

T. SHAW.
Power Hammer.

No. 99,958.

Patented Feb. 15, 1870.

Fig. 1

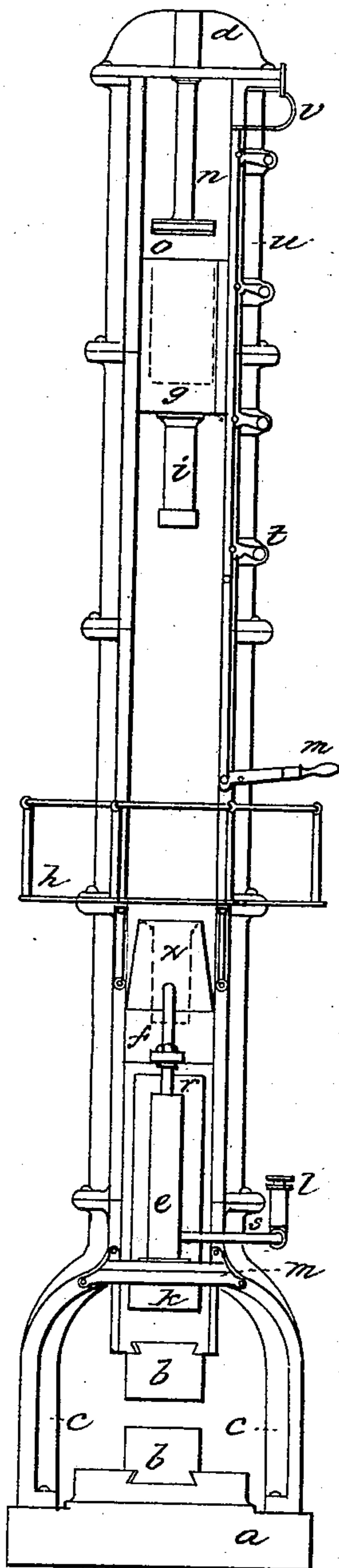
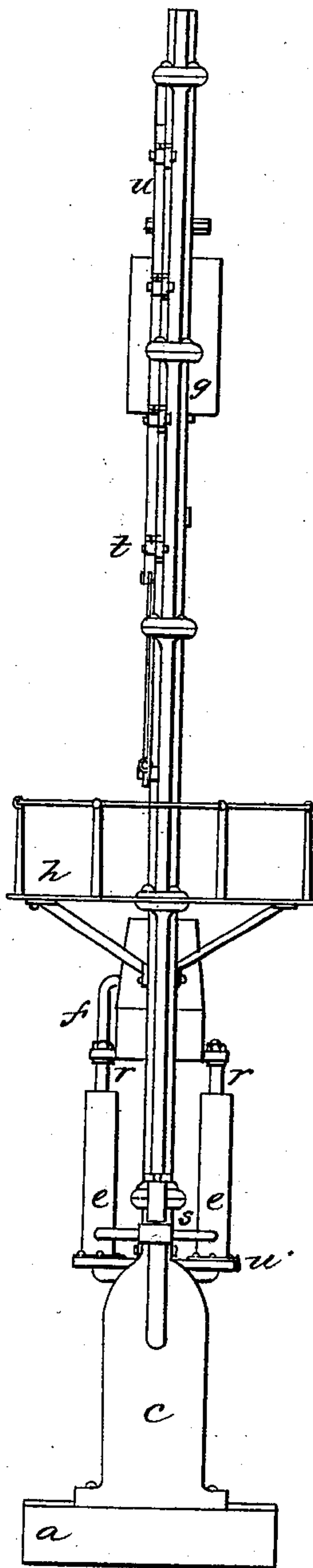


Fig. 2



Witnesses:
E. Cobb-
Eliat J. Shaw

Inventor:
Thomas Shaw

United States Patent Office.

THOMAS SHAW, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 99,958, dated February 15, 1870.

IMPROVED APPARATUS FOR FORGING METALS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, THOMAS SHAW, of the city and county of Philadelphia, Pennsylvania, have invented a new and improved Mode of Forging Metals; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

My invention consists in the employment of gunpowder for forging metals in the manner and for the purpose as hereafter described.

In order to enable others to use and practice my invention, I will proceed to describe its construction and mode of operation.

On reference to the accompanying drawing, which forms part of the specification—

The drawing represents a front and a side view.

Similar letters refer to similar parts.

a is an anvil-block, united to which is guide-pillars *c c*, connected at the top by beam *d*.

k is a hammer-block, sliding between and guide *l* by pillars *c*.

