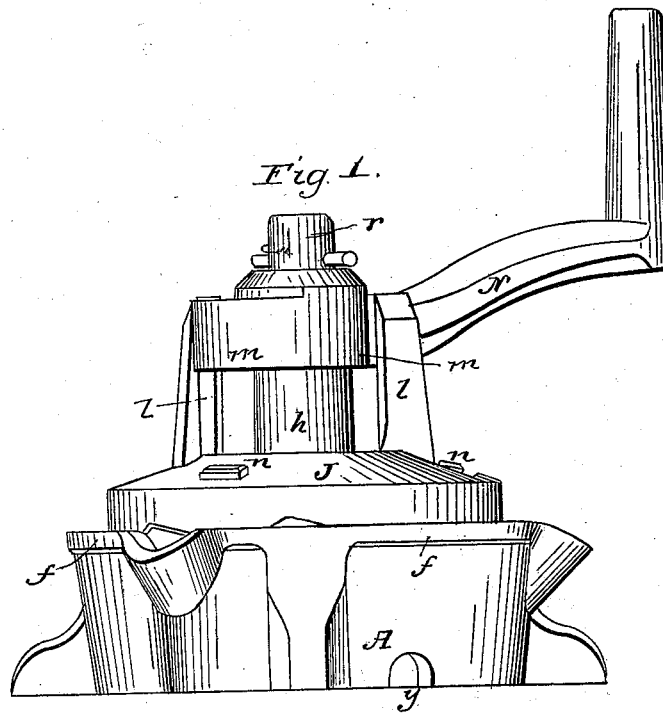


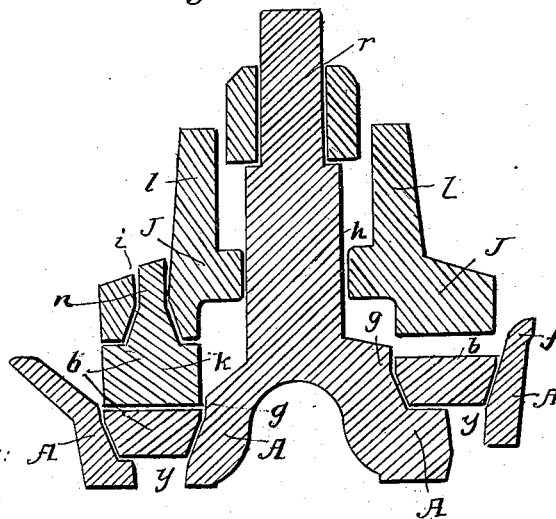
A. P. STEPHENS.  
Percussion Grinder.

No. 46,597.

Patented Feb. 28, 1865.



*Fig. 2.*



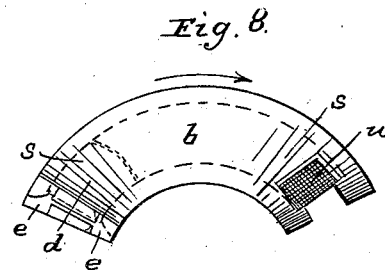
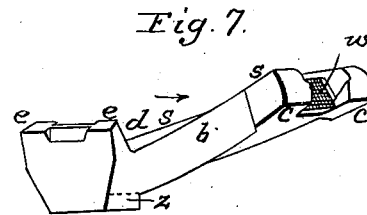
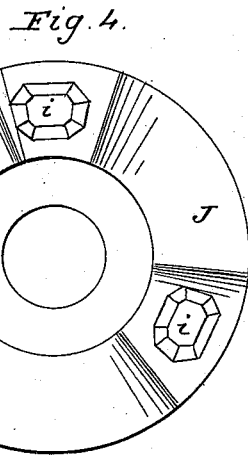
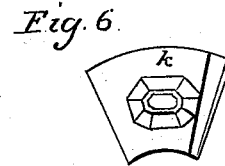
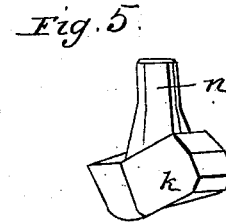
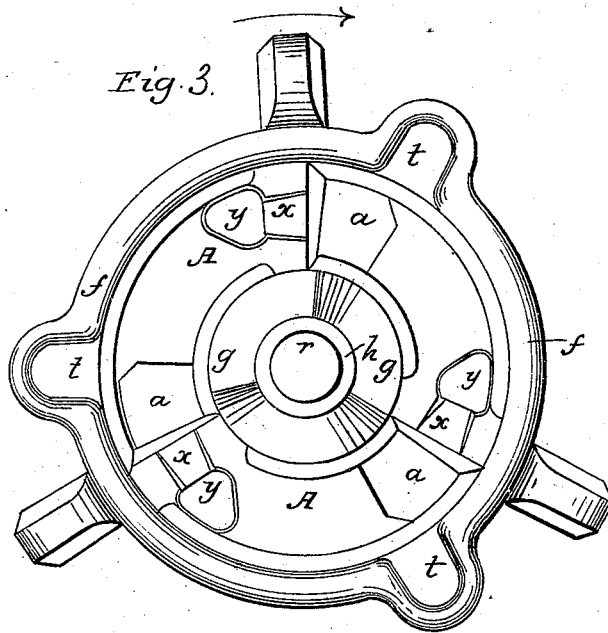
Witnesses: A  
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W. L. Bennett

