M. Peck.

Power Hammer.

No. 13,179. Patented Jul. 3, 1855.

Fig. 1.

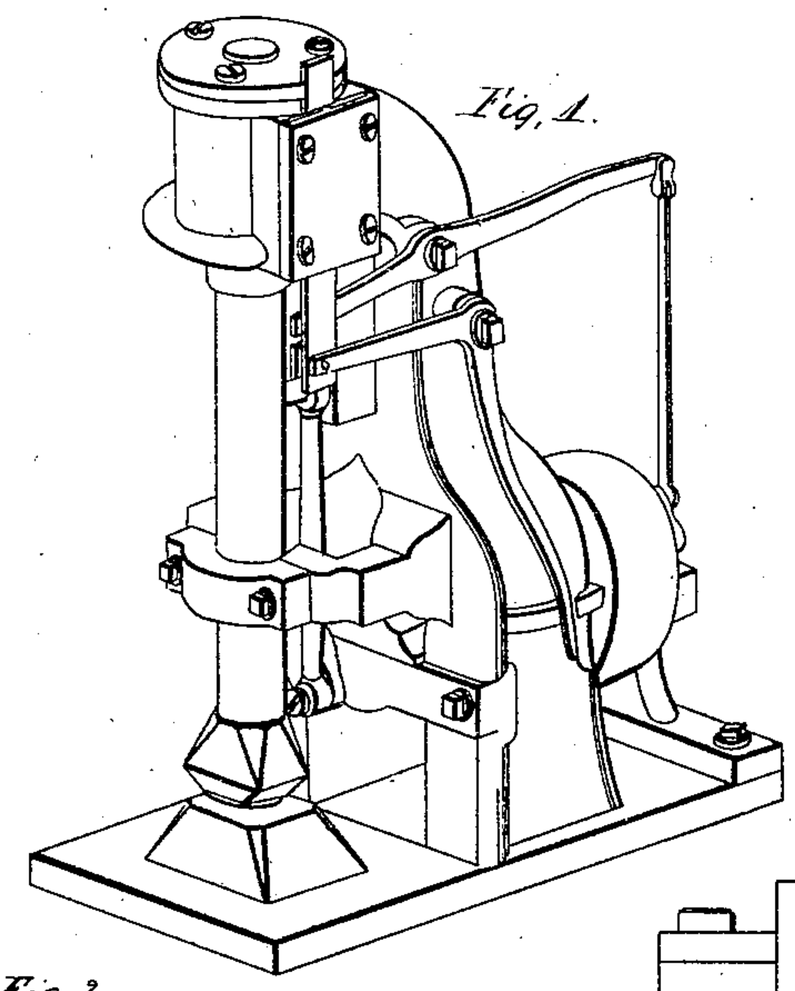

Fig. 3.

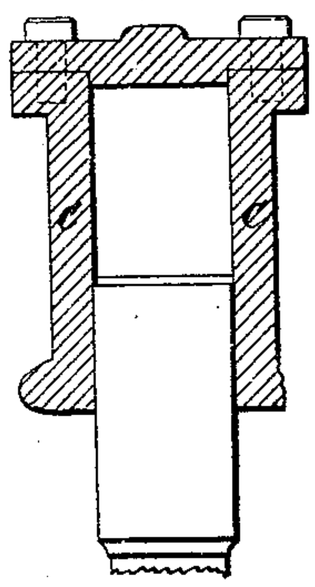

Fig. 4.

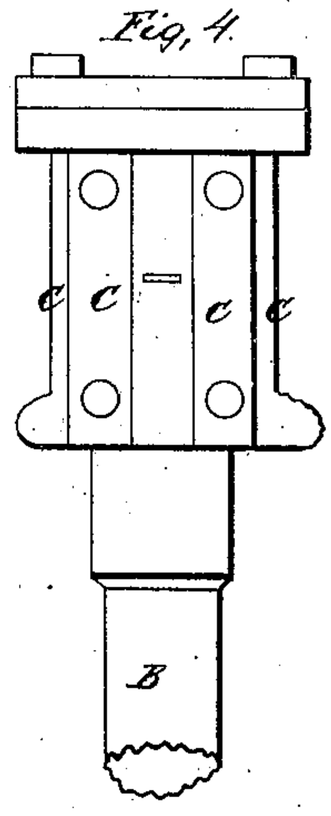

Fig. 6.

