J. C. BUTTERFIELD.

Power-Hammers.

No. 144,058. Patented Oct. 28, 1873.

Fig. 1.

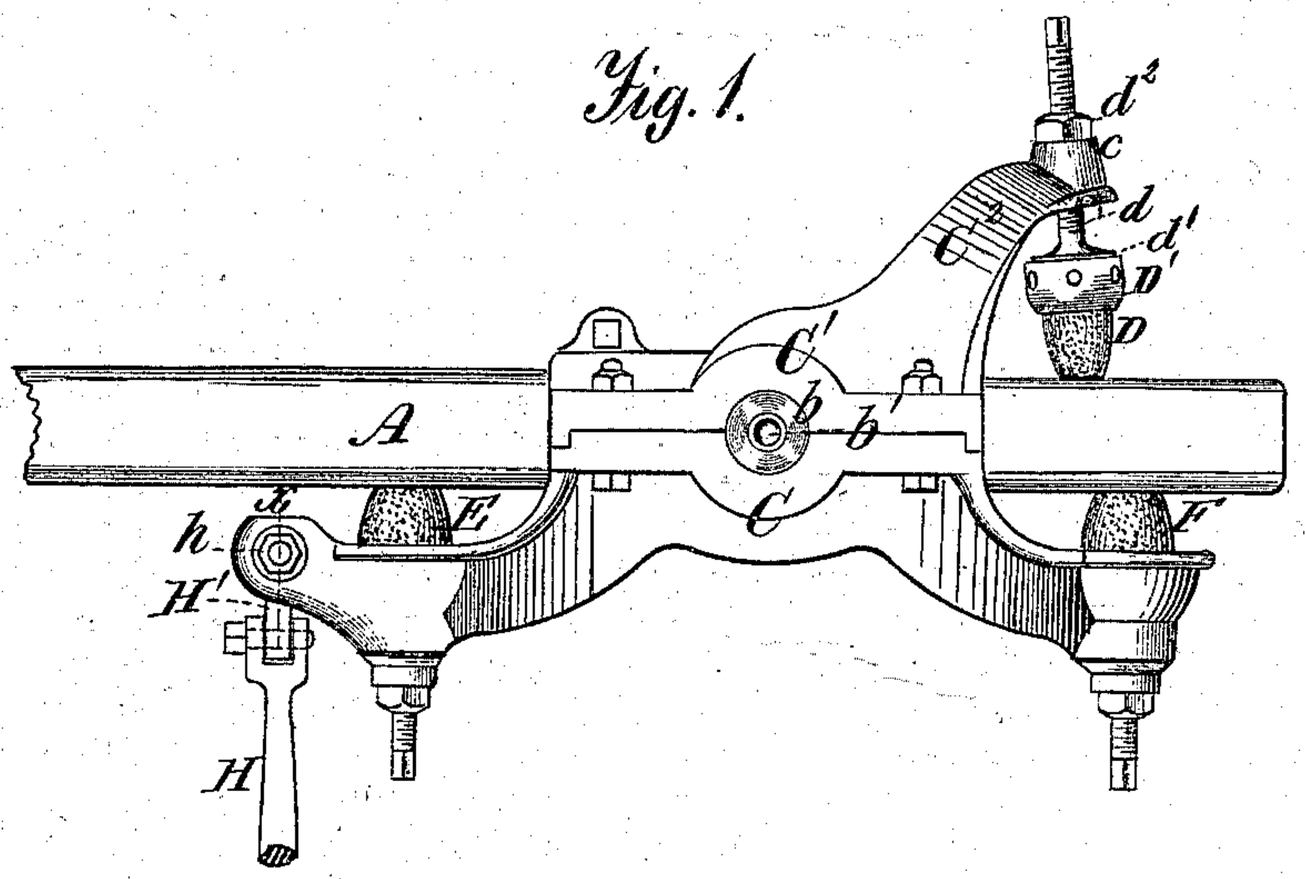


Fig. 2.

