

No. 45,896,

PATENTED JAN. 10, 1865.

W. D. GRIMSHAW.
ATMOSPHERIC HAMMER.

Fig. 1.

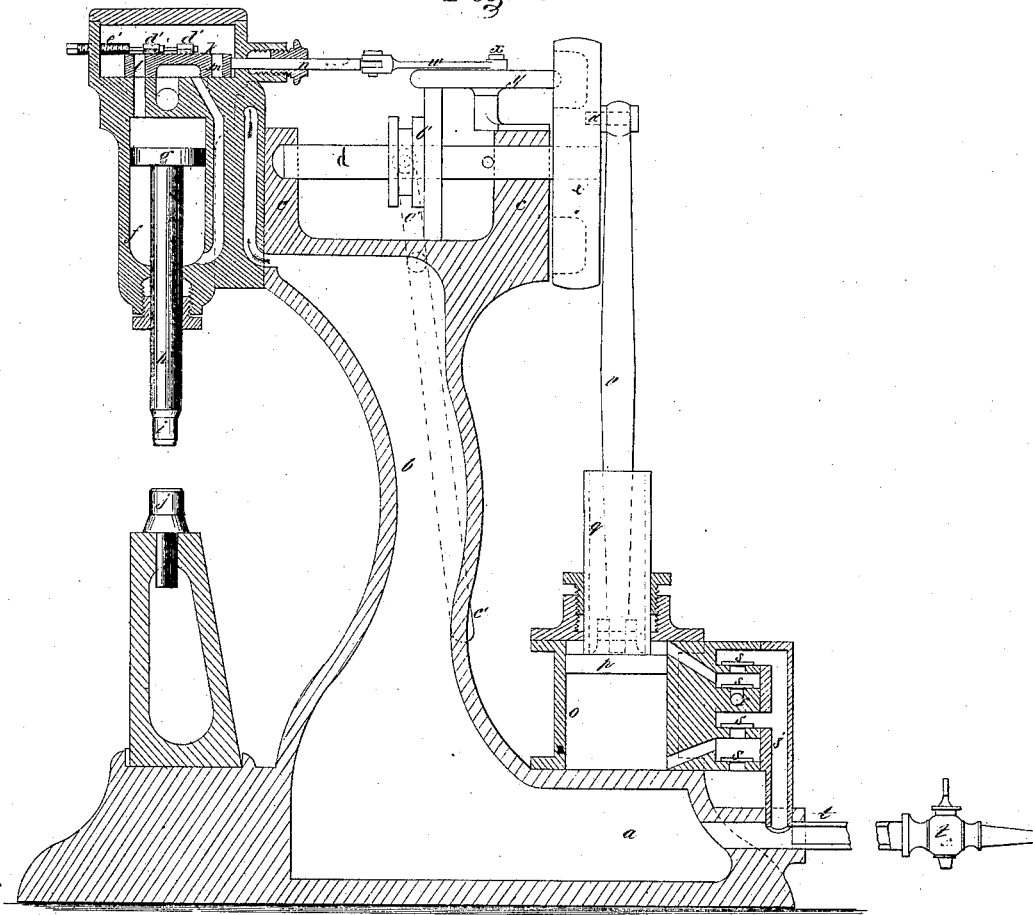
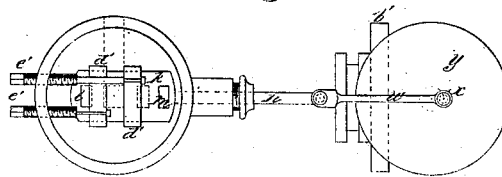


Fig. 2.



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IMPROVEMENT IN ATMOSPHERIC HAMMERS.

Specification forming part of Letters Patent No. 45,896, dated January 10, 1865.

To all whom it may concern:

Be it known that I, WILLIAM DAKIN GRIMSHAW, of Birmingham, in the county of Warwick, formerly of Mitcham, in the county of Surrey, England, engineer, have invented an improved atmospheric hammer, the reservoir of which is used as a blower when the hammer is at rest; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

I construct the frame-work of the machine hollow and air-tight, so that it may be employed as a reservoir of compressed air, and at the back part of the bed-plate I bolt or fix a double-action air-pump driven by a belt or by gearing. The piston of the said air-pump may be worked by a crank or other suitable contrivance. By the action of the air-pump I surcharge the hollow chambers in the frame-work of the machine with compressed air, (which may be rarefied or not, at pleasure.) The hammer-head is fitted onto a piston-rod connected to a piston working in an inverted cylinder with similar arrangements to an ordinary steam-cylinder, excepting in the construction of the cut-off. The slide-valve has two port-holes, and on the upper part of the valve there are two flaps or sliding blocks, which give the workman complete control over the hammer and enable him to regulate the blow at pleasure. The hammer is either stationary or constructed upon a compound bed-plate, so that it may be moved backward and forward and be capable of striking any required blow upon any particular part of the anvil or on a series of anvils, or of plating or bending heavy work and performing such work as it has not been hitherto practicable for previously-constructed mechanical hammers to execute. When the hammer is at rest, the pump and air chambers may be employed as a blast or blower for the furnace with considerable advantage and economy. The blast may be used hot or cold, as may be required.

