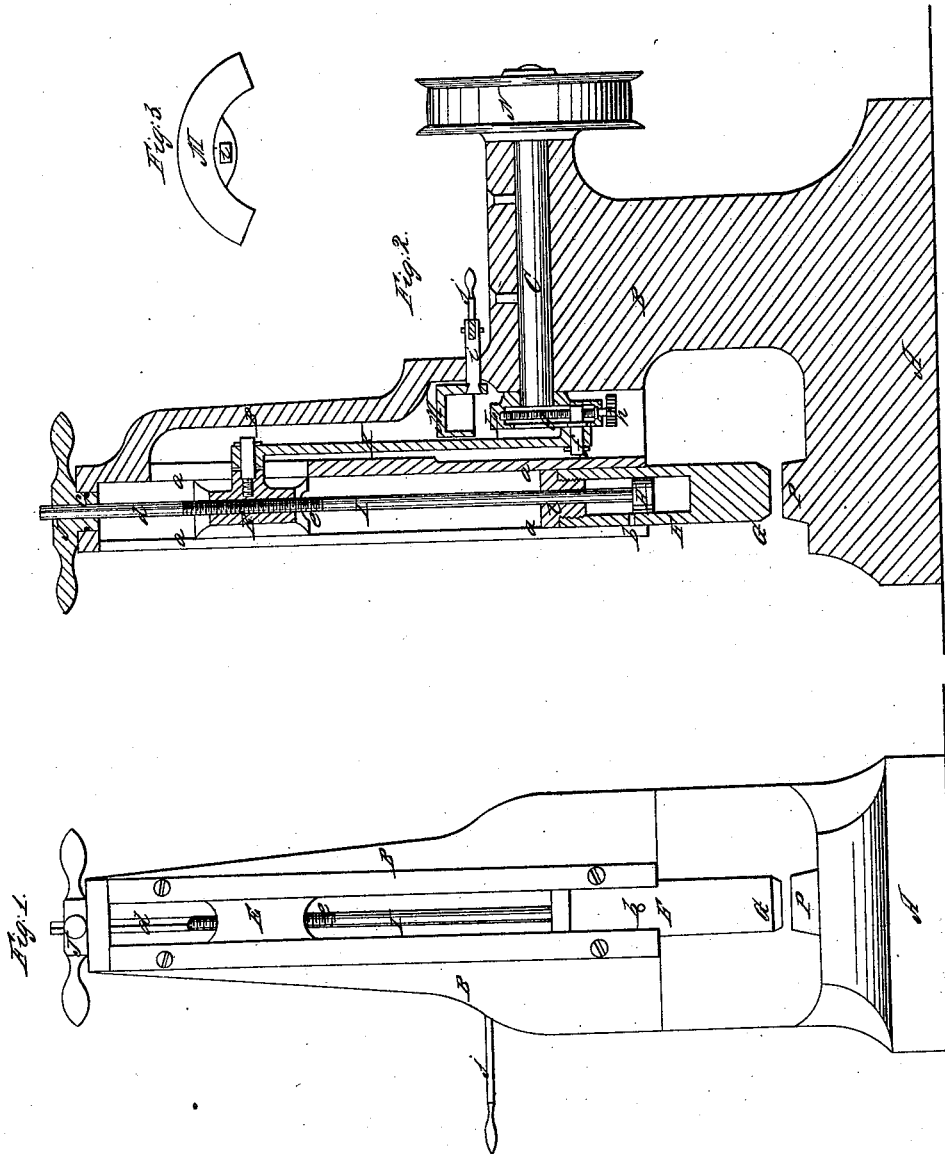


J. Robertson

Power Hammer.

N^o 54,413.

Patented May 1, 1866.



Witnesses:
J. W. Cramb
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Inventor:
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UNITED STATES PATENT OFFICE.

JOHN ROBERTSON, OF NEW YORK, N. Y.

IMPROVEMENT IN ATMOSPHERIC HAMMERS.

Specification forming part of Letters Patent No. 54,413, dated May 1, 1866.

To all whom it may concern:

Be it known that I, JOHN ROBERTSON, of the city, county, and State of New York, have invented certain new and useful Improvements in Atmospheric Hammers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of an atmospheric hammer constructed according to my invention. Fig. 2 is a central vertical section of the same at right angles to Fig. 1. Fig. 3 is a front view of the hood for varying the throw of the crank.

Similar letters of reference indicate corresponding parts in the several figures.

