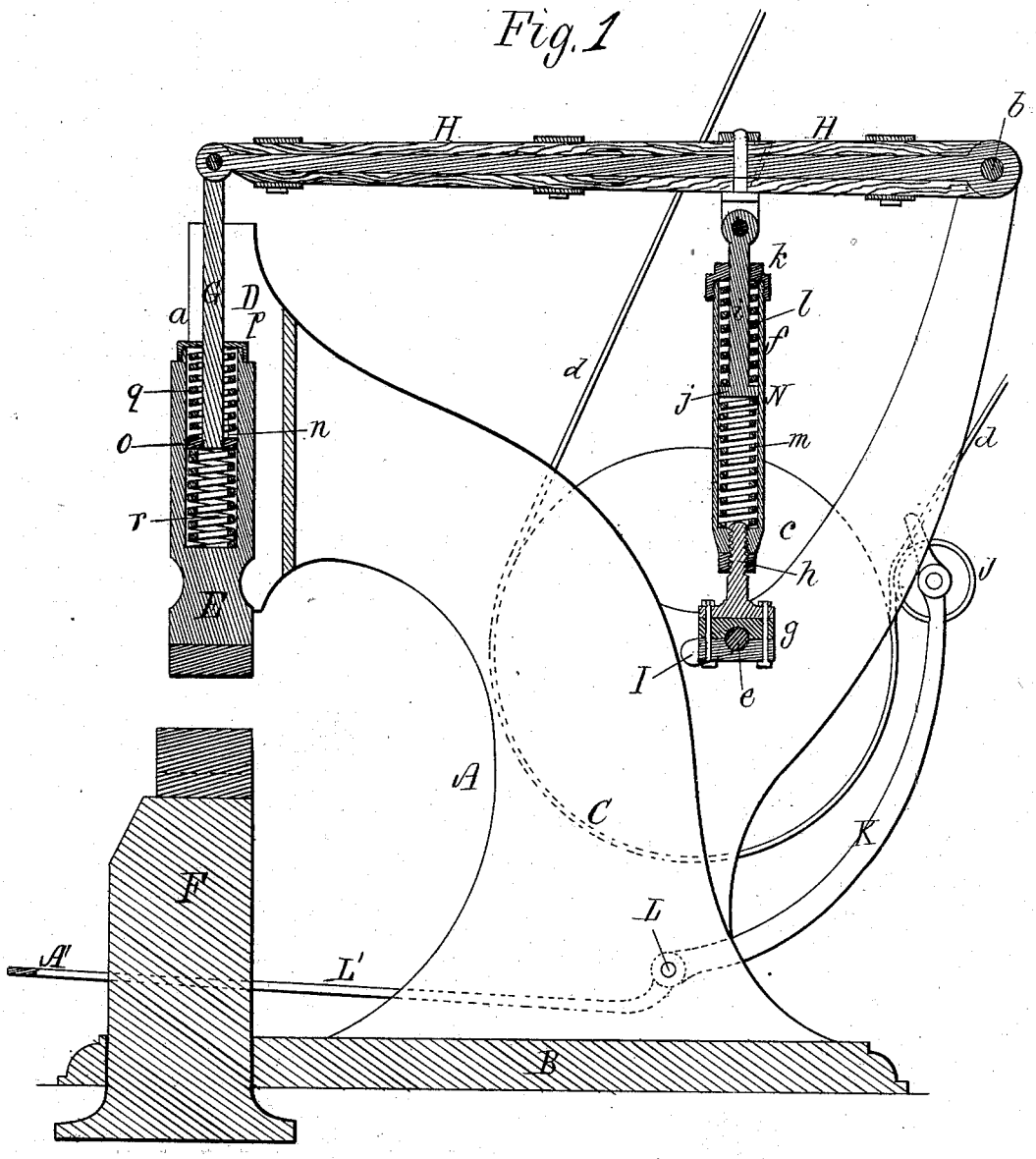
(No Model.) 2 Sheets—Sheet 1.

A. BEAUDRY.

POWER HAMMER.

No. 264,816. Patented Sept. 19, 1882.

Fig. 1



Witnesses.
H. E. Lodge
F. G. Simpson.

Inventor.
Alexander Beaudry.
F. Curtis. Atty.

(No Model.) 2 Sheets—Sheet 2.

