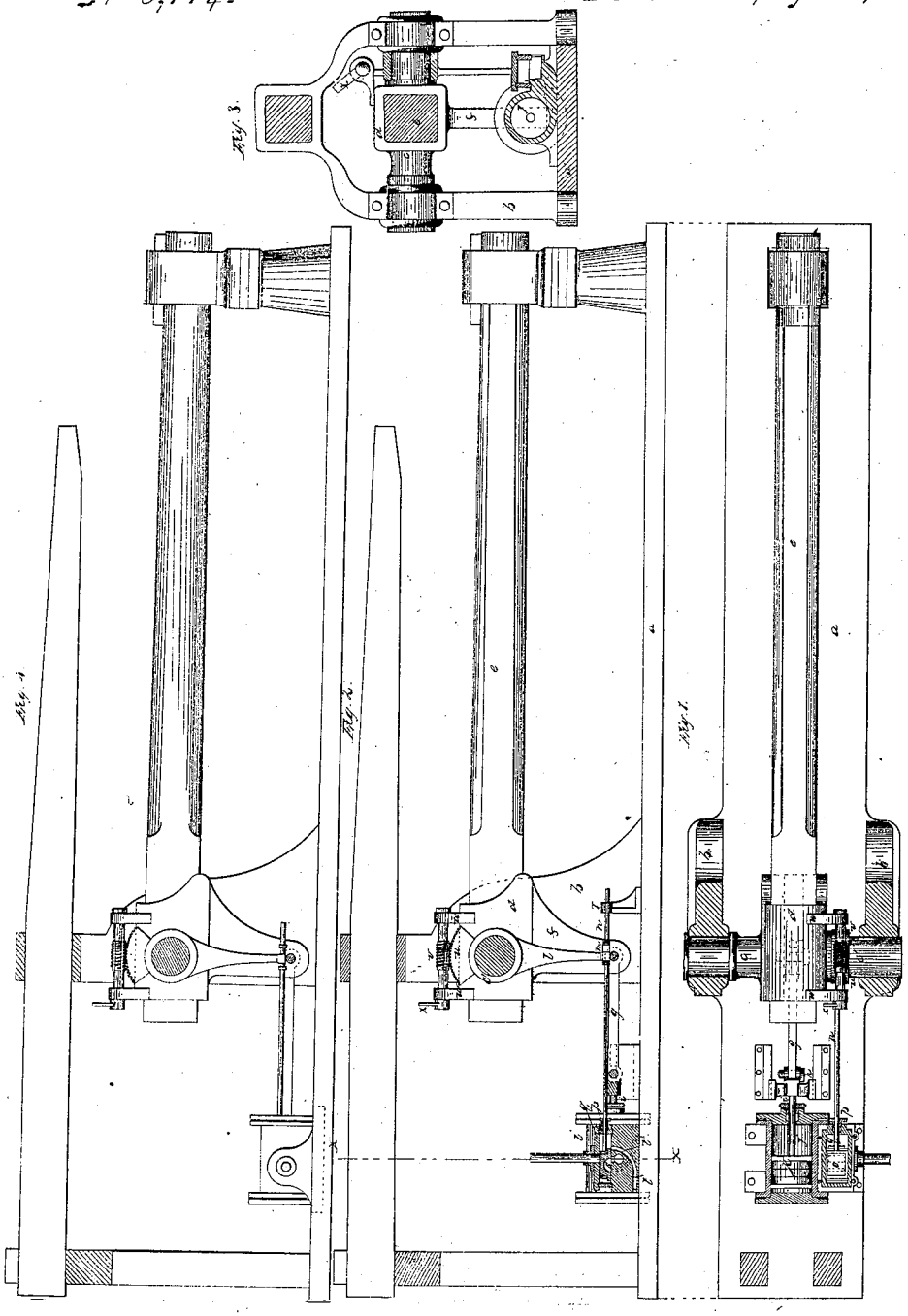
L. Kirk,

Steam Hammer.

No. 5,774. Patented Sep. 19, 1848.



UNITED STATES PATENT OFFICE.

LEWIS KIRK, OF READING, PENNSYLVANIA.

STEAM-HAMMER.

Specification of Letters Patent No. 5,774, dated September 19, 1848.

To all whom it may concern:

Be it known that I, LEWIS KIRK, of Reading, in the county of Berks and State of Pennsylvania, have invented new and useful Improvements in Steam-Hammers for Forges, &c., and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan with the steam cylinder and steam chest in section; Fig. 2, a side elevation with the steam chest and valve in section; and Fig. 3, a cross vertical section taken at the line (*x x*) of Fig. 2.