One object of this invention is to obviate the crystallization and breaking of the piston-rod and derangement or displacement of the packing to which atmospheric hammers having the hammer-head attached to the piston-rod are so liable. To accomplish this result I make a positive connection between the piston-rod and the crank or its equivalent, by which the upward motion of the hammer is indirectly produced, and attach the hammer-head to the air-cylinder, which is detached from but arranged so as to be operated indirectly by the crank or its equivalent.

Other objects of my invention are to provide for the more convenient variation of the force of the blow of the hammer while in operation, and provide for the striking of light blows with great rapidity, as in hand-forging.

To obtain these latter results my invention consists in the use of suitable means of raising and lowering the piston-rod relatively to the crank-connection, and by the use of a crank whose throw is variable at pleasure.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A B is the framing of the machine, consisting of a bed-plate or anvil-bed and a strong standard of cast-iron, in which are provided bearings for the horizontal shaft C, and upright ways *a a*, to receive and guide the cross-head E and the air-cylinder F, with the attached hammer-head G. The air-cylinder F may be made of the same piece with the hammer-head G, or be made separate and have

the hammer-head secured to its bottom in any suitable manner. The said cylinder and hammer-head are fitted to slide freely in the lower part of the ways *a a*. The cylinder has the usual vent-hole *b* at about the middle of its length, and this may be fitted with a valve to regulate the ingress and egress of air. The piston H, fitted to the said cylinder, may be packed with leather or other packing in any suitable manner. The piston-rod I, secured to the said piston, passes through a stuffing-box, *l*, in the upper head of the cylinder, and extends upward through the top of the standard B, and its upper part, *d*, is squared to fit a wrench, J, the socket *c* of which is fitted to turn freely in a bearing in the standard, but prevented from moving vertically by means of a groove and pin or other device which does not prevent it from turning.

The cross-head E is connected by a pitman, K, with the wrist *f* of the crank L on the shaft C, and the wrist is movable in a slot in the crank toward or from the center by means of a screw, *g*, which is fitted into the crank-arm in such manner as to be capable of turning therein, but not moving longitudinally. The stem of this screw projects through the end of the crank-arm, and is provided outside of the said crank-arm with a friction-wheel, *h*, which in every revolution of the crank passes through a hood, M, which is attached to a horizontal slide, *i*, working through a guide in the standard B. The outer end of this slide *i* is connected with a lever, *j*, or other means of giving it and the slide a horizontal movement parallel with the axis of the shaft C. The interior of the said hood through which the friction-wheel *h* revolves is wide enough to allow the said wheel to pass through it without touching when the said hood is in a proper position to permit the said wheel to do so, but by moving the said hood a little to the right or left of this position the wheel will be caused to roll against one side or other of the said hood, and by that means the screw will be turned in one direction or the other, and the crank-wrist will thereby be moved toward or from the axis of the shaft C, and the throw of the crank shortened or lengthened by the act of its own revolution.

The rotary motion of the shaft C is obtained from a belt running on its pulley N, or in any

other suitable manner, and the revolution of the crank thus produced gives the piston-rod and piston a regular reciprocating motion. The elastic column of air between the piston and the heads of the cylinder transmits motion from the piston to the cylinder and hammer-head, and so produces the blow of the hammer without any injurious jar on the piston-rod or piston-packing.

In case it is desired to vary the force of the blow at any time without stopping the operation of the hammer, this may be done by turning the wrench J, and thereby turning the piston-rod in the cross-head E. The male screw-thread on the piston-rod, being thus caused to work up or down in the female screw in the cross-head, increases or diminishes the effective length of the piston-rod, and so varies the distance within which the piston approaches the anvil P, and by varying the compression of the air between the piston and the bottom of the cylinder varies the force of the blow. The raising of the piston diminishes and the lowering of the piston increases the force of the blow.

When it is desired to produce a rapid suc-

cession of light blows, the throw of the crank is shortened by means of the hood M, as hereinbefore described. This shortening of the stroke diminishes the force of the blow by diminishing the compression of the air between the piston and both heads of the cylinder, and greater rapidity of the blow is obtained by an increased velocity of revolution of the crank-shaft, without any more power than is required to produce a slower blow with a longer stroke.

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

1. In combination with the cylinder, hammer-head, and piston, applied and operating as hereinabove specified, the provision for raising and lowering the piston-rod and shortening or increasing its effective length while the hammer is in operation, substantially as herein set forth.

2. In combination with the hammering apparatus, constructed as described, a variable crank, substantially as shown.

JOHN ROBERTSON.

Witnesses:

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