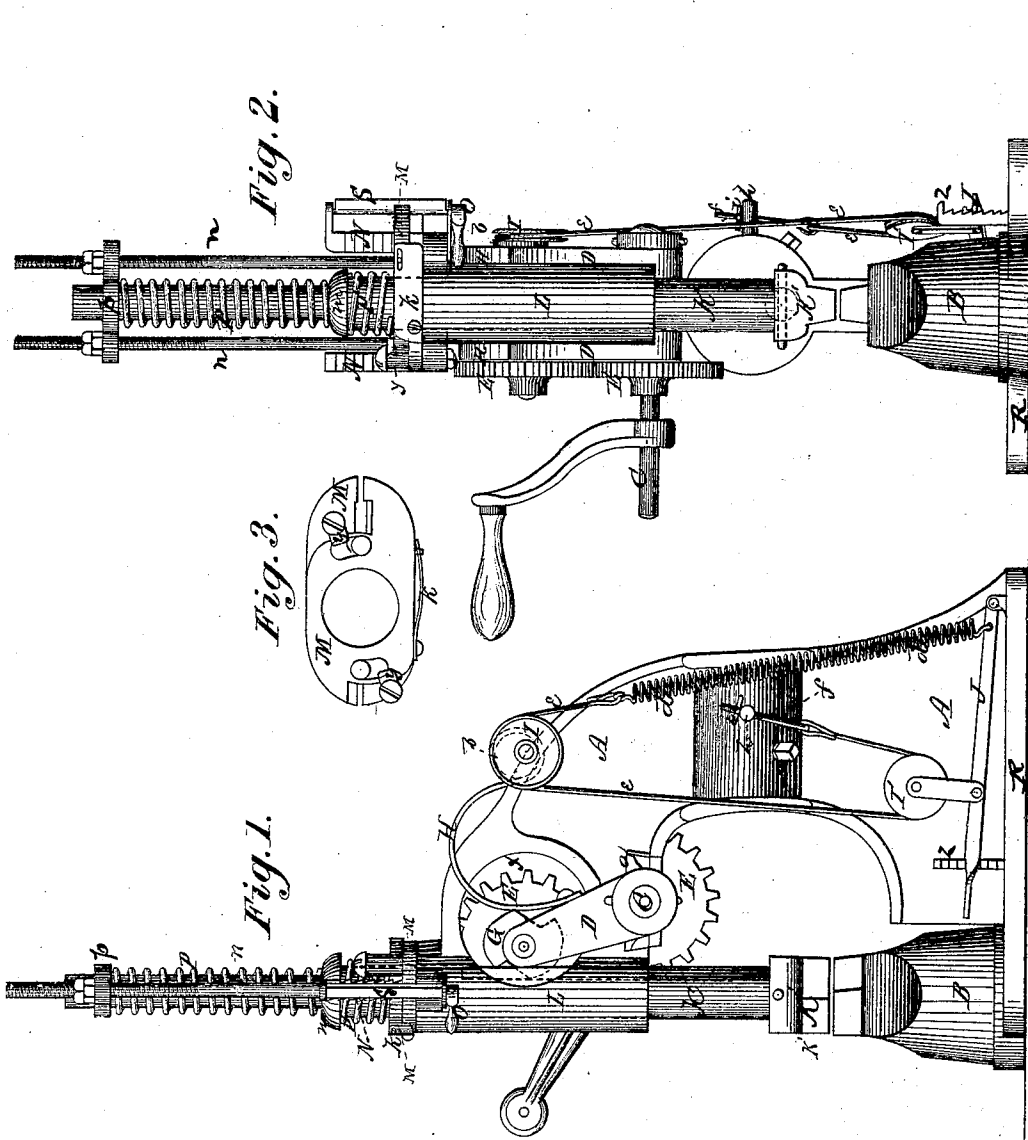


JOSEPH E. CRISP.

Improvement in Drop-Hammer.

No. 127,853.