Inventor:  
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A. P. STEPHENS.  
Percussion Grinder.

No. 46,597.

Patented Feb. 28, 1865.



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Inventor  
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# UNITED STATES PATENT OFFICE.

ANSON P. STEPHENS, OF BROOKLYN, NEW YORK.

## IMPROVEMENT IN PERCUSSION-GRINDERS.

Specification forming part of Letters Patent No. 46,597, dated February 28, 1865.

*To all whom it may concern:*

Be it known that I, ANSON P. STEPHENS, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful machine, which I denominate a Percussion-Grinder, for grinding quartz and other substances; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a percussion-grinder constructed according to my invention. Fig. 2 represents a vertical transverse section of the same. Fig. 3 represents a plan of the bed-plate of the same. Fig. 4 represents a plan of the stock of the upper grinder reversed, and with the shoes, which form the grinding-surfaces, removed. Figs. 5 and 6 represent a side view and a top view of one of the shoes of the upper grinder, and Figs. 7 and 8 represent similar views of one of the shoes of the under grinder or bed of the machine.

My invention consists of a machine which operates with a compound percussive and grinding action, and is composed substantially of two grinders, one of which turns upon the other and is raised and permitted to fall at intervals during its turning, so that the material between the two is crushed and reduced by alternate pounding and grinding.

The second part of the invention consists of the combination of the said two grinders with apertures in the lower grinder for the escape of the material when reduced to the required fineness.

The machine represented in the accompanying drawing embodies the invention in the best form thus far devised by me. It has a circular bed-plate, A, which forms the stock of the lower grinder, being fitted with three shoes, *b b b*, Figs. 2, 7, and 8, whose upper surfaces are inclined, and which are so arranged in the bed-plate that the under side, *c*, of the uppermost end of one shoe rests upon the upper side, *e*, of the lower end of the next adjoining shoe. The shoes and bed-plate thus form a lower grinder, whose grinding-surface has three pockets formed by the lowermost parts, *d*, of the surfaces of the three shoes, each of said pockets being approached on one side by the abrupt descent from the uppermost end of the adjoining shoe. The rim *f* of the bed-

plate extends above the shoes, so as to inclose them and to form a curb, which prevents the escape of the material under treatment. The central part of the bed-plate is also extended upward to form a hub, *g g*, against the periphery of which the inner edges of the shoes abut, and from the center of this hub there rises an upright arbor, *h*, upon which, as an axle, the upper grinder turns.

The upper grinder is formed of a circular stock, J, fitted with shoes *k*, Figs. 2, 5, and 6, whose under sides are inclined to fit the upper surfaces of the shoes of the lower grinder when the upper grinder is in place, as shown at Figs. 1 and 2. These upper shoes are narrower than the lower shoes, so that they can turn freely in the annular trough formed by the upper surfaces of the lower shoes, the periphery of the central hub, *g' g*, and the interior surface of the bed-plate or curb. The top of the upper grinder is fitted with two lugs, *l l*, which project upward in positions to engage with the opposite arms *m m* of a crank-handle, N, which is fitted to turn freely upon the head *r* of the central arbor, *h*, and rests upon its shoulder.

