E. J. HYDE.

Grinding Mill.

No. 30,407. Patented Oct. 16, 1860.

Fig. 1.

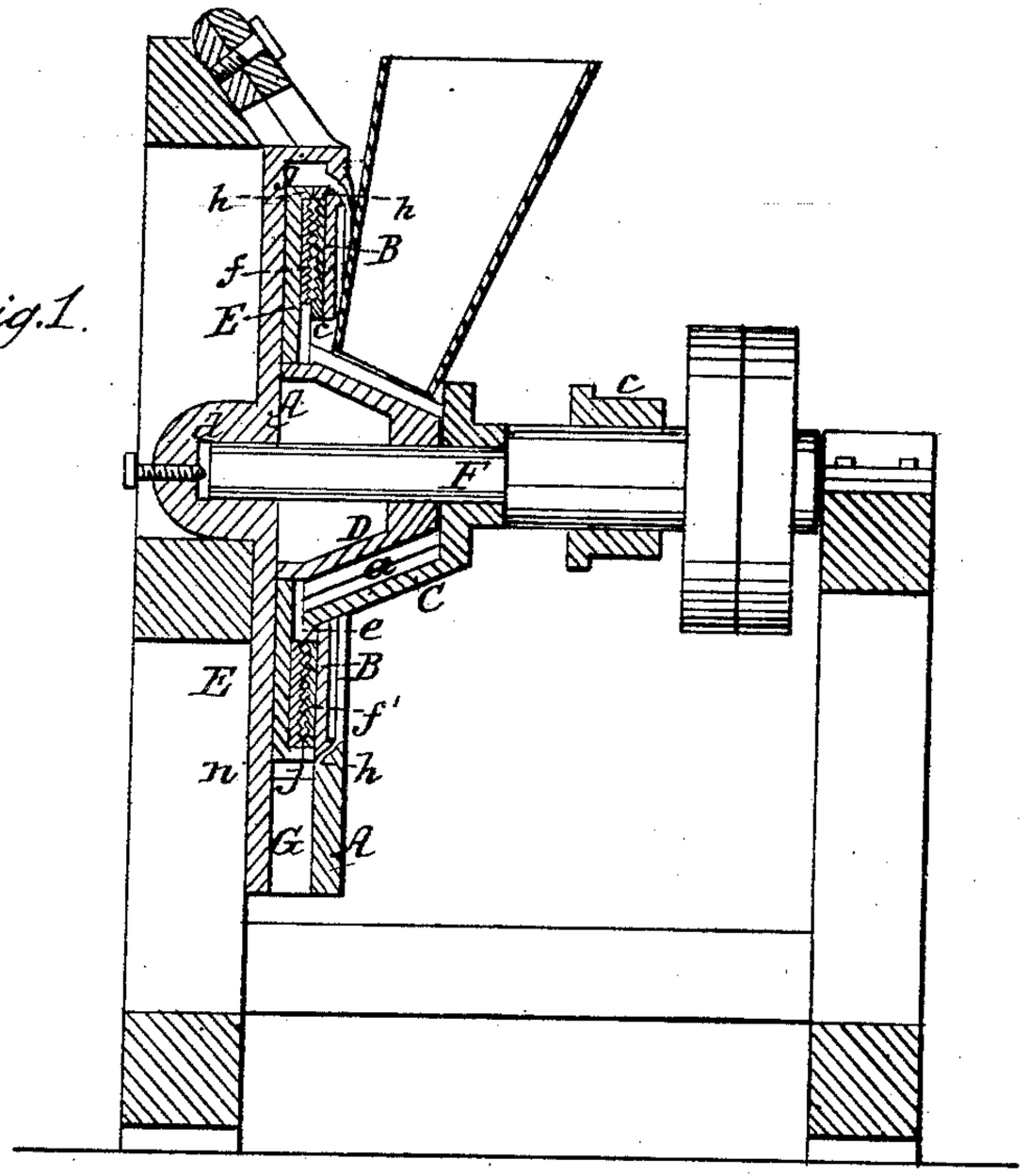


Fig. 2.

