

N. CONKLING.

Ore Mill.

No. 19,670.

Patented Mar. 16, 1858.

Fig. 3.

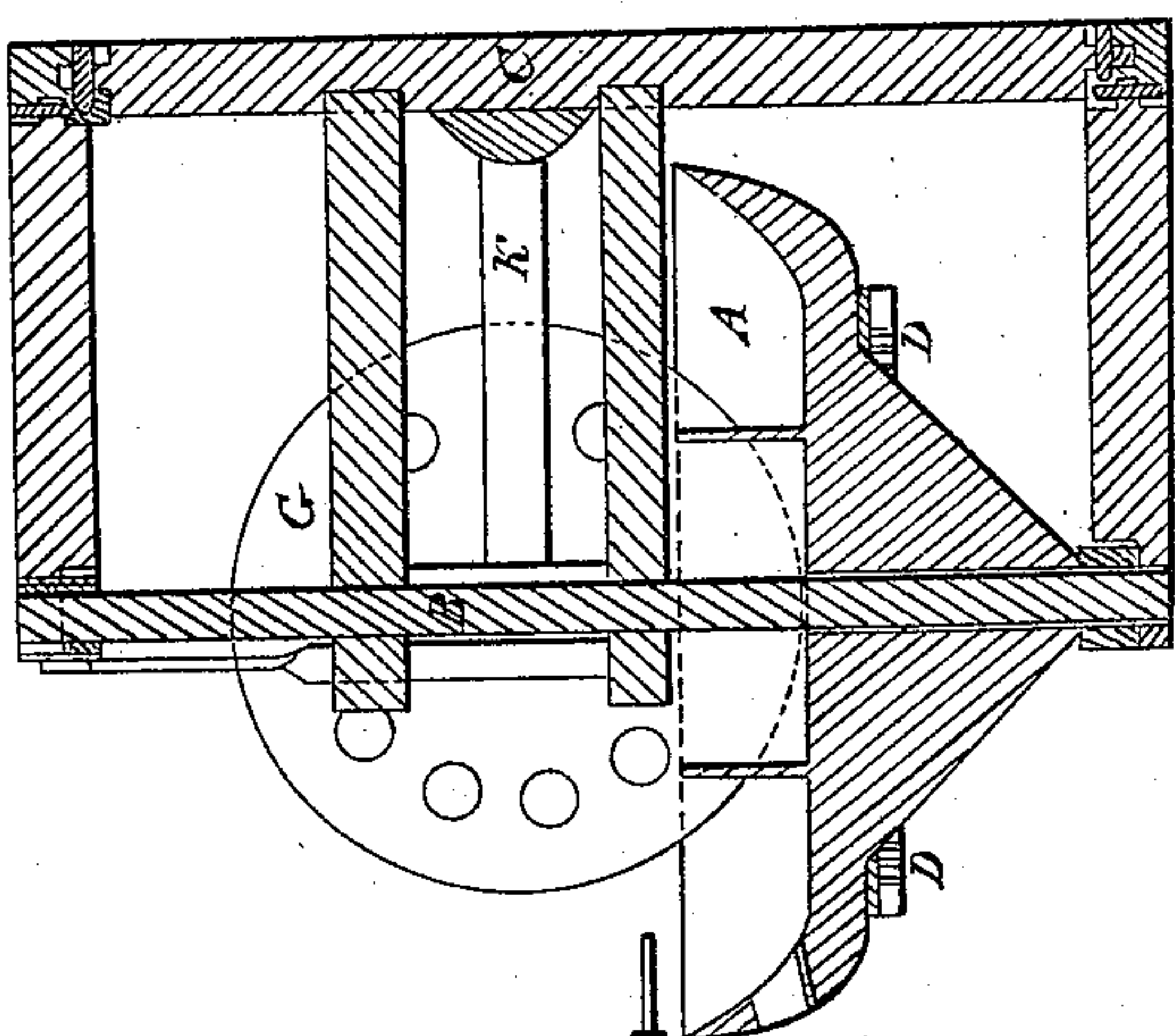


Fig. 4.