Patented June 11, 1872.



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UNITED STATES PATENT OFFICE.

JOSEPH E. CRISP, OF CHARLESTOWN, MASSACHUSETTS.

IMPROVEMENT IN DROP-HAMMERS.

Specification forming part of Letters Patent No. 127,853, dated June 11, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that I, J. E. CRISP, of Charlestown, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Variable-Stroke Power-Hammers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon which form a part of this specification.

The nature of my invention consists in the construction and arrangement of a "variable-stroke power-hammer," in which with the same hammer-head and the same rate of speed the blow may be regulated from a very light to a very heavy one, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a side elevation, and Fig. 2 a front view of my improved machine. Fig. 3 is a plan view of the ratchet-plates, whereby the hammer-shaft is held at any desired height to bring the hammer the required distance from the anvil-block.

A represents a standard of any suitable size and proportion, placed upon and firmly attached to or forming part of a bed-plate, R, upon which the anvil block B may be attached. The upper end of the standard A curves forward, and in its front end is a perpendicular guide, L, through which the hammer-shaft passes. This guide may be made separate from and attached to the standard. The rear side of this guide is open in the center, and in the standard immediately back of the guide is an opening, *x*, as shown in Fig. 1, within which the operating cam moves. Below this opening and on the under side of this part of the standard runs the main shaft C, in a suitable box, *a*, to which shaft the power is applied. The ends of the box *a* project beyond the sides of the standard, and are made round to receive swinging arms D D, one upon each end, which arms carry in their upper ends the journals of a double eccentric cam, G, placed within the opening *x* in the standard, and

driven by gear-wheels E E, one upon the main shaft C, and the other upon one of the journals of the cam projecting beyond the swinging arm. The face of the cam should correspond with the bottom of the groove in bar K, whether it be square, oval, or V-shaped. These arms D D are pressed forward to bring the cam in contact with the hammer-shaft, by means of curved springs H H, which are attached at their front ends, one to each arm, while their rear ends are wrapped around two eccentrics, *b b*, placed upon a shaft which passes through the standard, and is at one end provided with a grooved wheel or pulley, I. Around this pulley is passed a chain, *e*, one end of which is attached to a spring, *d*, hooked into a foot-lever, J, near its inner end, said foot-lever being pivoted to an ear or its equivalent on the bed-plate R. The chain *e* after passing entirely around the pulley I passes around another pulley, I', attached to the foot-lever nearer its outer end, and this end of the chain is hooked onto a screw, *f*, which passes through an arm, *h*, attached to the standard, and said rod has upon its upper end a thumb-nut, *i*. By depressing the foot-lever J the chain *e* revolves the pulley I slightly, thereby turning the eccentrics *b b* so that they will act upon the springs H H in such a manner as to force the upper ends of the arms D D forward throwing the cam G against the hammer-shaft or sliding bar K with a pressure corresponding to the tension of the springs. This hammer-shaft or upright sliding bar has the hammer-head K' attached to its lower end, and slides up and down in the guide L, above described. At the upper end of this guide L, on each side, is a projecting ear, to which is attached a vertical double ratchet-bar, N. These bars I call double ratchet-bars because they have teeth on both their front and rear sides, as shown in Fig. 1. The teeth on one side of each bar point upward and the other downward, and the teeth of the two bars are reversed. Upon these two ratchet-bars work two ratchet-plates, M M, constructed as shown in Fig. 3, and held one upon the other by L-shaped holders *y y*. Their ends are pressed against the bars N N by means of the spring *k*, the ends of one plate engaging with the upward teeth, and the ends of the other plate with the downward teeth. On one side of the

machine between suitable projecting ears, at the upper and lower ends of the ratchet-bar N, is an upright bar, S, pivoted eccentrically, and placed between the ends of the two ratchet-plates. At the lower end of this bar is a handle, O, by means of which said bar may be turned so as to disengage either one of the ratchet-plates, and thus permit the plates to be either raised or lowered on the ratchet-bars to adjust the hammer in its distances from the anvil.