The modifications of my improvements are represented in other figures to which reference will be made hereafter.

The same letters indicate like parts in all the figures.

The invention which I now claim is for improvements on a steam hammer secured to me by Letters Patent bearing date the third day of April 1847.

The first part of my present invention consists in arranging a horizontal steam engine in combination with the helve or handle of a hammer by means of an arm and a jointed link or its equivalent to adopt the rectilinear movement of the piston rod to the curvilinear movement of the arm with which it is connected, by means of which arrangement and combination the engine can be located more advantageously than by any other arrangement with which I am acquainted. And the second part of my present invention consists in operating the valve which governs the steam and exhaust ports for the admission and discharge of the steam by means of an arm so placed on the stock or trunnions of the hammer helve, as to admit of adjustment during the operations of the hammer for the purpose of governing the admission and discharge of the steam to regulate the strength and range of the blows of the hammer.

In the accompanying drawings (*a*) represents a bed plate and (*b*, *b*) two standards provided with appropriate boxes in which work the journals of two trunnions (*c*, *c'*) of the stock (*d*) to which the hammer helve (*e*) is attached. This stock (*d*) has an arm (*f*) that extends down at right angles with the helve, and to the lower end thereof is jointed a link (*g*) the other end of which in turn is jointed to a sliding crosshead (*h*) on the end of the piston rod (*i*) of a horizontal steam cylinder (*j*) properly secured to the bed plate, so that as the steam piston (*k*) reciprocates within the cylinder it communicates a vibratory motion to the hammer, the jointed link (*g*) that forms the connection between the piston and the arms of the helve stock admitting of the necessary play to follow the curves of the vibration of the said arm. This arm should be so located relatively to the cylinder and piston that when the piston is at the back end of the cylinder the piston rod and jointed link shall be at right angles with the arm that the leverage of the said arm may then be at its greatest length to overcome the inertia of the hammer and other parts connected therewith at the time of starting.

On the trunnion (*c'*) of the helve stock there is another arm (*l*) adapted to turn thereon. The lower end of this arm lies within a slot (*m*) in the rod (*n*) of a slide valve (*o*) of the usual construction, and the slot in the valve rod should be about double the length of the thickness of that part of the arm that lies in it, so that the hammer may be elevated some distance before the arm will begin to move the valve rod. This play of the arm within the valve rod is with the view of giving the steam freely to the engine during the commencement of the motion of the hammer, and of course the length of this slot relatively to the size of the arm that lies within it must be determined by the judgment of the constructor in view of the range which he desires to give to the hammer. The valve rod should, as is usual in such apparatus, work through a stuffing box (*p*) in the end of the steam chest (*q*) and through a guide (*r*). The steam valve (*s*) commands the exhaust port and two steam ports (*t*, *t*) located and arranged in the usual manner that steam may be admitted alternately at both ends of the cylinder at one end for the purpose of elevating the hammer, and at the other to force it down, and thus aid its gravity in striking the blow. If however it be desired to depend on the gravity of the hammer alone for striking the blow the steam chest should have only the steam port that communicates with the rear end of the cylinder for the purpose of elevating the hammer and

the exhaust port to permit the hammer to descend by gravity.

That part of the arm (l) which passes around the trunnion (c') is provided at top with a segment rack (u) the cogs of which engage with the threads of an endless screw (v) that has its bearings in two brackets (w, w) on the helve stock; and the spindle of this screw is provided with a handle (x) by which the attendant can turn it when desired for the purpose of changing the position of the arm (l) relatively to the arm (f) with the view of varying the position of the valve relatively to the ports in the steam chest and thus cause it to give more or less steam as the condition of the work may require a lighter or heavier flow.

It will be obvious that the first part of my invention can be varied in some particulars without changing the essential principle of my invention, as for instance, instead of the jointed link that forms the connection between the piston rod and the arm (f) of the helve stock, the piston rod itself may be connected directly with the piston rod by substituting instead a vibrating engine as represented in the accompanying Fig. 4, the cylinder of which is to be hung on trunnions in the usual way, but in that case instead of admitting the steam through ports in the trunnions of the cylinder as is usual in vibrating engines I make use of the usual slide valve arranged as represented in the first example Figs. 1 and 2, or in any manner essentially the same. But in some instances a hammer may be made in accordance with the first part of my invention without the second when a hammer is required to strike always with the same force, by using a common slide or any other kind of valve.

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

Combining a horizontal steam engine with the helve of a hammer by means of an arm and jointed link, or its equivalent, substantially as herein described.

LEWIS KIRK.

Witnesses:
CHAS. G. REIFF,
WILLIAM BETZ.