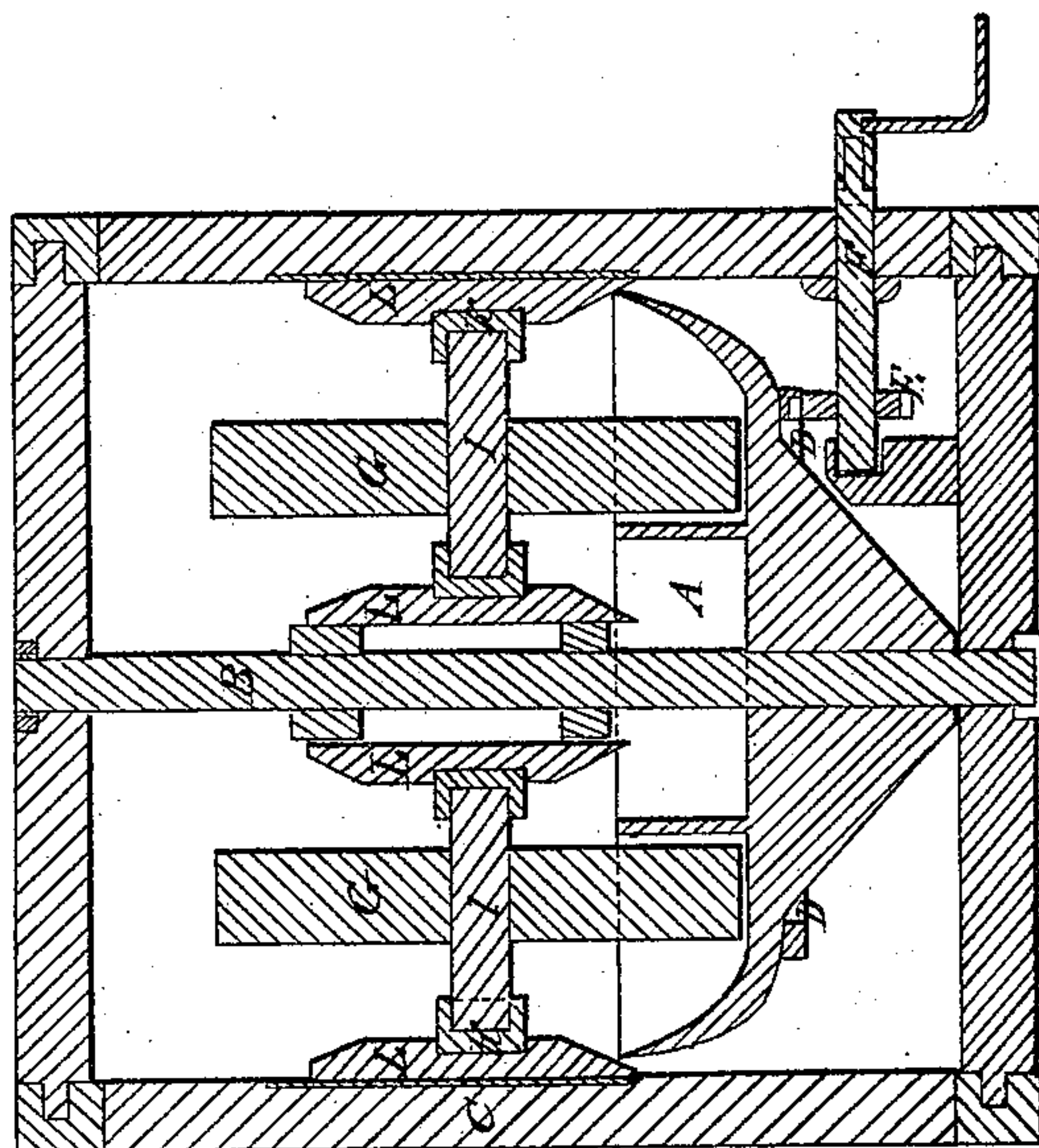


Fig. 1.