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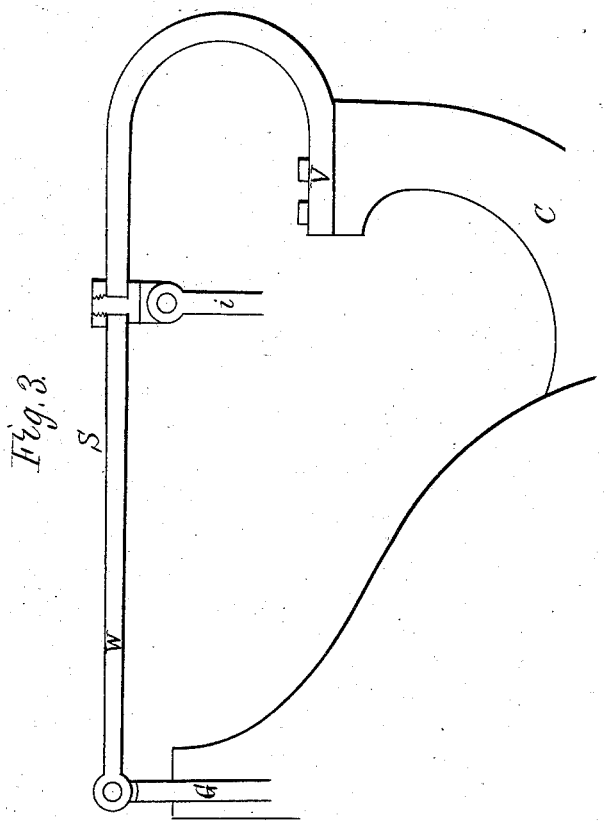

Fig. 3.

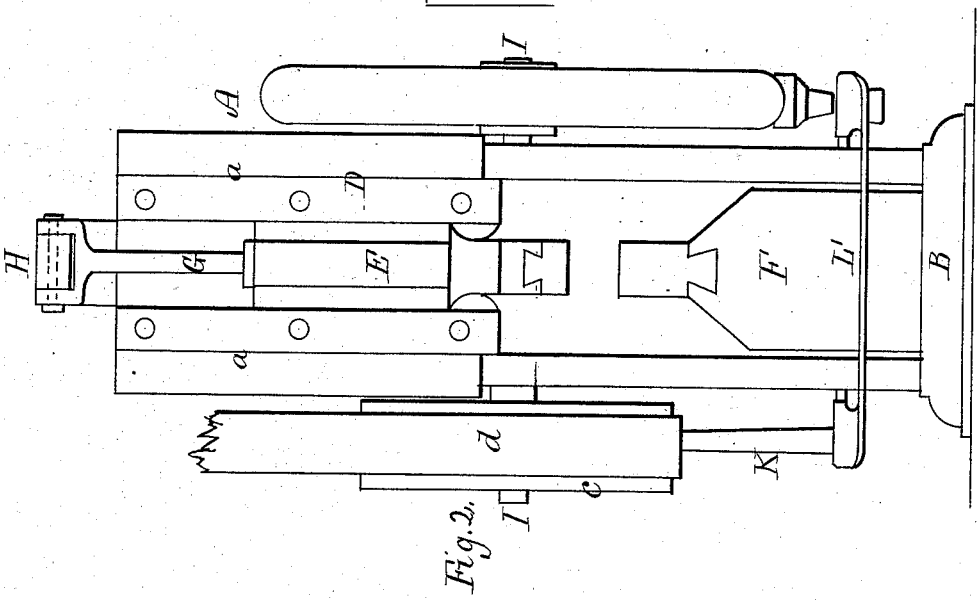

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

ALEXANDER BEAUDRY, OF BOSTON, ASSIGNOR TO AUGUSTINE BEAUDRY, OF EAST BOSTON, MASSACHUSETTS.

POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 264,816, dated September 19, 1882.

Application filed October 15, 1881. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER BEAUDRY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, 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 appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

These improvements are based upon a class of power-hammers in which the hammer-head is guided by vertical ways and moves in vertical reciprocations by the action of a rigid horizontal beam pivoted to it by a suitable connecting-rod, the rear end of such beam being pivoted to the rear of the machine-frame and operated by a crank-shaft connected with it by a rod situated between the hammer-head and the pivot of the beam.

This invention consists mainly in combining two pairs of springs with a power-hammer, its beam, and a pitman or connecting-rod, one pair of springs serving to lessen the shock of the hammer and to make its blow more forcible and elastic, and the other pair of springs serving to give additional impulse to the hammer at the end of the downward stroke and to accelerate the beginning of the upward stroke, as set forth.

In the accompanying drawings, Figure 1 represents a vertical section from front to rear through a machine embodying my invention; Fig. 2, a front elevation of the same, and Fig. 3 a detail view of a modified form of beam with attached parts.

Reference being had to the above-named drawings, it will be seen that A represents the frame of the machine, the same being composed of a bed-plate or base, B, and upright side standards or housings, C C, the latter being united at their upper ends to form a head, D, the opposite sides of which constitute ways or guides *a a* to guide the motions of the hammer-head.

E represents the hammer-head as playing vertically within the guides *a a*.

F represents the anvil; G, the rod connecting the hammer-head with the front end of the horizontal driving-beam, which is shown at H, such beam being disposed at the extreme upper part of the machine-frame and pivoted at its rear end to the rear part of such frame by a pivot, *b*.

The crank-driving shaft is shown at I as mounted horizontally in suitable bearings in the rear part of the machine-frame, such shaft being put in motion by a pulley, *c*, secured to one end of said shaft, about which and a driving-pulley an endless band, *d*, travels.