Said anvil and hammer-block are provided with the usual forging dies *b*.

e e are air-chambers supported on cross-beam *w*.

r r are piston-rods, each provided on its lower end with piston fitting the bore of chamber *e*.

The hammer-block *k* terminates above in a bored cylinder, *z*, which is tapped with pipe *f* for the purpose of leading gas under pressure from chamber *z* through hollow piston-rod connected with said pipe *f* into the air-chamber *e*. Said hollow piston-rod is provided on its lower end with an ordinary check-valve to prevent the return of any gas.

l is a safety-valve, regulated by an ordinary thumb-screw, and is connected by pipe *s* with chambers *e* for the purpose of allowing the pressure to be the same in both chambers, (by virtue of the pipe,) and for the purpose of allowing extra pressure to escape by virtue of the safety-valve that the anvil *k*, the weight of which is supported on the air-cushions formed in chambers *e*, may be regulated to rest at various heights.

g is a hammer, fitting into grooves in guide-pillars *c*, and can have a vertical movement between chamber *z* and beam *d*.

Said hammer is provided on its lower end with plunger *i*, fitting the bore of chamber *z*, and is bored in its upper end for the reception of piston *n*, to form an air-cushion for the purpose as hereafter described.

u is a friction-rod bearing against one side of hammer *g*, and is pressed hard against the same by the pivoted arms *t*, and is released from pressure against said hammer by pressing down upon lever *m*.

v is a spring for increasing the downward pressure of rod *u*.

o is a small flap-valve, covering an aperture in piston *n* for the purpose of closing the aperture when the piston enters the chamber of hammer *g*, and opening when withdrawing from the same.

h is a platform for supporting the engineer.

The object of the invention is to furnish a cheap and reliable forging apparatus, one that is complete within itself and independent of all other sources of power than that of gunpowder, of unlimited force, and competent to forge a homogeneous mass of metal. It is operated in this wise: A small cartridge of gunpowder is thrown into chamber *z*, when hammer *g* is allowed to fall, forcing its plunger into said chamber *z*, contracting the air contained therein so as to cause heat sufficiently to ignite the powder whenever the cartridge is broken by the plunger coming in contact with the same, at the time of ignition, the explosive gases are added to the air contained in chamber, causing sufficient pressure to arrest the hammer and to force the hammer-block *k* and die *b* violently down upon any material intervening between the dies. The force of the gases is exerted against the plunger until the hammer is thrown violently out, and when the hammer has received its highest throw it is caught and held suspended by reason of the friction-bar *u* pressing tightly against the hammer whenever it attempts to descend, caused by the arms *t* moving in a direction to narrow the distance between the guide-pillar and said friction-rod.

At every stroke of the hammer a portion of the explosive gases pass over through pipe *f* and through the afore-described hollow piston-rod *r* into the air-chamber *e*, the effect of which is to cause pressure in chambers *e*, which pressure will lift and support the secondary anvil *k* sufficiently high above the work operated on between the dies that the work will be released, and can be withdrawn, if desired, between each blow.

In case the anvil *k* is lifted too high, it can be lowered by means of the ordinary safety-valve *l*.

The piston and rod *n* is provided in case too heavy a charge of powder be employed, and so that the air-cushion formed in hammer *g* will receive the blow without harm to the machine.

The apparatus is intended for forging large masses, and will have twenty feet stroke of hammer. The speed will be limited by the ability of the hammer to travel through that distance.

It will be observed that the apparatus can be employed in stamping and that it might be modified, and that various explosive materials may be employed without any alteration in the result.

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

1. The combination of the free and unattached ham-

mer-block and devices to co-operate therewith, to produce a cushion of atmospheric air for sustaining it at a distance above the anvil, the free and unattached hammer and devices to co-operate therewith to produce a cushion of atmospheric air for arresting its upward movement, the frame for guiding the hammer-block and hammer when in motion, and the anvil *p*, substantially as and for the purpose set forth.

2. The combination of the chambered block *k*, plunger *i*, chambered hammer *g*, and piston and valve *n o*, substantially as and for the purpose set forth.

3. The combination of the hammer-block *k* with one or more pistons *r* connected thereto, and one or more stationary air-cylinders *e*, substantially as and for the purpose set forth.

4. The combination of the friction-bar *u*, spring *v*, and lever *m* with the frame *c* and hammer *g*, substantially as and for the purpose set forth.

THOMAS SHAW. [L. S.]

Witnesses:

E. COBB,

ELIAS J. SHAW.