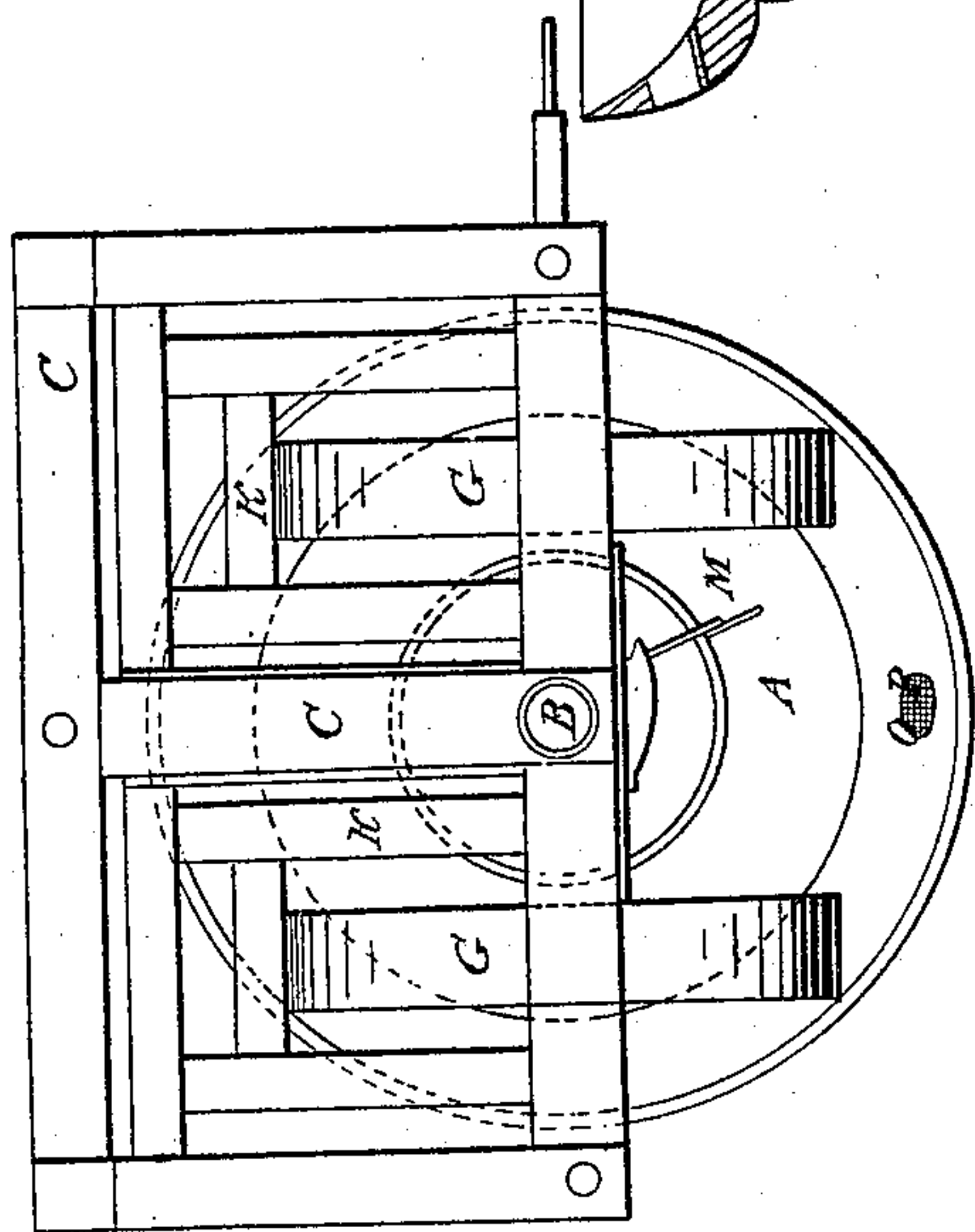
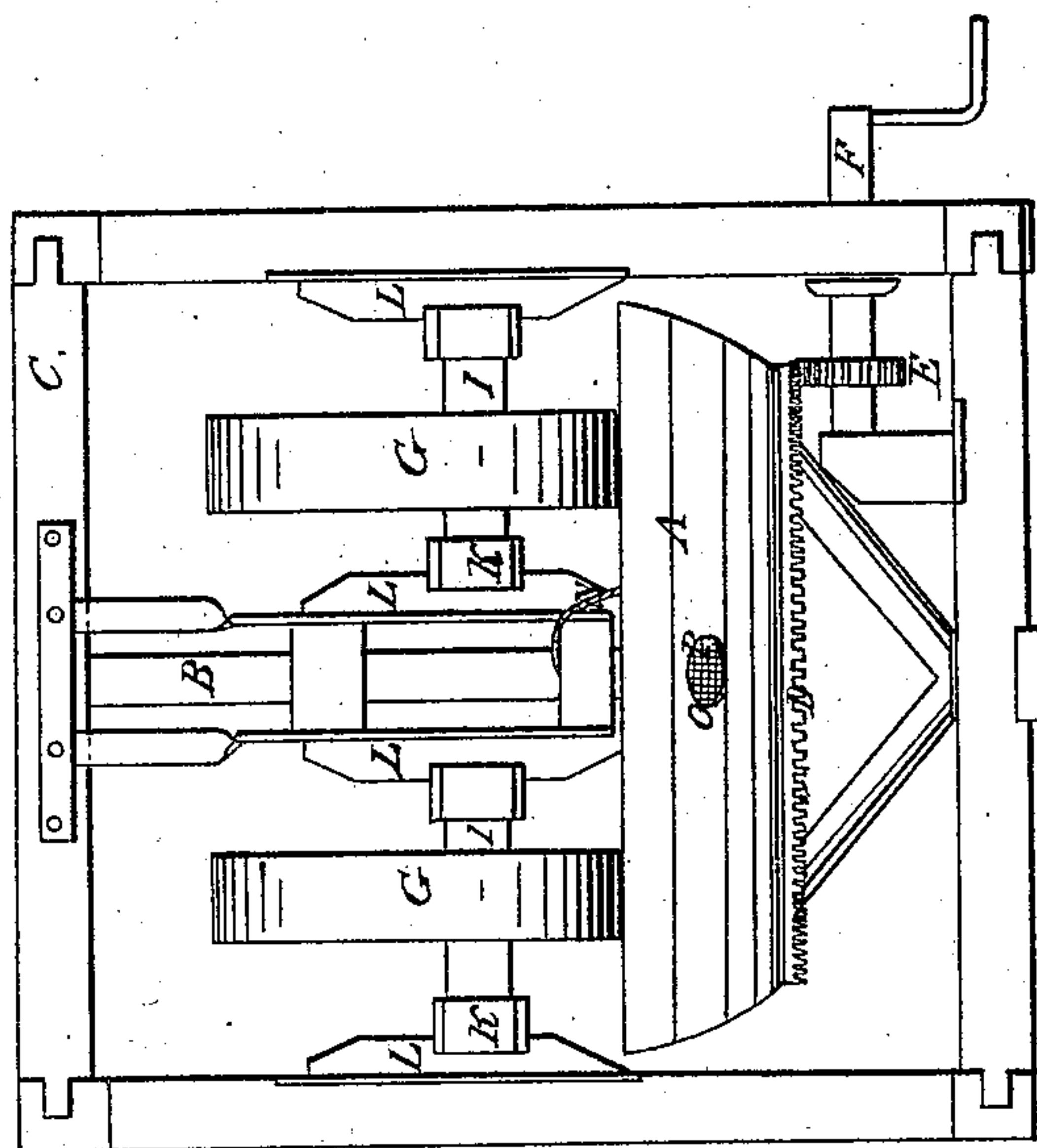


