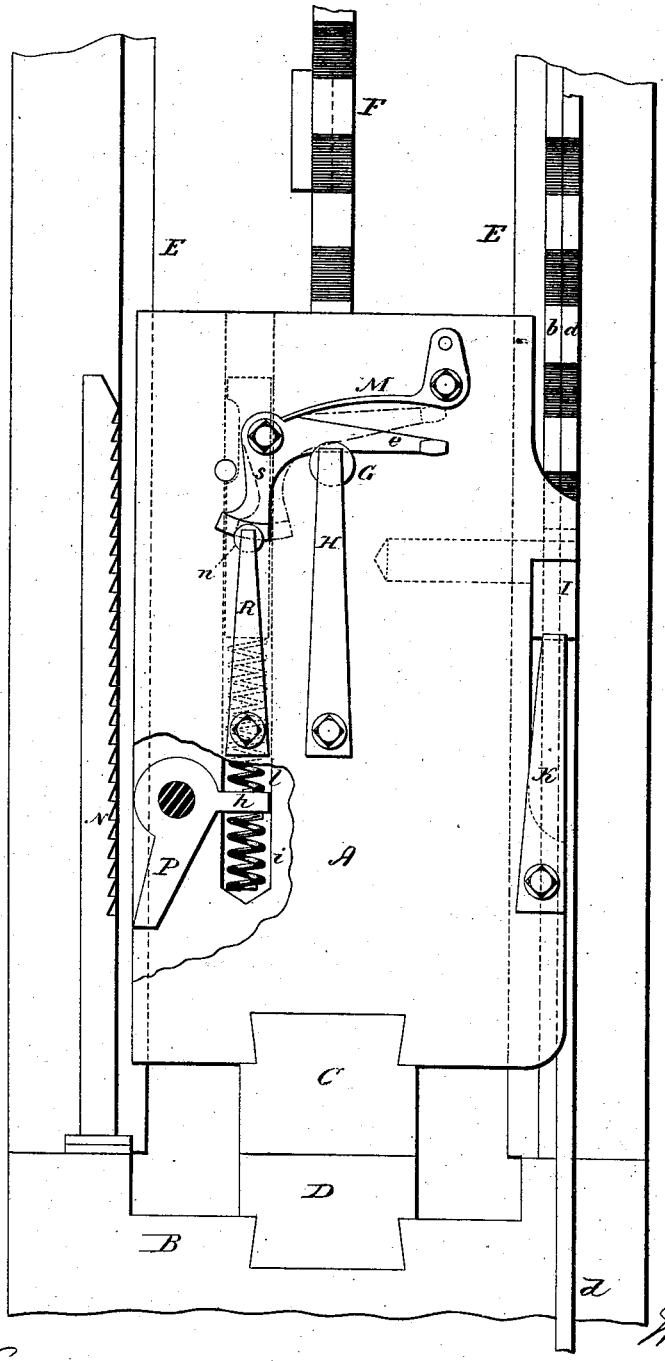
(No Model.) 2 Sheets—Sheet 1.

W. MASON.

DROP HAMMER.

No. 260,215. Patented June 27, 1882.

Fig. 1



Witnesses.
J. W. Shumway
Jos. C. Earle

Wm. Mason,
Inventor.
By atty.
Wm. C. Earle

(No Model.) 2 Sheets—Sheet 2.

W. MASON.

DROP HAMMER.

No. 260,215. Patented June 27, 1882.

