D. HUGHES.

Quartz Crusher.

No. 52,716. Patented Feb. 20, 1866.

Fig. 2

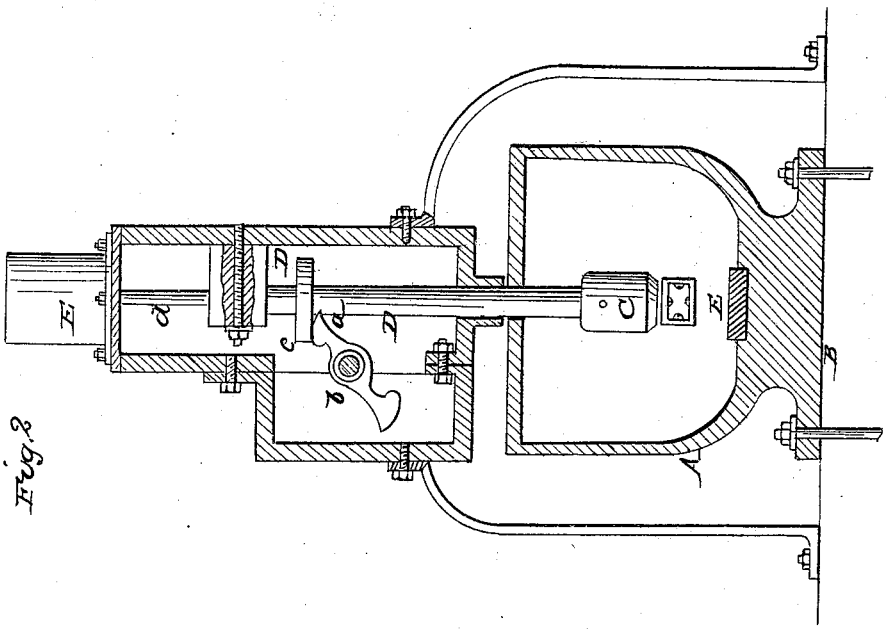
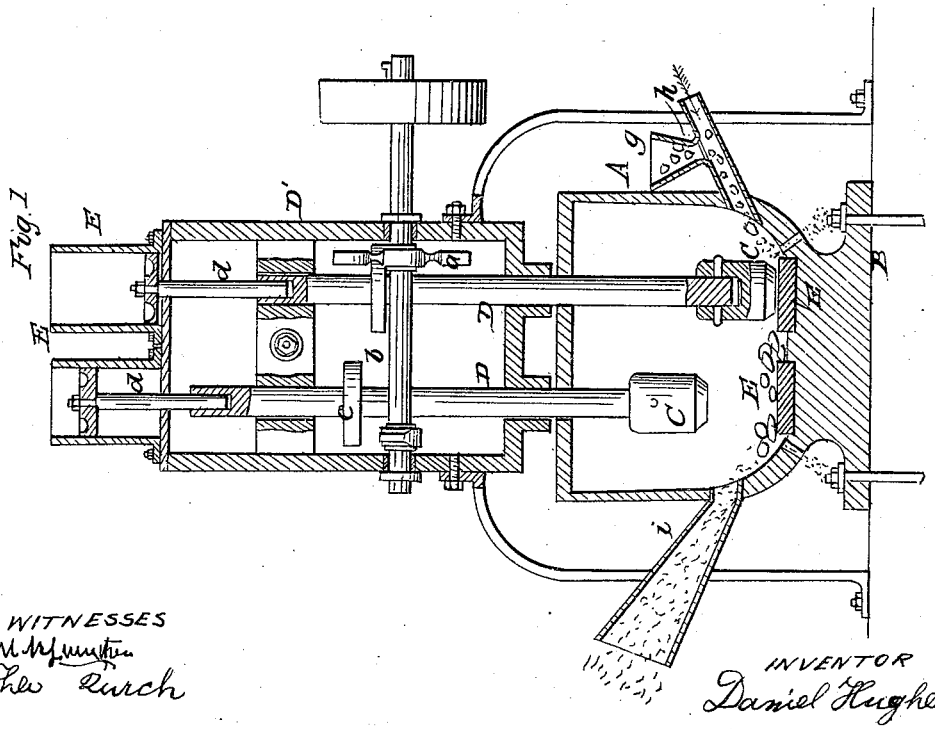


Fig. 1



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

DANIEL HUGHES, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN QUARTZ-CRUSHING.

Specification forming part of Letters Patent No. **52,716**, dated February 20, 1866.

To all whom it may concern:

Be it known that I, DANIEL HUGHES, of Rochester, in the county of Monroe and State of New York, have invented a new and Improved Machine for Crushing Quartz, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a longitudinal vertical section of this invention. Fig. 2 is a transverse vertical section of the same.