J represents a friction-pulley, mounted within the upper end of a vibratory bar, K, which is secured at its lower end rigidly to a horizontal rock-shaft, L, journaled at the lower rear part of the machine-frame, while A′ represents a yoke-shaped treadle passing about the anvil and secured rigidly at its rear part to the said shaft L. The operator bears down with one foot upon the treadle, thus tightening the belt *d* against the pulley *c* and putting the latter and the crank-shaft I in rotation and the hammer in motion, the strength of the blow exerted by the latter being governed by the extent to which the belt is tightened.

N represents the rod connecting the crank *e* of the shaft I with the beam H.

The above constitute the elementary features of power-hammers now generally in use combined with my improvements.

In carrying out my improvements I proceed as follows: The body of the connecting-rod N is a straight tube, *f*, connected at its lower end to the box *g*, which surrounds the crank *e*, by a screw-connection, *h*, in order that the height of the hammer-head with respect to the anvil may be varied or adjusted. The upper connection of the rod N with the beam is a rod, *i*, the upper end of which is swiveled to the beam, while its lower end carries a piston or plunger, *j*, which closely fits the bore of the tube *f*, and is situated about centrally of such tube. A tubular screw-cap, *k*, covers the mouth of the tube *f*, and, while permitting the passage of the rod *i*, serves as a resistance to a

coiled spring or other elastic material, *l*, which is contained within the upper part of said tube, and exerts its stress between the cap *k* and the plunger *j* of the rod *i*. A second coiled spring or other elastic material, *m*, is placed in the lower part of the tube *f*, and exerts its stress between the bottom of said tube and the plunger *j*. The hammer-head E is chambered at its upper part, as shown at *n*, to receive a piston or plunger, *o*, secured to the lower end of the rod G, such piston being disposed about midway of said chamber *n*, and the mouth of the latter being closed by a tubular screw-cap, *p*, through the bore of which said rod G passes, this screw-cap serving as an abutment to a coiled spring or other elastic material, *q*, which is disposed within the upper part of the chamber *n*, and exerts its functions between said cap and the piston *o*. A second coiled spring or other elastic material, *r*, is disposed within the lower part of the chamber *n*, and exerts its effort between the bottom of said chamber and the piston *o*. As the crank *e* ascends and passes its highest point the hammer-head continues to rise by its momentum until arrested by the contraction of the spring *l*, which spring stores the power thus exerted during the descent of the hammer until the crank *e* passes its lowest point, when, by its sudden reaction, it accelerates the drop of the hammer beyond the speed of the crank, and thus greatly increases the force of the blow delivered. The functions of the spring *m* are, first, to sustain the weight of the hammer, and, second, as the hammer nears the end of its descent to yield, while the hammer continues to descend after the crank *e* has reached its lowest point, and by its sudden reaction to lift the hammer instantly and faster for that instant than could be effected by the crank, thus imparting a wonderful elasticity to the blow, on account of which the heat is much longer retained in the metal being worked, and much of the danger of disintegration from abrasion is avoided, while both springs *l* and *m* serve in a measure to relieve the parts from shocks and strains incident to the working of the machine. The springs *q* and *r* operate in manner similar to the springs *l m*, and in a measure aid to impart a more powerful and elastic blow by the hammer, but serve chiefly to relieve the adjacent parts of the frame and driving mechanism from the shocks and strains incident to the working of the machine.

A brake is to be added to the shaft L, and so arranged with respect to the pulley *c* and treadle A′ that when such treadle is lowered by the foot of the workman in the act of starting the hammer the brake is removed from contact with a balance-wheel carried by the shaft I, and as the workman removes his foot from the treadle the brake, by its own weight, drops into contact with the fly-wheel and instantly arrests the motions of the hammer.

In lieu of the piston or head secured to the lower ends of the rods G and *i* as abutments for the springs *l m q r*, one or more pins may be passed horizontally through each rod to bear upon the springs. I prefer a circular head or piston, as it constitutes an effective guide to the lower end of the rod and as a firm and ample bearing for the springs.

In some styles of hammers I propose to employ, in lieu of the rigid beam H, a curved elastic one of the form shown in Fig. 3 of the accompanying drawings. This spring is shown at S as U-shaped, with its lower arm, V, secured to the extreme rear part of the housings C, and with its upper and longer arm, W, extending forward over the hammer-frame, and connected at its front end with the upper end of the rod G, before named. This spring or elastic arm S aids in imparting an elastic blow to the hammer.

I claim—

1. In combination with pivoted beam H, hammer E, rod G, and a pitman constructed in two parts, the springs *q* and *r* and the springs *l* and *m*, said springs operating respectively on the hammer and on the pitman, substantially as set forth.

2. In combination with beam H, hammer E, recessed as shown, rod G, working in said recess, and pitman N, consisting of an upper solid part and a lower hollow part, the springs *q* and *r*, arranged respectively above and below the piston of rod G, the cap *p*, which confines them in place, the springs *l* and *m*, similarly arranged with respect to the piston of pitman N, cap *k*, which confines the latter springs in place, and the driving-wheel, wrist-pin, and guides, all substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER BEAUDRY.

Witnesses:

H. E. LODGE,

F. CURTIS.