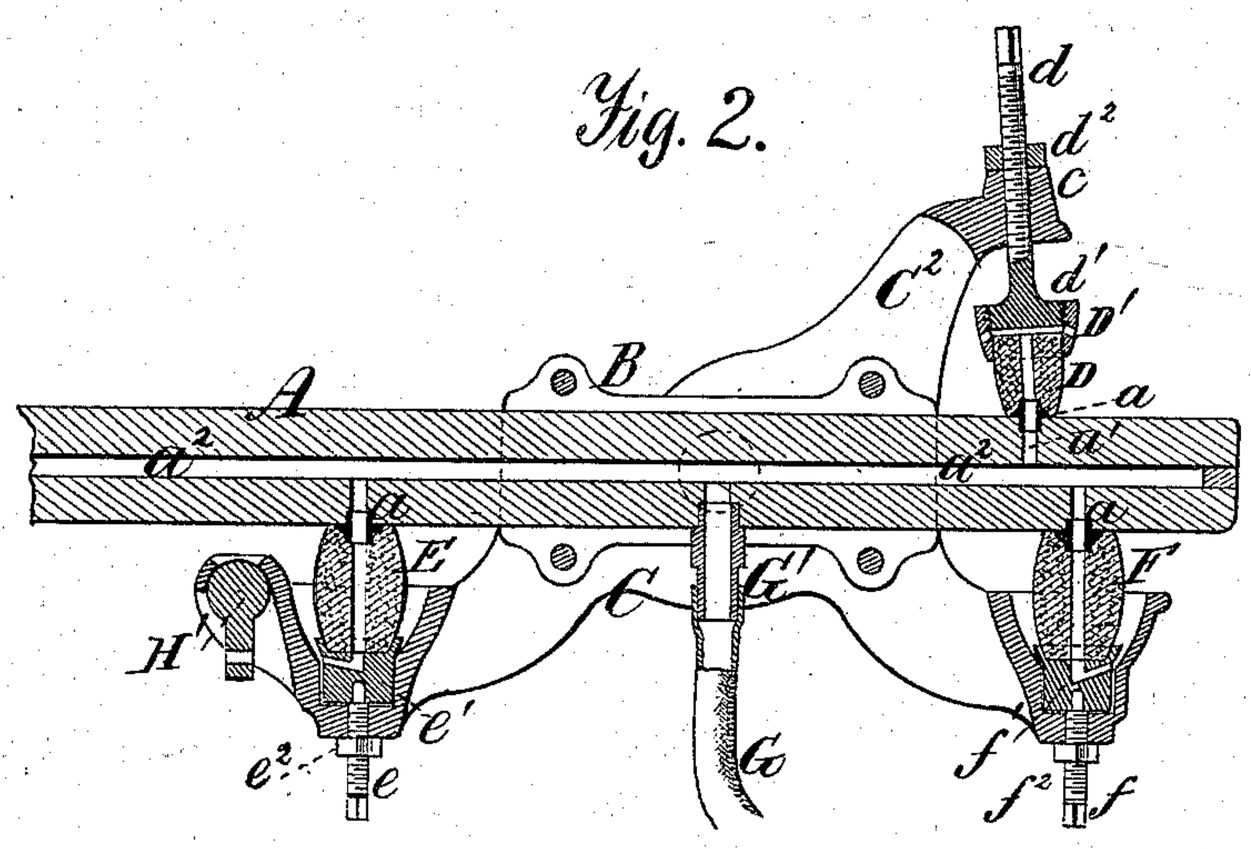
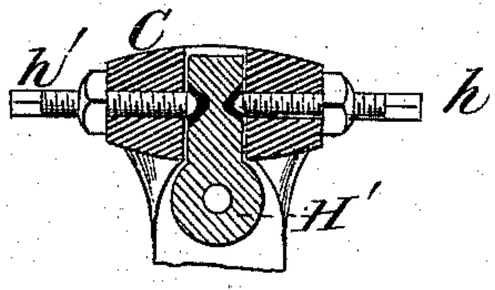


Fig. 3.



Witnesses.
A. Ruppert.
H. E. Linny

John C. Butterfield
Inventor.
per. Edw. J. Gile
his Att.

UNITED STATES PATENT OFFICE.

JOHN C. BUTTERFIELD, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN POWER-HAMMERS.

Specification forming part of Letters Patent No. **144,058**, dated October 28, 1873; application filed September 11, 1873.

To all whom it may concern:

Be it known that I, JOHN C. BUTTERFIELD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Power-Hammers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to power-hammers, such as described in the reissued patent No. 4,470, granted, jointly, to myself and James Hay, July 18, A. D. 1871, in which the helve can vibrate independently of the oscillating beam, which transmits the throw of the eccentric to the helve through interposed rubber springs or cushions.

In machines built in accordance with the specification of said patent, the entire weight of the hammer, in lifting it, is sustained by the forward spring, and in the larger sizes of machines it was found practically impossible to so effectively cushion the helve as to prevent the hammer from rebounding and giving a second blow on every down-stroke before the forward spring began lifting it steadily, and, in consequence of this objectionable feature, the action of the hammer could not be controlled so nicely as is necessary to satisfactorily perform the various kinds of work required of it.