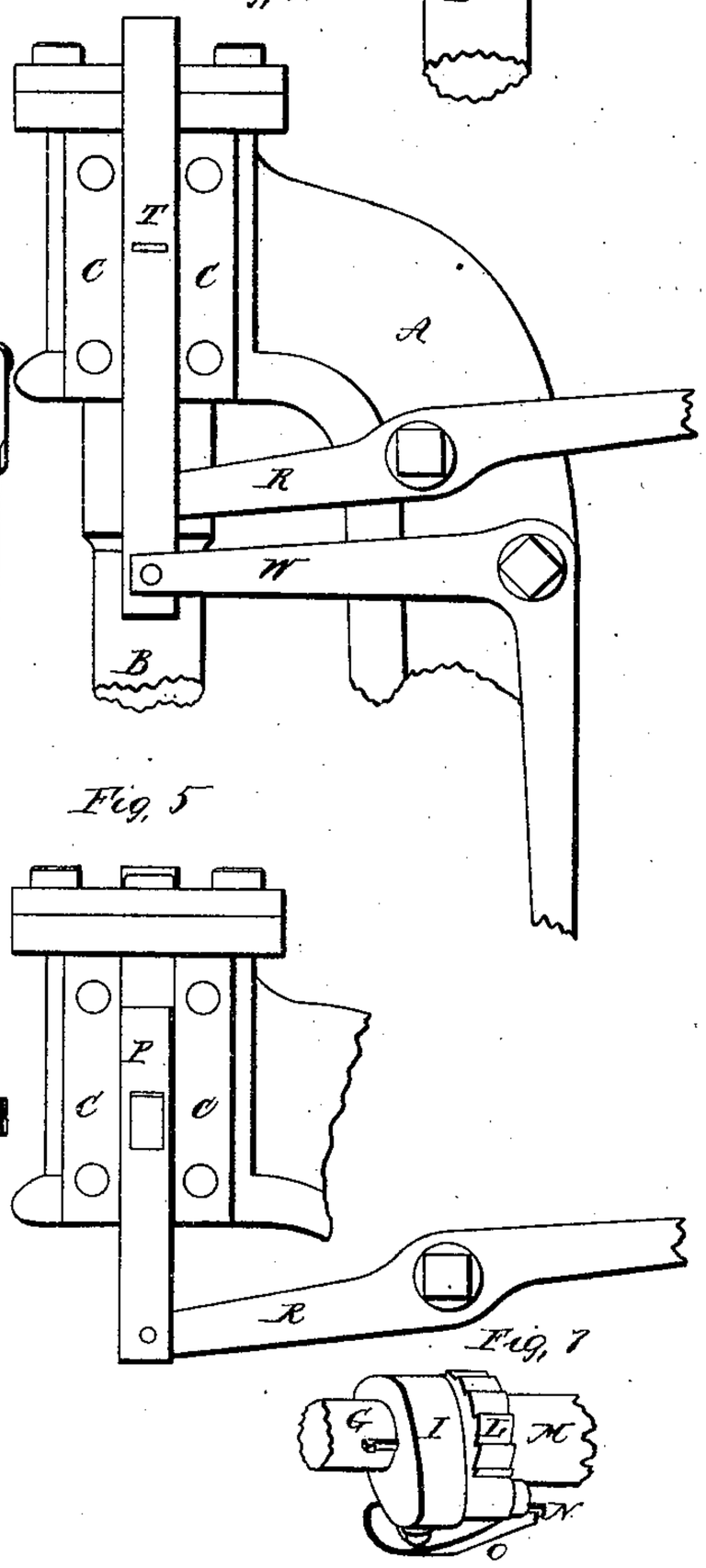

Fig. 2.