Instead of ratchet-plates and ratchet-bars I may employ friction-plates and bars, if desired.

From one of the ratchet-plates M two rods, *n n*, extend upward, one on each side of the hammer-shaft or bar K, and said rods are at or near their upper ends connected by an adjustable plate, *p*, through which said shaft or bar passes. At a suitable point on the hammer shaft is a collar, *m*, between which and the plate *p* is a spring, P, surrounding the hammer-shaft or bar, to throw the same down after it has been raised by the cam G. Between the collar *m* and the ratchet-plates M is another spring, P', also surrounding the hammer-shaft or bar, to raise the hammer after it has been thrown down by the spring P. The tension of the spring P is gradually increased as the bar K rises, and the cam as it rotates to its greatest diameter, gradually increases the tension of the springs H; therefore the friction between the cam and hammer-bar is gradually increased in proportion to the increased tension of the spring P, thus obviating all danger of the cam from slipping. In place of these two springs P and P' I may, perhaps, preferably use one elliptic spring. In the rear side of the shaft or bar K is placed a vertical groove, corresponding in shape with the edge of the cam G. The center line of the arms D D should sit at an angle of between forty-five and sixty degrees to insure a perfect union between the cam G and the groove in the bar K.

Power is applied to the main shaft C, and the cam G, through the medium of the gear-wheels E, turns to raise the shaft or bar K. Then the foot-lever J is depressed, catching on a ratchet-bar, *z*, which causes the cam to be forced up and placed in contact with the bottom of the groove in the bar K, so that the friction between said parts will raise the bar as the cam rotates. The tension of the spring P is increased by the bar K being forced up by the cam, and the tension of the springs H is increased as the cam turns to its greatest diameter; this gradually makes the contact stronger between the cam and bar, thus preventing all slip between them. When the cam G clears the bar or shaft K the spring P forces the hammer down upon the anvil-

block or the work placed thereon. If a light blow is desired the foot-lever J is depressed but a small distance, and only the points of the cam will engage with the hammer-bar. If a very hard blow is required, then the lever J is carried down further, and the necessary force is obtained. The blow may be still further regulated by the thumb-nut *i*, whereby the chain *e* is lengthened and shortened at will. Thus it will be seen that the blow may be varied from a very light to a very heavy one, independent of the weight of the hammer or the speed of the machine; or, in other words, with the same weight of hammer and the same speed the blow may be varied at will. The hammer-bar or shaft K is raised or lowered to suit the work on the anvil by the turning of the bar S to the right or left, which disengages one of the ratchet-plates M, allowing both plates, with the rods *n n* and top plate *p*, to be moved up or down, as the case may be. When the hammer is to be raised to work on a thick piece of metal, the plates M are raised on the bars N; this lessens the tension of the spring P and permits the spring P' to overcome it, and the latter, through the flange *m* carries the hammer-bar upward. To lower the hammer-bar, the plates M are lowered on the bars N, which lessens the tension of the spring P', and permits the spring P to overcome the same, and the latter, through the flange *m*, forces the hammer down.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the swinging arms D D, cam G, vertically-grooved hammer-shaft or bar K, springs H H, and eccentrics *b b*, all substantially as and for the purposes herein set forth.

2. The combination of the foot-lever J, chain *e*, pulleys I I', spring *d*, and eccentrics *b b*, all substantially as and for the purposes herein set forth.

3. In combination with the subject-matter of foregoing clause I claim the screw-rod *f*, arm *h*, and thumb-nut *i*, substantially as and for the purposes herein set forth.

4. The combination, with hammer-shaft K and its springs P P', or their equivalents, of the ratchet-plates M M, and ratchet-bars N N, or their equivalents, the bar S, with handle O, rods *n n*, and adjustable plate *p*, all constructed and arranged substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOSEPH E. CRISP.

Witnesses:

HENRY W. BRAGG,
GEO. H. LONG.