To overcome these difficulties I have added a third spring, which, being suspended from an overhanging arm or bracket of the oscillating beam, bears forcibly against the upper side of the short arm of the helve, so as to act in unison with the lower forward spring in lifting the hammer, and to serve as a medium for balancing the hammer on the oscillating beam. My improvement further consists in introducing, through an aperture bored lengthwise in the helve, a constant blast of cool air to one or more of the rubber springs which cushion the helve, to prevent them from becoming heated when the hammer operates with great speed. It further consists in providing for the separate adjustment of the several springs, so that their tension may be regulated to the exact degree required of each.

Figure 1 is a side elevation of those parts of a power-hammer which embody my invention. Fig. 2 is a longitudinal vertical section thereof. Fig. 3 is a transverse section on line *x x*, Fig. 1.

The same letters of reference are used in all the figures in the designation of identical parts.

The helve A of the hammer is, by means of the journals *b* of the cross-head B encircling it, pivoted to the vibrating beam C, which is to this end provided with suitable bearings upon opposite sides of the helve. The caps C^1 of these bearings or boxes are united by an arched bar, C^2, which inclines rearward from the fulcrum of the helve, and forms an overhanging arm or bracket, from the bossed end *c* of which a rubber spring, D, is suspended by means of the screw-threaded rod *d*, the head d^1 of which is screwed into the cap D′ encircling the upper end of the said rubber spring. The rod *d* screws through the boss *c*, and is locked by a jam-nut, d^2, after the rubber spring, which bears with its lower end against the upper side of the helve, has been compressed to the required degree. Rubber springs E and F are interposed, in the usual manner, between the respective arms of the oscillating beam and the helve of the hammer. Heretofore the tension of these springs has been regulated by moving the oscillating beam toward or from the helve through set-screws. This means of adjustment is defective, partly by reason of the ever-varying quality of the springs, and partly because it is often desirable to adjust the springs separately to properly regulate the stroke of the hammer. I employ for each spring a separate means of adjustment, composed of set-screws *e* and *f*, respectively, which screw through taps in the beam, and bear against the pistons e^1 and f^1, which are fitted in sockets formed in the beam, and carry the springs upon their upper ends within an encircling rim, as clearly shown in Fig. 2. The set-screws are locked by jam-nuts e^2 and f^2. The spring D is usually a solid block of rubber; but, in the annexed drawing, I have illustrated all the springs as tubular, and holes are bored laterally through their supporting caps and pistons, communicating with the apertures through them. The outer ends of the springs are provided with short nipples *a*, which enter lateral apertures a^1 in the holes, and thus communicate with the lon-

gitudinal hole a^2 therein. A blast of air is introduced into this longitudinal aperture of the helve, and thence to the rubber springs through a flexible hose, G, attached to the nozzle G′, which projects from the helve directly under its fulcrum, so as to have but a slight vibrating motion. As the air can escape through the caps and pistons of the springs, a constant circulation is maintained, and the heating of the springs prevented very effectually.

The helve will be bored from end to end; and this feature, aside from the facility it offers for the introduction of a constant blast of cool air to the rubber springs, is found to be of very great importance, from the fact that it prevents the twisting and splitting of the helve as it shrinks, to which it is subject when made of a solid stick of timber, as ordinarily.

The cross-head B is made in two parts, as heretofore, and applied laterally to the helve. Its interior surface may be provided with V-shaped projections to sink into transverse grooves in the helve, for the purpose of preventing end movement of the one on the other. Female centers b' are driven into the ends of the journals b, by which to suspend the connected helve and oscillating beam from male steel centers projected through the standards of the frame. The eccentric rod H is connected by a universal joint to the extreme forward end of the oscillating beam C, the coupling H′ being provided with female steel centers, by which to suspend it from the male steel centers h and h' of the beam. The touching surfaces of the centers are hemispherical, so that the coupling H′ may have a slight wabbling motion, and thus readily accommodate itself to slight irregularities in the alignment of the moving parts.

In the complete machine a fourth rubber spring is suspended from the standards over the helve, forward of its fulcrum, to assist the spring F in checking the upstroke of the hammer.

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

1. The combination of the independently-vibrating helve A, oscillating beam C C^2, and diagonally-arranged springs D and E, substantially as and for the purpose specified.

2. The combination of the independently-vibrating helve A, oscillating beam C C^2, and springs D, E, and F, either separately adjustable or not, substantially as and for the purpose specified.

3. The tubular springs, in combination with the helve A, also made tubular for the introduction of a cold-air blast, which passes by lateral ports through the springs, substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of September, 1873.

JOHN C. BUTTERFIELD.

Witnesses:
B. EDW. J. EILS,
H. E. QUINN.