Similar letters of reference indicate corresponding parts.

This invention relates to certain improvements in that class of quartz-crushers in which stampers or pestles are used, the force of which is increased by the action of steam or of the atmospheric air on a piston working in a closed or open cylinder. In ordinary crushers of this construction the piston-rod is firmly connected to the stamper-rod, and the pestle cannot turn without turning the piston to which it is attached, and thereby the operation of turning said pestle is rendered difficult, if not impracticable. This difficulty is obviated by providing the stamper-rod with a socket to receive the end of the piston-rod, which is loosely inserted therein, so as to permit the pestle to rotate independent of the piston by the action of a tappet secured to the driving-shaft on a disk or shoulder attached to the stamper-rod. A piece of leather or other suitable material inserted between the end of the piston-rod and the bottom of the socket prevents jars at that point, and for the same purpose a piece of leather or other suitable material is inserted into the socket of the pestle between the bottom thereof and the lower end of the stamper-rod.

An air-blast introduced at one side of the stamper-box or mortar drives the fine particles of quartz out through an upwardly-inclined spout, the inclination of which is so regulated that the coarse particles which are or may be carried up a short distance by the air-blast roll back into the mortar, where they are again exposed to the action of the stampers until they have been reduced to the desired degree of fineness. The mortar is provided with a series of small holes round the anvils, through which the heaviest parts of the quartz, such as small grains of gold or silver, drop down, so as to reduce the quantity of mercury which has to be used after the stamping process for amalgamation.

A represents a mortar made of cast-iron or any other suitable material, and supported by a bed-plate, B. Said mortar is arranged for two (more or less) pestles, C, which are secured to rods D by means of suitable keys or wedges, and in order to reduce the jar between the end of the rods and the pestles small disks of leather or other suitable material are placed in the sockets intended to receive the rods, as shown in Fig. 1.

The pestles C are opposite to movable anvils E′, which are inserted in the bottom of the mortar, so that they can be removed when they are worn out and replaced by new ones.

The stampers are lifted by tappets *a* secured to the main shaft *b*, said tappets being made to act on collars or disks *c*, which are fastened on the rods D. These rods rise up through a box, D′, the top of which supports the cylinders E, and the upper ends of the said rods are bored out to receive the lower ends of piston-rods *d* connecting to pistons *e*, which work in the cylinders E. These cylinders may be open on the top, and as the pistons rise by the action of the tappets on the disks of the stampers the air in the lower parts of said cylinders is rarefied, and when the tappets relieve the stampers the pressure of the outside atmosphere on the upper sides of the pistons causes said stampers to descend with great force. If desired, the cylinders E may be closed and arranged to be used with steam; but in most cases the pressure of the atmospheric air is sufficient to impart to the descending stampers the requisite force or momentum.

The tappets *a*, on sweeping over the lower surfaces of the disks C, have a tendency to impart to the stampers a revolving motion, and in order to obtain the benefit of this motion the piston-rods *d* are placed loosely into their sockets in the upper ends of the stamper-rods D. Small disks of leather, *f*, placed into these sockets and under the ends of the piston-rods, serve to lessen the jar and prevent the rods from being bent or injured by the continuous blows to which they are exposed when the machine is in operation.

The quartz to be crushed is fed to the mortar

A through a hopper, *g*, which communicates with a tube, *h*, and through this tube a current of air is forced in. By this air those particles of quartz which have been reduced to the desired degree of fineness are swept off through the inclined spout *i*, which extends from that side of the mortar opposite the tube *h*. The inclination of this spout is so adjusted that such particles of quartz which may be carried partially up through the spout before they have been reduced to the requisite fineness will roll back into the mortar, to be acted upon again by the stampers until they are reduced to such a state that the current of air blown in through the tube *h* is enabled to carry them off through the spout.

Small holes *j* made in the bottom of the mortar around the anvils E′ serve to carry off such grains of pure gold or silver which may be mixed with the quartz and which cannot be reduced by the action of the stampers to such a degree of fineness that the current of air forced in through the tube is enabled to sweep them off. A pretty large quantity of the precious metals is thus separated from the quartz in a pure state, and the subsequent operation of treating the crushed quartz either with mercury or otherwise is facilitated.

I claim as new and desire to secure by Letters Patent—

1. Placing the ends of the piston-rods *d* loosely into the sockets of the stamper-rods D, substantially as and for the purpose set forth.

2. The combination of the leather disks *f* with the rotary stamp-rods D and loose piston-rods *d*, as and for the purposes specified.

DANIEL HUGHES.

Witnesses:

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