Fig. 2.



UNITED STATES PATENT OFFICE.

NATHANIEL CONKLING, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN MACHINES FOR CRUSHING ORE.

Specification forming part of Letters Patent No. 19,670, dated March 16, 1858.

To all whom it may concern:

Be it known that I, NATHANIEL CONKLING, of Brooklyn, Kings county, New York, have invented an Improved Machine for Pulverizing or Crushing Ore; and I do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, of which—

Figure 1 exhibits a top view of the said machine. Fig. 2 is a front elevation of it; Fig. 3, a vertical and transverse section of it; Fig. 4, a vertical section taken through the grinding-wheels and upright shaft to be hereinafter explained.

In the drawings, A is a circular or endless trough, which is arranged horizontally and affixed to a vertical spindle or shaft B, sustained by and within a suitable frame C, and so as to be capable of being revolved. The said circular trough is provided with an endless toothed rack D, extending around its under surface and made to engage with a pinion-gear E, which is fixed on a driving-shaft F, arranged as seen in the drawings, the same being to enable the trough A to be put in revolution horizontally. Operating in connection with said trough are one, two, or more heavy crushing-wheels G, which are arranged within it, as shown in the drawings, each of said wheels having its shaft I supported by a rocker-frame K, arranged and applied to the main frame C in such manner as to enable the wheel G to freely rise upward away from the bottom of the trough and to approach said bottom, as circumstances may require. For this purpose the rocker-frame at its rear end is hinged to the rear posts of the frame C, while at its front end it plays between and is guided by two vertical and parallel guides L L, arranged as shown in the drawings.

I am aware that it is not new to apply each crushing-roller on the end of a shaft arranged so as to vibrate upward and downward and to bear against a vertical post. This mode of applying the wheel, which will be found in Davis and Miner's application, rejected July, 1852, is attended with serious objections, for the post soon becomes indented by the shaft, so as to operate to obstruct the operation of the shaft, and, furthermore, the friction of the post against the shaft has a tendency to prevent the wheel from rising over a lump of

ore. In my machine no such difficulties are experienced, because the shaft of each crushing-wheel turns in and is supported by vibrating or rocker frame K, and thus is free to rotate within its frame, and to rise and fall without any obstruction from a post or any friction against such post. Furthermore, the shaft, by means of the guides L L, is supported longitudinally, so as to preserve the wheel in its proper place or path in the trough. Besides this, the vibrating frame so supports the shaft as to prevent it from being twisted, bent, or broken, as it will be liable to be when supported by a post and arranged as it is in Davis and Miner's machine.

