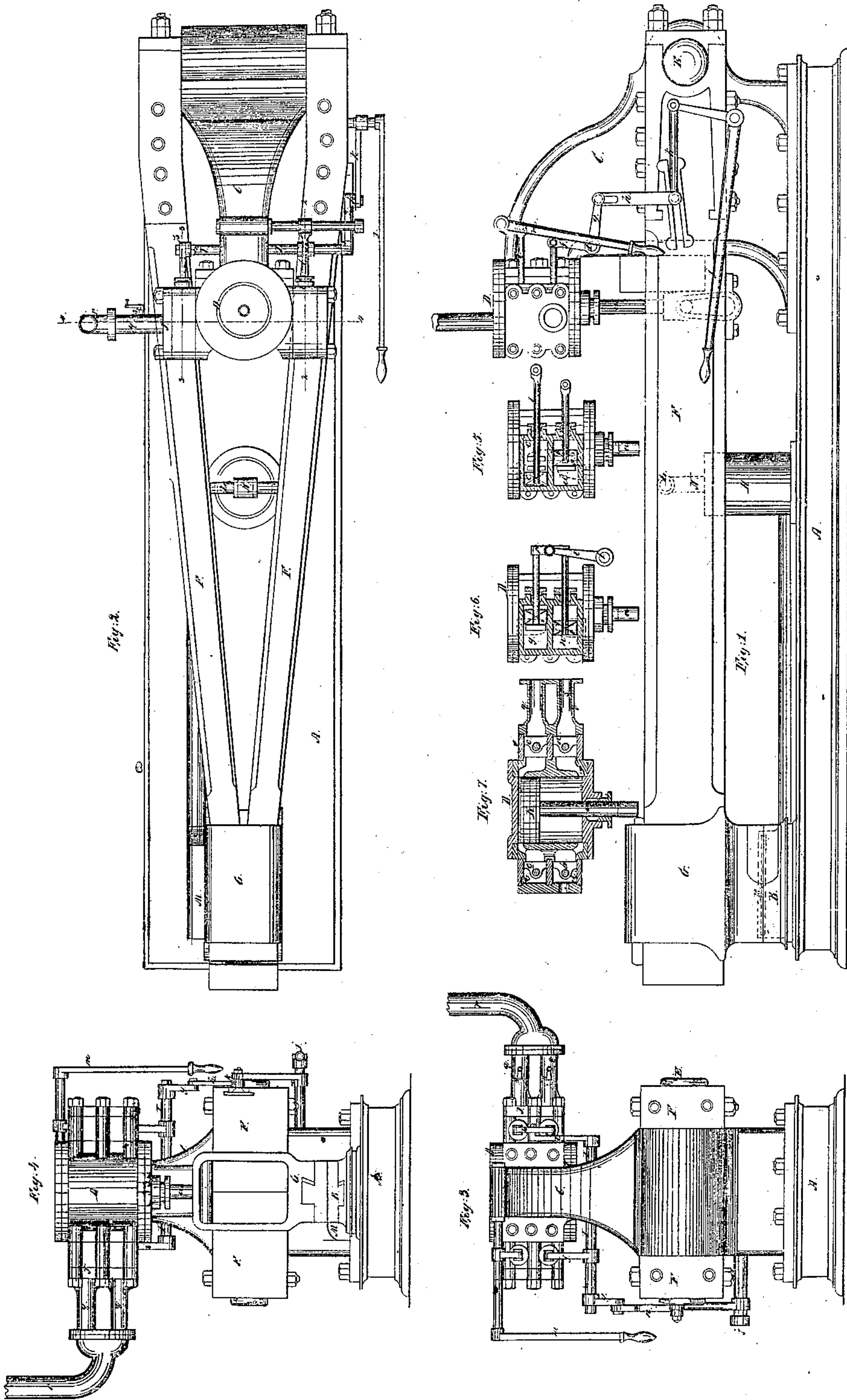


R. R. TAYLOR.
ARRANGEMENT OF VALVES, PORTS, AND PASSAGES FOR OPERATING
STEAM HAMMERS.

No. 10,276.

Patented Nov. 29, 1853.



UNITED STATES PATENT OFFICE.

ROBERT R. TAYLOR, OF READING, PENNSYLVANIA.

ARRANGEMENT OF VALVES, PORTS, AND PASSAGES FOR OPERATING STEAM-HAMMERS.

Specification of Letters Patent No. 10,276, dated November 29, 1853.

To all whom it may concern:

Be it known that I, ROBERT R. TAYLOR, of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Hammers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, in which—

Figure 1 represents a side elevation of a steam hammer embracing my improvements. Fig. 2 represents a top view of the same; Fig. 3 represents an elevation of the end at the right in Fig. 1; Fig. 4 a similar view at the left in Fig. 1; Fig. 5 represents a section at the line 2, 2, of Fig. 2, showing the steam chests with their valves; Fig. 6 represents a section at the line 3, 3, of Fig. 2 showing the exhaust valve chest; and Fig. 7 represents a similar view taken at the line 4, 4, of Fig. 2, showing the valves, valve chest, steam cylinder, and steam and exhaust pipes.

My improved steam hammer or machine for forging metals by steam power consists of a strong bed frame or beam (A) supporting the anvil (B) at one end, and a strong standard or bracket (C) at the other end, which carries the engine (D) and the journals (E) on which the helve (F) of the hammer (G) turns. Near the middle of the bed and beneath the helve a cylinder blower H is placed. It is worked by the hammer and is to produce a blast of air to clear the cinders off the anvil.