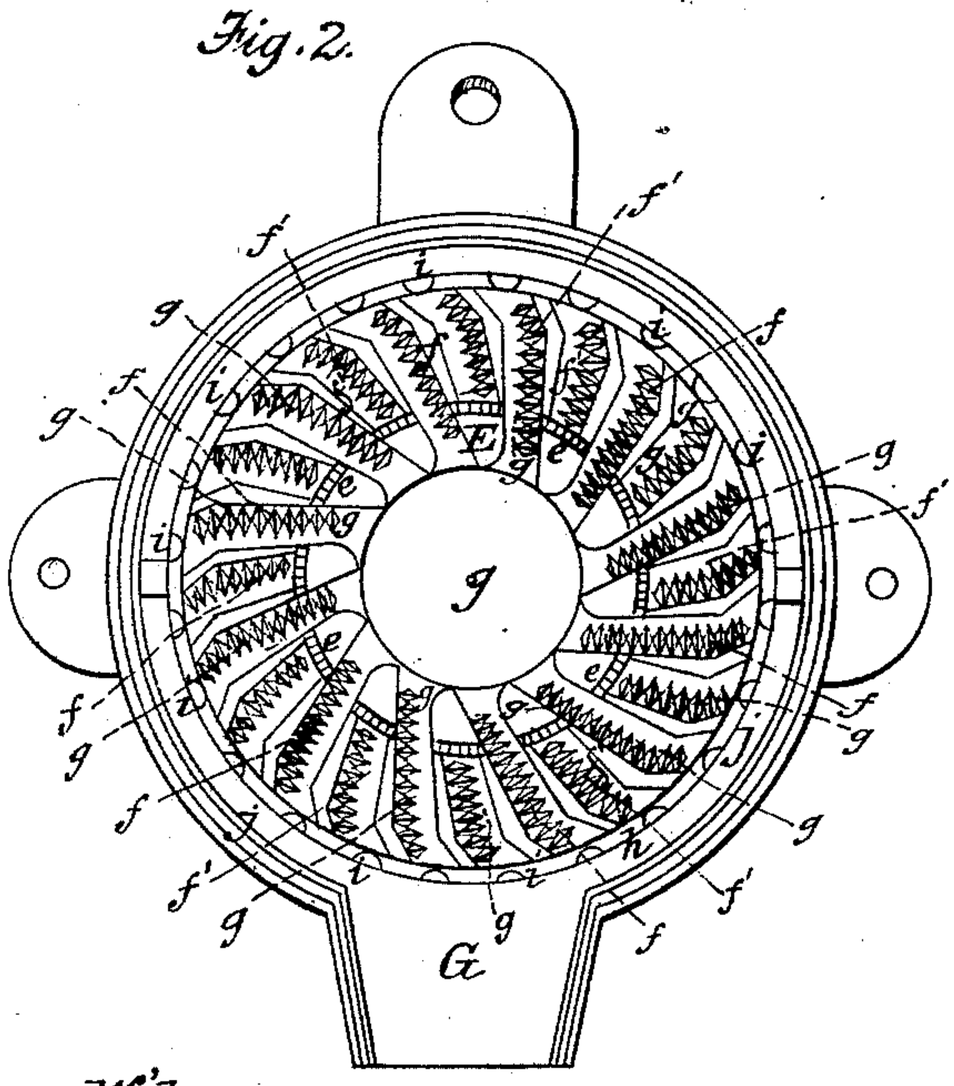
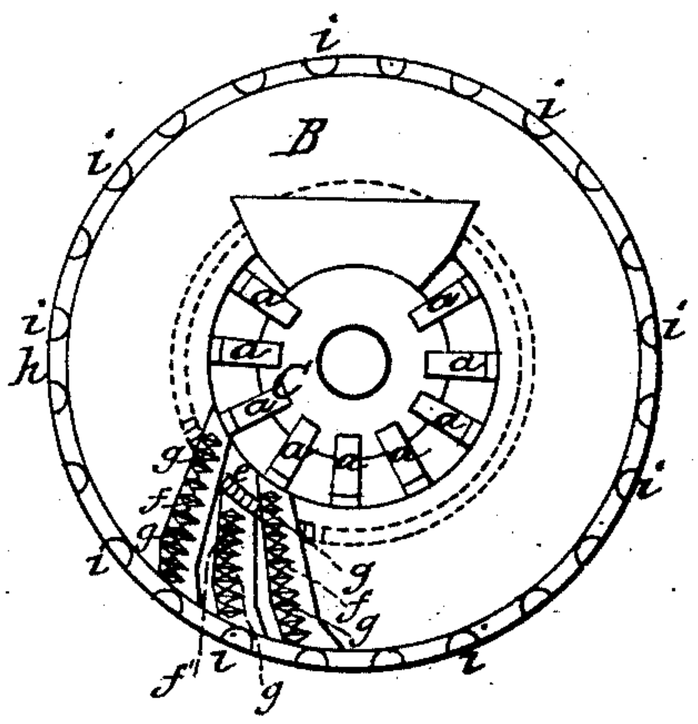