Besides the above, other important advantages result from the employment of the rocker-frame and guides in supporting the wheel.

In order to prevent the ore from packing between the inner vertical side of the trough and that of each wheel, I arrange in the trough and near to each wheel and close against the bottom and inner side of the trough, as shown in Fig. 1, a deflector, guide-plate, or scraper M, which I support in position by means of an arm N, extending downward from the frame-work C, as shown in Figs. 1 and 2. The circular trough is provided with one or more circular openings O formed through its side, each of such openings being furnished with a wire netting or sieve P, in order to prevent the escape of matters which should be retained within the trough.

In operating with the above-described machine the auriferous or other ore to be reduced is to be placed in the trough, the said trough put in revolution, and water suffered to flow into it. The water and ore will be carried by the trough toward and under each wheel G, and the wheel be made to revolve upon the ore so as to crush and pulverize it, the water and pulverized earthy matter being discharged through the orifice O.

In some respects my machine resembles a Chilian mill for grinding ores or auriferous quartz, and it may also be said to resemble in some particulars the well-known machines of Berdan and Gardiner, as patented in the United States of America, the one on May 24, 1853, and the other on June 7, 1853. There are, however, important differences between my machine and such others, and these dif-

ferences render my said machine very valuable in comparison with the said other machines.

In the common "Chilian mill" the wheel or wheels are rolled around within the trough while the latter is stationary, the said wheels revolving on their axis at the same time. While so operating each wheel as it descends into the water impels the water forward of it and creates a current in advance, which washes away the material from the wheel and keeps it more or less out of the sphere of the action of the wheel. This is a material defect of the Chilian mill, and in fact in any other of the kind in which the trough is stationary and the wheels made to roll around within said trough.

In the machines of Berdan and Gardiner the trough is arranged at an inclination to the horizon, and within said trough one or more large and very heavy iron spheres or balls are employed to produce the reduction and pulverization of the ore, and, besides, the trough has rotary motion imparted to it.

In Berdan's machine, owing to the inclination of the trough, the ore will pile behind the ball, and very little of it pass around or up the inclined surface of the trough so as to come in front of and underneath the ball and be crushed by it. This great defect in the operation of Berdan's machine has caused such machine (as I have been informed) to be entirely abandoned in practice.

In Gardiner's machine the rocking motion of the trough while rotating causes the water and mineral to keep at such a distance ahead of the balls as to render it difficult for them to overtake and crush it, and this difficulty has caused the general abandonment of the said machine.

Besides the above, in both Berdan's and Gardiner's machines, as the balls work on a surface inclined to the horizon and at an angle of about forty-five degrees, nearly half, or at any rate a very material portion, of the weight of each ball is lost so far as crushing of the ore is concerned.

In my machine, as the trough is arranged horizontally, we have the advantage, first, of bringing the whole weight of the crushing-rollers to bear upon the ore; second, that of moving the water and the ore together toward the rollers, whereby the swash or current that is produced by the rollers when rolling around in a stationary trough is avoided.

I do not claim for crushing or mixing any substance or substances one or more wheels or one or more spheres or heavy balls made to roll around in a stationary circular endless trough; nor do I claim arranging the axis of the trough at an inclination from a vertical line, when spheres or balls are placed in said trough and it is put in rotation; nor do I claim the application of a grinding-wheel to a vibrating shaft supported by a post, as in the machine of Davis and Miner, hereinbefore mentioned; but

What I do claim in the machine constructed in manner and so to operate substantially as described (that is to say, with its circular trough arranged and made to revolve horizontally or thereabout, and each of the wheels applied thereto in such manner that it may be stationary with respect to said trough, except in being capable of revolving on its axis and of rising up and down to accommodate itself to the ore in the trough during the revolution of said trough) is—

1. Supporting each wheel G by means of a rocker-frame and guides applied to it and the main frame or arranged therewith, substantially in the manner as hereinbefore specified.

2. The arrangement of a deflecting-scraper with respect to the inner surfaces of each wheel and the trough, and so as to operate substantially in manner and for the purpose as hereinbefore specified.

In testimony whereof I have hereunto set my signature this 3d day of July, A. D. 1856.

N. CONKLING.

Witnesses:

R. H. EDDY,
F. P. HALE, Jr.