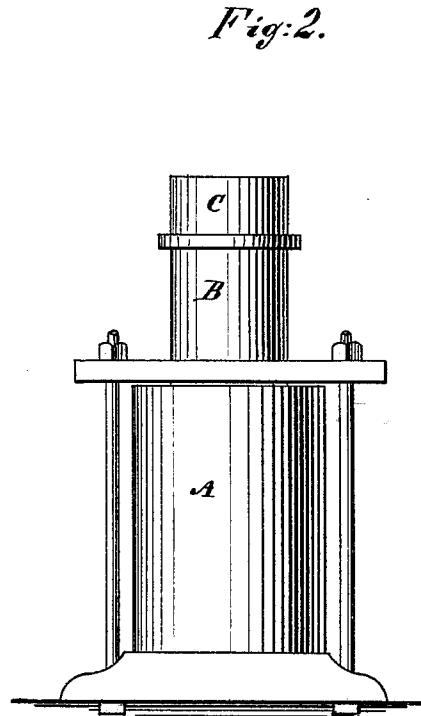
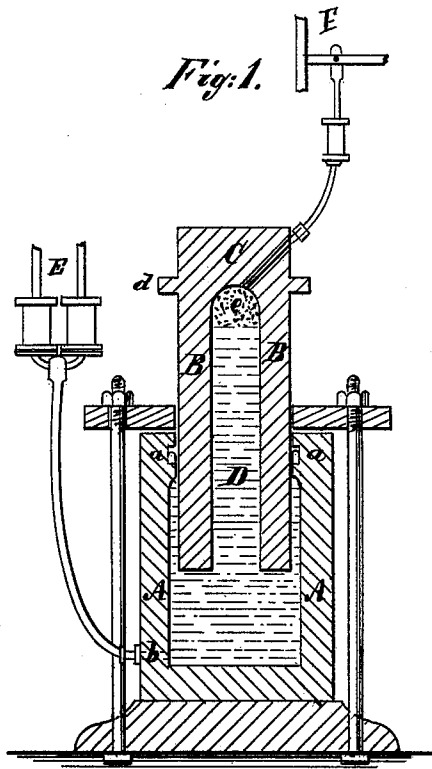


A. HITCHCOCK.

ANVIL-BEDS.

No. 175,284.

Patented March 28, 1876.



Witnesses:

Henry Eichling.
B. E. Clark.

Inventor.

Alonzo Hitchcock
By J. M. Smith
his atty.

UNITED STATES PATENT OFFICE.

ALONZO HITCHCOCK, OF NEW YORK, N. Y.

IMPROVEMENT IN ANVIL-BEDS.

Specification forming part of Letters Patent No. **175,284**, dated March 28, 1876; application filed August 20, 1875.

To all whom it may concern:

Be it known that I, ALONZO HITCHCOCK, of the city, county and State of New York, have invented an Improvement in Anvil-Beds, of which the following is a specification, reference being had to the drawing accompanying the same.

This invention relates to the combination of atmospheric air with water in the formation of an anvil-bed, wherein the force of blows upon the anvil is measurably expended in simultaneously moving the water and compressing the air.

In the accompanying drawings I have shown an anvil-bed embodying the said invention.

Figure 1 is a central vertical section, and Fig. 2 an elevation, of my combined water and air anvil-bed and anvil.

Like letters indicate the same parts throughout the drawing.

A is a strong metal cylinder, and B a plunger, fitted into the neck of the cylinder, the latter being provided with a packing, *a*, forming a water-tight joint around the plunger, while the said plunger is permitted to have longitudinal movement in the cylinder. C is the anvil at the top of the plunger. The said plunger is cored to form in it the central chamber D, open at the bottom and closed at the top, as shown. The cylinder is provided with a small aperture, *b*, through which water may be forced into the cylinder by a force-pump, E, and the plunger is provided with a small aperture, *c*, through which air may be forced into the chamber D by an air force-pump, F. Both apertures are provided with suitable stop-valves. Before water is introduced into the cylinder the plunger will rest on the bottom of the cylinder, or may be suspended therein by the flange *d* resting upon the top of the said cylinder. By forcing water into the cylinder the plunger and anvil may be raised to any desired height within the length of the cylinder. Upon introducing the water into the cylinder, if the air it contains is allowed to escape, the water will take its place and entirely fill both the chamber D and the space in the cylinder not occupied by the plunger. Under these conditions the water constitutes the immediate bed of the anvil, and is, of course, practically solid and inelastic,

and the entire force of a blow upon the anvil beyond that expended in overcoming the inertia of the anvil and plunger will be communicated hydraulically to the interior surface of the cylinder A and the upper parts of the chamber D, no movement of the water taking place, and it is well known that it is practically impossible to control the rending action upon the cylinder of such force so applied. If, however, the contained air is not allowed to escape upon the introduction of the water, or if afterward air is forced in through the aperture *c*, it will, it is evident, be imprisoned over the water at the top of the chamber D, where it will be compressed to a degree due to the weight of the anvil and plunger, and constitute an elastic cushion, upon which the plunger will rest, and a downward motion of the plunger will not only further compress the air, but also move the entire mass of the water. Moreover, this movement of the water must take place under the pressure to which it is at the instant subjected, for it is evident that as the plunger moves downward a portion of the water below it is displaced and caused to rise into the chamber against the air at *e*, whereby the air is quickly compressed between the downward-moving upper end surface of the aforesaid chamber D and the upward-moving column of water contained within said chamber, and at the same instant there is caused a movement among themselves of all the atoms of the entire body of water in the cylinder, and this latter movement taking place under intense pressure, will consume force for its accomplishment in proportion to the pressure.

Under the above specified conditions the air at *e*, in the chamber D, is compressed until it offers a resistance equal to the weight of the plunger B and anvil C. Then if a blow is delivered upon the anvil its force is first expended in overcoming the inertia of the anvil and plunger, then in simultaneously compressing still further the air at *e*, and displacing a part of the water below the plunger, forcing it into the chamber D, thereby causing a movement among themselves of the atoms of the whole body of water, and only the force remaining after the expenditure of so much of it as is required to produce the movements

above described will reach the cylinder A, while the elasticity of the air prolongs the time in which the expenditure of the force takes place, thereby diminishing its concussive action upon the cylinder and the foundation upon which the cylinder may rest.

The extent of the elastic action of the air under a given pressure is determined by the amount of air confined, and this amount may be regulated by means of the force-pump F. The anvil may be elevated or lowered by increasing or diminishing the amount of water in the cylinder by the force-pump E.

Instead of locating the chamber D in the interior of the plunger, it may be in a separate cylinder or pipe, closed at the upper end, the lower end opening into the cylinder A below the plunger. The preferable arrangement, however, is to locate it in the plunger, as shown in the drawing, and I would also recommend that the lower end of the hollow cylinder constituting the cored body of the plunger should be beveled to an edge, whereby the plunger is made to rest almost wholly upon

the air-cushion *e*, and the concussive action upon the parts of a blow upon the anvil is thereby almost wholly relieved.

This combined water and anvil bed is useful to diminish the concussive effect of any heavy blow, and is specially adapted to and advantageous for the forging of large masses of metal under hammers of great weight, or taking up the recoil of heavy ordnance.

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

An anvil-bed, composed of atmospheric air and water, confined and operating as described, so that a blow upon the anvil, causing its movement, acts to compress the air and communicate motion to the water, as herein set forth, and for the purpose specified.

Witness my hand this 16th day of August, 1875.

ALONZO HITCHCOCK.

Witnesses:

B. S. CLARK,
FRED BOND.