fig. 2

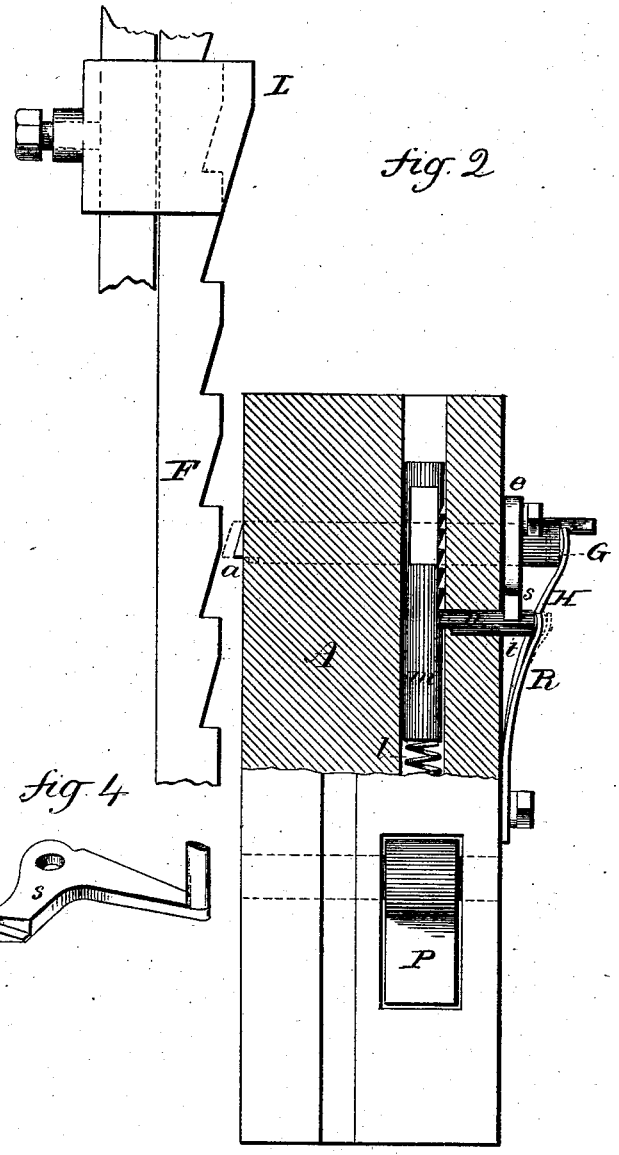


fig. 3

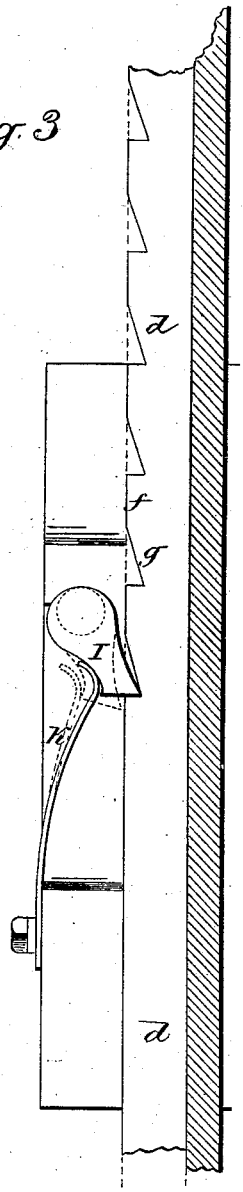


fig. 4

Witnesses.
J. H. Shumway
Jos. C. Earle

Wm. Mason,
Inventor
By atty.
Wm. G. Earle

UNITED STATES PATENT OFFICE.

WILLIAM MASON, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE COLTS PATENT FIRE-ARMS MANUFACTURING COMPANY, OF SAME PLACE.

DROP-HAMMER.

SPECIFICATION forming part of Letters Patent No. 260,215, dated June 27, 1882.

Application filed March 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MASON, of Hartford, in the county of Hartford and State of Connecticut, have invented a new Improvement in Drop-Hammers; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front view, omitting the device for imparting reciprocating movement to the lifting-rack F, as this is too well known to require illustration; Fig. 2, a vertical section; Fig. 3, a side view; Fig. 4, a perspective view of the latch-lever detached.

This invention relates to an improvement in that class of hammers for forging, swaging, and striking purposes such as are lifted from the anvil by the application of power thereto, then dropped, imparting a force corresponding to the height of their descent, commonly called "drop-hammers" or "drop-presses." In all this class of hammers there is unavoidably a rebound of the hammer after striking its blow, which in fine forging is objectionable.

The object of this invention is to overcome this difficulty, as well as to simplify the adjustment of the stroke of the hammer; and it consists, first, in a balance-pawl arranged in the hammer, combined with a free weight, also in the hammer, whereby the arrest of the hammer in its downward stroke will impart to the said weight a downward movement immediately following the blow of the hammer, said weight operating upon the pawl to force it into engagement with the teeth of a stationary rack, whereby the ascent of the hammer on the rebound will be caught, so as to hold the hammer suspended, and also in details of construction more fully hereinafter described, and particularly recited in the claims.