The bed frame (A) of the machine, the anvil (B), and the hammer head (G) are of the usual construction. The helve (F) is an open triangular frame, made of this form to give it greater lateral stiffness and stability and to diminish the tendency to excessive vibration which this part always has. The sides of this frame meet in the eye of the head of the hammer at the front end, and at the opposite end diverge far enough to pass on either side of the standard (C) to the journals (E) on which they are secured. The steam cylinder (D) with its valves is secured to the upper front extremity of the standard (C) and its piston rod (a), is connected to the helve (F) of the hammer by a link. The engine is of the double acting variety, so that the force of the steam may be employed to impel the hammer downward as well as to raise it up, but the steam valves are so arranged

that the steam can at will be made to act on the lower side only of the piston, as in the ordinary steam hammer, or the upper side of the piston with more or less force as required. To accomplish this object in the present instance, I have arranged a pair of sliding valves (b and c) in two steam chests (d and e, Fig. 5). The lower chest (d) is fitted with two steam ports, one of which communicates with the lower side of the cylinder (D) and the other with the upper steam chest (e). The valve (b) in the lower steam chest is made to cover each of the two ports in that chest alternately, to admit the steam alternately above and below the piston (K, Fig. 7). This valve derives its motion from the helve in this instance, through the intervention of a rock-shaft (I), one arm (f) of which is connected to the valve rod, and the other arm (g) to a link rod (h) having a movable fulcrum in a slot (i) on the side of the helve, in which it may be adjusted to a greater or less distance from the center of motion of the helve by means of a hand lever (j) connected to the fulcrum by a link (k).

The upper valve chest (e) has a receiving port which admits steam from the lower chest (d), and a discharge port through which the steam passes into the upper end of the cylinder. The valve (c) in this chest is connected by its stem (l) with a hand lever (m) by which it can be adjusted to cover the discharge port wholly or partially or leave it wide open to admit or exclude the steam from the upper end of the cylinder, so as to admit a little or a full head of steam as may be deemed necessary. The valve in this chest regulates the quantity of steam admitted to the upper end of the cylinder; the valve in the lower chest determines the frequency with which the steam is admitted and the duration of the intervals between the admissions. The two exhaust ports of the cylinder each communicate with a valve chest (n and o, Fig. 6). Both of these chests are closed by one cover which has an opening opposite the middle of each chest. The inside of this cover is fitted with a valve in each chest, and each valve is connected with a yoke (p) by rods of such inequality of length that while one valve is over the aperture which it is designed to cover and open the other will be off the opening, so that by communicating to the

yoke (*p*) a regular reciprocating motion it will cause the valves to cover and uncover the openings in the lid (*J*) alternately. The yoke derives its motion from an arm (*i*) of the rockshaft (*I*) to which it is attached. These openings thus alternately covered and uncovered are to permit the escape of the exhaust steam from the cylinder into a pipe for conveying it to the atmosphere or a condenser, as the engine is of the non-condensing or condensing variety. Each of these valve openings of the lid is fitted with a short pipe (*q*) to connect it to the main escape pipe (*r*, Fig. 3) and each of the short pipes is fitted with a throttle valve (*s*), by means of which the passage for the exhaust steam may be left wide open, or partially closed, as it is desired to permit the exhaust steam to escape freely or be partially retained to arrest the momentum of the piston and modify the force of the blows of the hammer.

The blowing cylinder *H* is open at the top and closed at its lower end with the exception of an opening into a pipe that leads to a nozzle (*M*) opposite the anvil. The piston of the blowing cylinder is connected by its stem (*N*) with a cross-bar (*L*) in the helve (*F*), so that at every ascent of the hammer air may be drawn into the cylinder, and every time the hammer descends the air so drawn into the cylinder may be forcibly expelled through the nozzle (*M*) to blow the scales, cinders, and dust, &c., off the anvil, and prevent them from roughening the surface of the metal being forged.

By admitting the steam both above and below the piston in a regulated quantity it is plain that the force of the hammer can be regulated at will and by throttling the exhaust steam the momentum of the hammer and helve can be overcome without giving lead to the steam, and thus the object is attained without the extra expenditure of

steam required to give a lead to it sufficient to arrest the motion of the hammer.

Among other advantages resulting from actuating the hammer by a double acting engine is the facility with which it can give blows so light that they are mere taps or so heavy as to exceed in force, very far, the blows that can be given by the gravity of the hammer, even when aided by a recoil spring, while at the same time the jarring and strain upon the machine always produced by the recoil apparatus is avoided.

The valves, engine, and other parts of the mechanism it is obvious may be constructed in various ways and still be capable of the same objects for which the present construction is adapted, but as such modifications and changes would not alter the principle of operation I deem it unnecessary to describe them.

I claim—

The arrangement as herein described of the steam ports and passages; the variable automatic valve (*b*) for directing the steam alternately above, and below the piston, and for admitting a variable quantity of steam beneath the piston; and the adjustable hand valve (*c*) to exclude altogether the steam from above the piston, or to admit a greater or less quantity of it, both valves being adjustable while the hammer is in operation, so that the steam can be made to act with a variable force, on either the up or down strokes of the piston, or of both, or prevented from acting on the down stroke, without interrupting the action of the hammer, as herein set forth.

In testimony whereof I have hereunto subscribed my name.

R. R. TAYLOR.

Witnesses:

P. H. WATSON,
A. E. H. JOHNSON.