

A. H. SMITH.

Improvement in Stone Crushing Apparatus.

No. 120,784.

Patented Nov. 7, 1871.

Fig. 1.

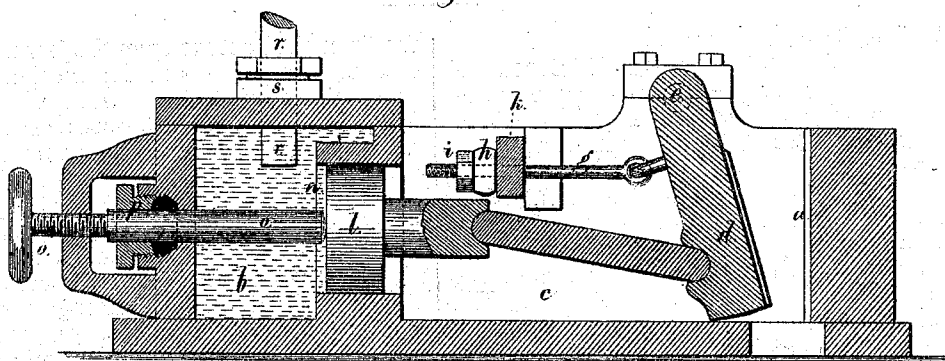
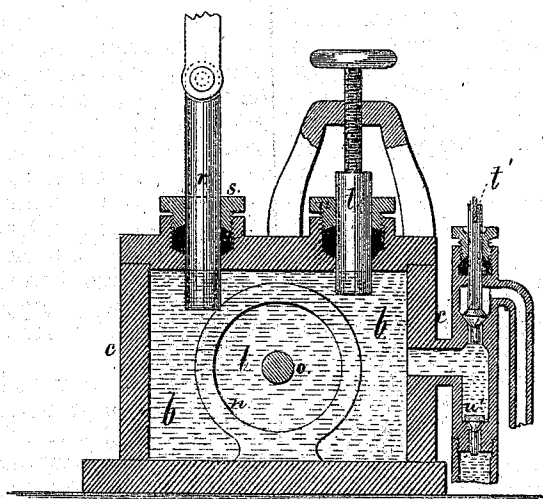


Fig. 2.



Witnessed,

Chas. H. Smith
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UNITED STATES PATENT OFFICE.

AUSTIN H. SMITH, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STONE-CRUSHING APPARATUS.

Specification forming part of Letters Patent No. 120,784, dated November 7, 1871.

To all whom it may concern:

Be it known that I, AUSTIN H. SMITH, of Brooklyn, Kings county, New York, have invented and made an Improvement in Stone-Crushing Apparatus; and the following is declared to be a correct description thereof.

Stone-crushing machines have been made with one jaw stationary and the other movable, and having a swinging or rocking motion so as to crack and break the stone or ore between the corrugated surfaces of said jaws. Difficulty has been experienced in applying the power to the moving jaw without great loss by friction and risk of the parts breaking when any hard piece, such as a steel-chisel point, becomes wedged in between the jaws.

My invention is for removing these difficulties by applying the direct action of water in a close chamber to give motion to the rocking jaw. For this purpose I employ a close vessel of great strength, containing water or other liquid, and at one side of this vessel is a cylinder and piston, the rod of which acts upon the moving jaw. The power is derived from a reciprocating plunger that is forced into the liquid in the vessel, and, by the displacement thereof, moves the piston outwardly, and thereby the hydraulic force is applied directly upon the moving jaw without unnecessary loss by friction. I compensate for any leakage of the liquid from the vessel by a supply that is drawn in whenever the plunger, in drawing back, produces a minus pressure. I provide a variable stop to regulate the return or opening movement of the jaw, and a safety-valve to prevent injury to the apparatus in case of any substance getting between the jaws that cannot be crushed.

In the drawing, Figure 1 is a longitudinal section of the apparatus, and Fig. 2 is a transverse section of the same.

The stationary jaw *a* is connected with the water-vessel *b* by the frames or side pieces *c*, and between these is the moving jaw *d*. These jaws *a* and *d* are to be of any desired construction, and adapted to the character of work to be performed. The jaw *d* is shown as swinging upon the shaft or trunnions *e*, and a rod or rods, *g*, with an India-rubber or other spring, *h*, are employed to draw back the jaw and open the same, the spring resting against the cross-bearer *k*, and the nut *i* being applied to the rod *g* to regulate

the force that acts to open the jaw and move the actuating ram in its return motion. The actuating ram or piston *l* is made to fit the cylindrical opening *n* in the water-vessel *b*, and extends in the form of a rod or ram to the outer side of the moving jaw. I prefer that the said rod be spread so as to take a long horizontal bearing against the side of said jaw. The distance that the jaw *d* and ram *b* are allowed to move back is regulated by the screw *o*, that has a cylindrical rod passing through a stuffing-box, *p*, and forming a stop that regulates the return movement of the said ram. The plunger *r*, passing through the gland or stuffing-box *s*, is connected to a crank or other device for communicating a reciprocating motion, and the amount of movement should be variable so as to be in proportion to the movement given to the jaw *d* by the ram *l*, for it will be apparent that when the ram or plunger *r* is forced down into the water in the vessel *b*, the ram *l* will be moved by the pressure of the water due to the displacement by the plunger *r*, and when that plunger is raised, the ram and jaw will be allowed to move back by the action of the springs *h* and rods *g*. The screw and plunger-rod *t*, passing through the gland *u*, are employed to displace sufficient water to prevent the existence of any space not filled with water when the plunger *r* rises, for should such vacuum space exist, the plunger or ram *l* would not be moved by the descent of the plunger *r* until such space had been filled with the water displaced by said plunger *r*.

In order to prevent injury to the parts in case any substance passes into the stone-breaker that will not easily break, I employ the safety-valve *t'* properly weighted, so that any excess of pressure will open the same, and allow the water to pass away to any suitable reservoir. The inlet-valve *u'* in a pipe leading to such reservoir may be employed to allow water to be drawn into the vessel *b* as the plunger *r* rises, in case there should not be sufficient in said vessel *b*.

I have spoken herein of the vessel *b* containing water; but oil or other liquid may be employed instead of water.

By this construction the stone-crushing apparatus is under the most perfect control, and there is very little loss of power from friction.

I claim as my invention—

1. A hydraulic ram, reciprocated by a reciprocating plunger acting upon the liquid in an enclosed vessel, substantially as set forth.

2. The stone-crushing jaws, combined with the ram *l* and reciprocating plunger *r*, substantially as set forth.

3. The stop *o*, ram *l*, rods *g*, and springs *h*, in combination with the moving jaw *d* and stationary jaw *a*, as and for the purposes set forth.

4. The adjustable displacement plunger *t*, in combination with the plunger *r*, ram *l*, and wa-

ter-vessel *b*, substantially as and for the purposes set forth.

5. The stone-crushing jaws, in combination with hydraulic mechanism, substantially as set forth, for moving one or both such jaws, as set forth.

Signed by me this 30th day of August, A. D. 1871.

Witnesses:

GEO. T. PINCKNEY.

CHAS. H. SMITH.

A. H. SMITH.

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