In illustrating my invention I show it as applied to that class of hammers which are lifted by a ratchet-like action—that is, step by step—to any required height.

A represents the hammer; B, the anvil, to which are respectively attached the two parts C D of the die. The hammer is arranged between guides E E, so as to be moved freely up and down in the usual manner.

In rear of the hammer is the lifting-bar F, which consists of a toothed rack, and to which a vertically-reciprocating movement is imparted, by a crank or otherwise, equal to the pitch of the teeth, or very little more. Transversely through the hammer is a bolt, G, its rear end formed into a bevel-shaped nose, *a*. In the path of the vertically-moving rack F, on the front side of the hammer or at any other convenient point, a spring, H, is arranged to bear upon the bolt, the tendency of which is to force the bolt backward and into engagement with the rack, as indicated in broken lines, Fig. 2. In this position the rack F, as it is raised, will engage the nose of the bolt G, so that as the rack ascends it will take with it the hammer.

On the upright, at one side of the hammer, is a toothed rack, *b d*, the teeth of which correspond to the teeth of the rack F. In the side of the hammer is a pawl, I, with a spring, K, bearing upon it to force it into engagement with the teeth of the rack *b d*, so that as the hammer is lifted by the ascending rack F one point the pawl I will engage the rack at the side and hold that lift. The rack F then descending will take a new hold upon the bolt of the hammer, lift it another step, to be in like manner engaged by the pawl I, and so on until the required elevation is attained. It will be understood that this manner of lifting the hammer is well known, and no part of this invention.

At the point of elevation where it is desired to arrest the ascent of the hammer a trip, L, is arranged upon the frame, made adjustable thereon by screws or otherwise, and which is set relatively to the teeth of the rack F, as seen in Fig. 2, and so as to form a continuation of the inclined surface of the teeth of the rack. Hence as the rack F moves upward, and after the bolt has arrived at that point, the incline of the trip L will strike the end of the bolt and force it inward to a position indicated in Fig. 2, which will free the hammer from the teeth of the rack which lifted it. When so forced inward it is caught by a latch, *e*, hung upon the front of the hammer, which falls into

a notch in the bolt, as seen in Figs. 1 and 2, the latch forced so to fall or aided in falling by means of a spring, M, bearing upon it, so that after the bolt has been thus forced inward and caught it is free to descend so far as the lifting mechanism is concerned; but the pawl I in engagement with the teeth of the rack *b d* holds it at the position where the pawl has caught it.

To throw the pawl I out of engagement with its rack, the rack *b d* is divided longitudinally, as seen in Fig. 1, and the space between the teeth of these two parts of the rack is made, the upper half straight—that is, parallel with the rack, as seen at *f*, Fig. 3—and the lower half down to the shoulder of the teeth, as at *g*, is inclined. One half of the rack—say *b*—is made permanently stationary on the upright. The other half, *d*, is arranged to be moved vertically, preferably by extending down, as seen in Fig. 1, into some convenient position for the operator to move it either by foot or hand. Drawing down this part *d* of the rack the distance of one-half the teeth will bring the upper parallel part, *f*, into a position previously occupied by the inclined part, as indicated in broken lines, Fig. 3, so that the two racks together present a continuously-straight face. This drawing down of the part *d* of the rack forces the end of the pawl I out of its engagement with the rack and prevents its engagement at any point below. Hence so soon as the movable part *d* of the rack has been thus drawn down, and the hammer freed from connection with the rack F, as before described, it is free to descend. Thus the hammer will be lifted step by step until the required elevation is attained, and the bolt by which it was lifted is thrown out of possible engagement with the rack which lifted it, and will there be held by the pawl I until such time as the operator desires the descent of the hammer. Then he disengages the pawl I, as before described, and the hammer falls. In its descent the hammer strikes upon the anvil, from which it unavoidably rebounds. In order to catch this rebound and prevent the return of the hammer upon the work after the rebound, I arrange upon one of the sides a stationary toothed rack, N, and in a corresponding position in the hammer I hang a pawl, P, as seen in Fig. 1, a portion of the hammer broken away to show the pawl. This pawl is fitted with an arm, *h*, and in a vertical recess below the arm is a spring, *i*, and above the arm a corresponding spring, *l*, and in the same recess above the spring *l* is a weight, *m*, free for movement upon the spring. These springs are adjusted relatively to each other, so that with the weight free and resting upon the upper spring the pawl will be held in equilibrium and out of engagement with the ratchet N, as seen in Fig. 1. When the hammer descends the weight *m* of course descends with it, and maintains its normal position until the hammer strikes its blow. Then the momentum induced by the fall drives the weight *m* downward upon the springs and arm *h* of the pawl, which forces the pawl to turn outward. This descent of the weight, occurring, as it does, immediately after the blow of the hammer has been struck—that is, while the hammer is on its rebound—will force the pawl P outward during that rebound, so as to engage one of the teeth of the rack N, and thus prevent the descent of the hammer after it has risen on the rebound, and will there hold the hammer until it be lifted. Thus the difficulties attending the rebound of the hammer in forging or other work are avoided.

