completed, or nearly completed, its downward stroke. At that point the water passes from the working end of the cylinder through the channel *m* in the upper part of the valve-chest, where it acts on the valve and carries the same down to its lowest position. The steam is thereby changed and the piston raised until it passes the channel *m'*, and allows the steam from the lower part of the cylinder to enter below the valve, causing the same to change its position and to admit steam into the upper part of the cylinder. The length of the stroke of the piston is regulated by giving to the channel *m'* two or more outlets in the cylinder at different levels, and by combining with said channel a piston or plunger, *o*, which is adjustable by a hand-lever, *p*. If this plunger is lowered so as to uncover all the outlets of the channel *m'*, the piston B rises until it has passed

the lowest outlet of the channel *m'*, when the steam, rushing through said channel, causes the valve G to change.

If the plunger *o* is raised, so that one or more of the outlets of the channel *m'* are covered, the stroke of the piston B will be increased accordingly; and if the plunger is pushed up to its highest position the piston B rises until it passes the channel *m** before the valve changes.

In large hammers it is desirable to let the steam act on the piston until the hammer strikes, so as to increase the force of the blows, and in that case the channel *m* is so arranged that it can be opened and closed by means of a valve or stop-cock which is under the control of the operator.

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

1. In hammers where steam or other fluid which actuates the hammer is used to move the valve without the use of levers, cams, tappets, or links, regulating the action of the valve so moved by the early or late opening of the port or hole admitting the pressure upon it by means of slides *o*, substantially as described.

2. Regulating the force of the blow of the hammer by means of the holes *m** in the cylinder and valve-chest and the channel which connects them, substantially as described.

DAVID JOY.

Witnesses:

JOSEPH WETHERELL,
JOHN HART.