The hammer is entirely under the control of the workman, both as to speed and the power of the blow. The speed may be varied from one to five hundred blows per minute, and its striking force from one to two thousand pounds, or in accordance with the constructed power of the machine. It will do its work with

considerably less consumption of power than is usually employed by steam-hammers.

The manner in which my invention is to be performed will be clearly understood by referring to the figures and letters on the accompanying sheet of drawings, in which—

Figure 1 is a vertical section of one of my improved atmospheric hammers with a stationary bed, and Fig. 2 a plan of the slide-valve and cutting-off flaps.

The main frame-work of the machine consists of the hollow bed *a* and hollow column *b*, both of which are used as reservoirs of air, and at the top of the column there are pedestals or bearings *c* for the driving-shaft *d* to work in, the shaft being turned by the driving-pulley *e* from any driving power.

f represents the hammer-cylinder; *g*, the hammer-piston; *h*, the hammer piston-rod; *i*, the hammer-head; *j*, the anvil-block; *k*, the slide-valve having two apertures or port-holes, *l m*, from back to face; *n*, the valve-rod; *o*, the cylinder of the air-pump; *p*, the piston or plunger of the air-pump; *q*, the trunk or hollow piston-rod; *r*, the valve-box for the pump having four valves, *s*, there being a side pipe, *s'*, for conveying the air to the chamber *a*.

t represents a pipe and cock communicating with the said chamber *a*, which pipe and cock are for the purpose of tempering or regulating the pressure of the blow of the hammer by opening or shutting the cock, so as to allow the air to escape or to keep it in, and when the hammer is not in use the pipe and cock may be employed for conveying the blast of air.

To the back of the driving-pulley is fixed the crank-pin *u*, which is connected to the pump-piston *p* by the connecting-rod *v*, so that as the driving-pulley and crank-pin revolve the piston shall work up and down, according to the throw of the crank.

The slide-rod *n* is connected by a rod, *w*, to a crank-pin, *x*, fixed to the friction-disk *y*, working on a stud.

On the driving-shaft *d* there is a friction-wheel, *b'*, held to the shaft by a key or feather, so that it can revolve with the shaft and at the same time be moved to and fro when required by the clutch lever *c'*, the said friction-wheel being for the purpose of giving the disk revolving motion when they are in contact with each other, the number of revolutions of the disk and to-and-fro motion of the slide-valve

k being in proportion to the greater or less distance the wheel is placed from the center of the disk, which arrangements enable the speed of the slide-valve, and consequently the speed of the hammer, to be varied with great facility. At the top of the slide-valve there are two flaps or sliding blocks, *d'*, for cutting off the air at any particular given time and thereby regulating the force of the blow of the hammer, the said flaps being worked by the screws and rods *e'*, or by levers, and the air-passage from the air-chambers to the valve is shown by the small arrows. When the hammer is placed upon a compound bed-plate, the anvil or anvils are detached from the frame-work, and the lower plate at the bottom of the chamber or reservoir is jointed by a bolt or swivel to a stationary foundation-plate, in order that the hammer may be turned to any required position.

The formation of a reservoir for the compressed air in hollow and air-tight frame-work enables the machine to be very compact; but in cases where my improvements have to be adapted to old machines with solid frame-work I employ one or more separate or distinct reservoirs for the compressed air, and although I have shown only one double-action pump, it is evident that I may use a series of pumps, and also vary the arrangements, dimensions,

and strength of the machine, in order to adapt it for any description of work to be hammered.

I claim—

1. The system of employing a reservoir between the pump or pumps and the hammer-cylinder for holding the compressed air, the reservoir to be formed in the frame-work of the machine.

2. The combination of the adjustable, but otherwise stationary, valve *d'* *d'*, the slide-valve *k*, the cylinder *f*, the piston *g*, the piston-rod *h*, and the hammer *i*, substantially as set forth.

3. The combination of the valve-rod *w*, the friction-wheel *y*, the sliding friction-wheel *b'*, and the shaft *d*, substantially as and to the effect hereinabove set forth.

4. The combination of the reservoir *b*, the pump *a*, and the stop-cock *t*, as described.

5. The arrangement described of the pump *a*, reservoir *b*, friction-wheel *b'* and *y*, valve-rod *w*, valve *k*, cylinder *f*, and piston *g*, by which they are made to operate in relation to each other, substantially as set forth.

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Witnesses:

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