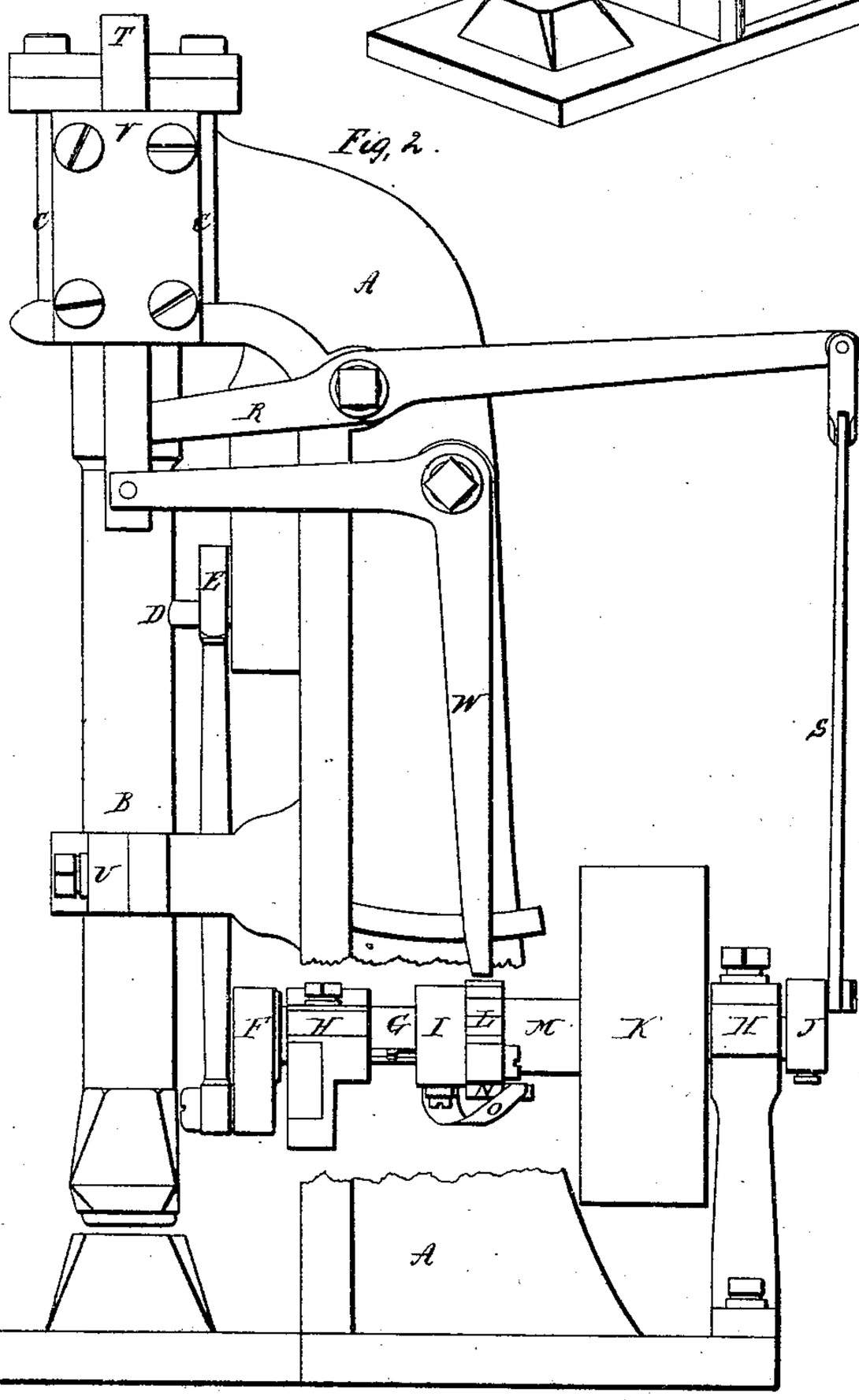

Fig. 5

Fig. 7

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UNITED STATES PATENT OFFICE.

MILO PECK, OF NEW HAVEN, CONNECTICUT.

TRIP-HAMMER.

Specification of Letters Patent No. 13,179, dated July 3, 1855.

To all whom it may concern:

Be it known that I, MILO PECK, of the town and county of New Haven, in the State of Connecticut, have invented a new and useful Improvement in Trip-Hammers; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1, is a perspective view of the trip hammer complete. Fig. 2, is an outline view of the same with a portion of the frame removed to show the machinery for raising and dropping the hammer. Fig. 3, is a sectional view of the cylinder or air chamber in which the head of the hammer shaft operates as a piston. Fig. 4, shows the cylinder with air port the slide valves being removed. Fig. 5, shows the position and form of the inner slide valve. Fig. 6 shows the position and form of the outer slide valve. Fig. 7 shows the ratchet sweep, dog, and ratchet wheel. In all these drawings like parts are designated by the same letters, Fig. 1 being just half the size of the other drawings.

The nature of my invention consists in so controlling the admission and exit of air above the piston, that the force of the blow given by the hammer may be regulated by the condensation and attenuation of air.

To enable others skilled in the art to build and use my improved trip hammer I will now particularly describe its construction and mode of operation.

The machinery by which the hammer is operated is placed in an iron frame A, sufficiently strong to prevent shaking or trembling. At the top of the frame in a line with the vertical rod or shaft B, of the hammer a cylinder C, is cast in which the upper end of the hammer shaft works like a piston back and forth. This is packed air tight; so that as the hammer is raised the air in the cylinder is compressed. This piston should be so regulated as not to approach within from $\frac{1}{4}$ to $\frac{1}{2}$ an inch of the cylinder head leaving always a cushion of air between the piston and cylinder head. The valves by which the air in the cylinder is regulated and the force of the hammer controlled will be described hereafter.