To insure the holding of the pawl P in engagement with the rack N until the lifting of the hammer is desired, a catch-bolt, *n*, is arranged, extending from the front of the hammer inward, so as to engage the teeth or notches on the side of the weight *m*, as seen in Fig. 2, and, being forced inward by a spring, R, on the descent of the weight *m*, it will be caught by the bolt *n* at nearly its lowest position, and while its pressure is upon the pawl P.

To relieve the weight *m* from engagement with the bolt *n*, an arm, S, extends downward from the latch-lever *e*, its lower end made wedge shape, as seen at *r*, Fig. 4, which wedge-shaped part works in a corresponding notch, *t*, in the bolt, so that while the latch *e* is engaged with the bolt G the wedge-shaped part permits the free action of the bolt *n*, but when the latch-lever *e* is raised, as indicated in broken lines, Fig. 1, it draws the wedge into the notch of the bolt *n*, so as to force that bolt outward and away from its engagement with the weight *m*, as seen in broken lines, Figs. 1 and 2, so that after the descent of the hammer, when the workman again requires its ascent, he has only to raise the lever *e*, which frees the pawl G and permits it to fly backward to engage with the lifting-rack F. Then the hammer will rise as before, and if he desires that the hammer shall be caught at any point in its elevation he releases the movable part *d* of the rack from the force which holds it down, or raises it to its position corresponding with the other part, *b*, as before described. Then the pawl I will engage that rack *b d*, as before.

This device for catching the rebound of the hammer may be used in drops having any of the known lifting devices, and is not therefore to be limited to this particular lifting mechanism.

The second spring, *l*, may be dispensed with and the weight lie directly upon an arm, *h*, of the pawl; but I prefer the intermediate spring, *l*.

While I prefer to make the weight *m* loose, it will be readily seen that it may be attached to the pawl—as, for instance, the arm *h* may be made of sufficient weight to impart the required movement to the pawl. I therefore do not limit my invention, whereby the rebound of the hammer is caught, to the specific arrangement of weight shown in the accompanying drawings.

I claim—

1. In a drop-hammer, the pawl P, hung in the hammer, a weight arranged in the hammer so as to act upon said pawl by the momentum imparted to the weight by the descent of the hammer, and a stationary toothed rack into engagement with which the said weight forces the said pawl P, substantially as and for the purpose described.

2. In a drop-hammer, the pawl P, hung in the hammer, a weight arranged in the hammer so as to act upon said pawl by the momentum imparted to the weight by the descent of the hammer, and a stationary toothed rack into engagement with which the said weight forces the said pawl P, and the catch-bolt *n*, substantially as described.

3. In a drop-hammer, the pawl P, hung in the hammer, a weight arranged in the hammer so as to act upon said pawl by the momentum imparted to the weight by the descent of the hammer, and a stationary toothed rack into engagement with which the said weight forces the said pawl P, and the catch-bolt *n*, with the wedge-shaped lever S, substantially as described.

4. The combination of the hammer, the pawl P, hung in the hammer, with an arm, *h*, extending therefrom, a spring below and another above said arm, a loose weight resting upon the upper spring, and the stationary toothed rack, substantially as and for the purpose described.

WILLIAM MASON.

Witnesses:
JOHN E. EARLE,
JOS. C. EARLE.