When the handle of the machine is turned in the direction of the arrows, Figs. 1, 3, 7, and 8, the upper shoes, *k*, are carried around upon the inclined surfaces *s s* of the lower shoes until the upper ones pass over the abrupt upper ends of the lower shoes, whereupon the upper grinder falls until its shoes come in contact with the bottoms of the pockets. Hence the material subjected to the machine is alternately pounded by the descent of the upper grinder and ground by the movement of the grinding-surface of the upper grinder up the inclined grinding-faces of the lower shoes, which form the surface of the lower grinder.

In order that the material may be fed to the grinding-surfaces, the curb of the machine is formed with three spouts, *t t t*, at which the material can be introduced, and in order that the material may escape when sufficiently reduced, an escape-aperture covered by wire-gauze *w* is formed at the abrupt side of each pocket by making indentations in the ends of the lower shoes, and portions of the bed beneath the ends of the shoes are channeled, as seen at *x*, Fig. 3, to permit the material which works out through the wire-gauze to pass to openings *y y*, at which it can leave the ma-

chine. Hence, when the machine is operating the material dragged around by the frictional contact of the upper grinding-surface passes over the wire-gauze to descend into the succeeding pocket, and is thereby screened, the finer portion escaping through the meshes of the gauze, while the coarser descends into the pocket to be pounded and ground and dragged onward until it is reduced sufficiently to enable it to pass through the gauze.

The lower shoes are held in their places by lugs *z*, formed upon them, which are received in corresponding openings *a a* in the bed-plate, and they are made fast by jamming pieces of leather or wood between the sides of the lugs and of the openings. The upper shoes are also formed with lugs *n*, or shanks, which are received in holes *i*, formed in the stock of the upper grinder, and are secured therein by means of thin pieces of wood or leather applied to the shanks before they are inserted in the holes.

The construction of the grinding-faces upon separate pieces or shoes which are detachable from the stocks which hold them is advantageous, because it permits of their ready removal and replacement, and because it permits them to be made of a very hard material, such as tempered steel or cast iron chilled at the grinding-surface; but it is obvious that when the shoes are in place they are combined with the stock upon the upper side and the bed at the lower side to form two grinders, just as if these grinders were each formed of one piece, so that the construction of the grinders with detachable shoes, although advantageous, is not essential to my invention.

As the wear may be rapid at the upper ends of the lower shoes, where their surfaces are reduced to form the openings for the escape of the material, I propose to partially fill up the openings by forming the upper end of the shoe with a solid corner, which will be preceded by a hole containing the wire-gauze and

forming a spout down which the material will pass to the succeeding pocket. If the weight of the upper grinder is not sufficient of itself to strike the material with the requisite force, the percussive action may be increased by loading the upper grinder with weights or by the application of springs.

The machine represented in the drawings is adapted to being operated by hand, but it may be driven by power and made of any required dimensions. The number of pockets may also be increased or diminished, but I do not propose to use less than two pockets, placed diametrically opposite each other. The machine may be used to amalgamate ores as well as to crush and grind them. When used to amalgamate, the lower shoes are constructed without escape apertures at their ends. The machine may also be used to grind ores or other materials with water or other liquids. In such cases one or more discharge-apertures may be formed in the curb of the lower grinder, and such apertures may be fitted with sieves.

I am aware that a series of wheels have been made to rise and descend independent of the runner with which they revolve. This I do not claim; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of two grinders, one of which turns upon the other and is raised and permitted to fall at intervals so as to pound and grind the material alternately, substantially as set forth.

2. The combination of the said two grinders, with apertures in the lower grinder for the escape of fine material, substantially as set forth.

I testify whereof I have hereunto set my hand this 6th day of December, A. D. 1864.

ANSON P. STEPHENS.

Witnesses:

E. S. RENWICK,  
W. L. BENNEM.