I will now describe the machinery for raising and dropping the hammer. The hammer shaft working at the piston end in the cylinder is held preferably perpendicular by the guide box W, as shown in Figs. 1, and 2. A lifting pin is securely fastened to the hammer shaft as shown at D, and at the other end plays up and down in a guide groove in the iron frame. This lifting pin passes through a slot in the connecting rod E, which at the other end is attached in the ordinary way to the wrist of the crank or sweep F. This sweep F is firmly secured to the sweep shaft G so that at each revolution of the sweep shaft it will be seen the hammer is lifted and drops. The sweep shaft runs in the journals H, H. On this are three sweeps or cranks, the lifting sweep F, the ratchet sweep I, and the valve sweep J all fastened to it in the positions shown.

The pulley K, and the ratchet wheel L run loose upon the sweep shaft and are connected together by the hub M. The ratchet sweep I, carries the ratchet dog N, with its spring O. The pulley K, the hub M and the ratchet wheel L running loose upon the sweep shaft while the ratchet sweep I carrying the dog N, is fastened to it, it will be seen that the dog cannot take hold of the teeth of the ratchet wheel at any time except when the hammer is down and is to be lifted or raised again. The operation of this portion of the machine at each revolution is then as follows. As the pulley K is turned by its band the dog N on the ratchet sweep I catches hold of the ratchet wheel L and carries the sweep shaft with the three sweeps half around and by means of the connecting rod E lifts the hammer to its greatest height; at that moment it passes the center, the dog runs loosely over the ratchet teeth and the hammer drops to be raised again in the same manner.

I will now describe the arrangement of the valves by which the force of the hammer is regulated. The position of the air port and valve box with the valves removed is shown in Fig. 4. In Fig. 5, the position of the inner slide valve P, is shown as it is when the hammer has dropped and lies upon the anvil. This inner slide valve is connected with the lever R, as shown which is moved up and down at each revolution of the sweep shaft, by the valve sweep J, and the connecting rod S. As the hammer drops carrying with it the sweep

shaft the inner valve gate rises so as to touch with its lower edge the air port of the cylinder.

The outer slide valve T with its gate is shown in Fig. 6. When the hammer is arranged so as to strike with its greatest force, the outer valve gate should approach the lower edge of the inner valve gate leaving but a slight opening not more than $\frac{1}{8}$ of an inch in a working hammer, so that the instant the hammer begins to rise, the inner valve connected with the sweep shaft as before shown begins to rise with it, the air is cut off, and as the hammer rises the air in the cylinder is compressed between the piston and the cylinder head till the hammer falls. These rollers are secured in their place by the plate V firmly screwed to the cylinder. This plate may have grooves cut in its under surface as shown in Fig. 1 to allow air to pass freely to the outer valve or a slot may be cut through the plate for the same purpose.

The position of the outer valve it will be seen regulates the force of the blow, and this position is fixed by the hand of the workman upon the lever W. As the outer valve is raised the hammer rises farther before the air is cut off by the inner valve, which rises with it and of course there is less air in the cylinder to be compressed. And this can be carried so far as to prevent any blow at all and keep the hammer vibrating over the anvil without touching it. For the outer valve gate may be raised so high that the upper edge of the inner valve gate will cut off the supply of air as soon as the hammer begins to fall, thus tending to produce a vacuum and the farther the hammer falls the more complete the vacuum so that the hammer is arrested before it reaches the anvil and can be made to strike an egg without breaking it.

In describing the construction and mode of operation of my invention I do not mean to limit myself to the particular form herein set forth. This may be varied in many ways. For instance the inner valve instead of being operated by the lever R in connection with the sweep J may be operated by a valve rod attached to the sweep F and in some cases this mode of operation may be preferred. Again the lifting apparatus may be placed above the air cylinder, or the air cylinder may be used in connection with a horizontal trip hammer so arranged that as the hub of the hammer shaft is tripped down it is pressed against a piston in an air tight cylinder and thus driven back with all the force of compressed air. These and other mechanical equivalents will readily occur to any one skilled in the art.

I am aware that hammers have been operated direct from a steam cylinder and that in Hughes' hammer patented May 16 1854 the force of the blow is increased by atmospheric pressure; the hammer as it is raised exhausting an air chamber and tending to produce a vacuum, but these operate on principles entirely different from my own.

I do not claim the lifting apparatus herein described by itself; this has already been secured to me by Letters Patent dated November 25, 1851.

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

So controlling the admission and exit of air above the piston that the force of the blow given by the hammer may be regulated by the condensation and attenuation of the air as herein set forth.

MILO PECK.

In presence of—
W. T. Bartlett,
Lucius G. Peck.