Fig. 3.



Witnesses.
Charles D. Freeman.
Anton Colburn.

Inventor:
Edw. J. Hyde

UNITED STATES PATENT OFFICE.

EDWARD J. HYDE, OF PHILADELPHIA, PENNSYLVANIA.

GRINDING-MILL.

Specification of Letters Patent No. 30,407, dated October 16, 1860.

To all whom it may concern:

Be it known that I, E. J. HYDE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Mills; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1, represents a vertical central section of my invention. Fig. 2, is a plan or top view of the rotary grinding cone and disk, and, Fig. 3, is a similar view of the stationary disk and concave.

Similar letters of reference indicate corresponding parts in the several figures.

To enable those skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, represents a shell or case of cast iron or other material, which is secured in a suitable frame or box. Secured to this shell by means of screws is the stationary disk B, and I prefer to make the disk of a separate piece from the case so that when the same is worn out, it can be replaced without the necessity of throwing away the whole shell. The central portion of this disk forms a concave C, to which grain or any other substance, which is to be ground is introduced by means of a hopper box in the usual manner. Said concave is arranged with a series of ridges *a*, and it fits over a cone D, which forms the center of the rotary disk E, and which is rigidly attached to the shaft or spindle F. Motion is imparted to the shaft by means of pulleys or by a crank as may be desired, and it has one of its bearings in a boss *d*, on the center of one of the shells and its other bearing in a journal box secured to the framing which supports the mill, passing freely through the center of the concave C, and through an arc *c*, which is rigidly attached to the shell A. When the mill is put in proper working order the shaft is adjusted by means of a set screw in the center of the boss *d*.

The grinding surfaces on the disks B, and E, are formed of three distinct parts. The concentric ridge *e*, encircles the grinding cone and the mouth of the concave, sloping down toward the center and it is notched all around on its inner side. This ridge, however, is not continuous, it being interrupted at regular distances by eccentric ridges *f*, which alternate with shorter ridges *f'*, of similar construction, which latter however extend only to the outside of the ridge *e*. The ridges *f*, *f'*, form the grinding surfaces, and their cutting sides are furnished with diamond shaped notches *g*, which considerably increase the grinding capacity of my disks. Said notches, however, do not extend over the whole width of the ridges *f*, *f'*, as clearly shown in Figs. 2, and 3, so that they produce both a cutting and crushing surface.

The periphery of each of the disks is closed by a flange *h*, which extends up to the same level with the ridges *f*, *f'*, and these flanges are provided with notches *i*, so that the ground substance when reduced to the required fineness can escape from the grinding surfaces without packing between the eccentric ridges. These notches are made just opposite to the centers of the outer ends of the eccentric ridges *f*, *f'*, and they lead to a channel *j*, between the outer circumference of the disks and the inner circumference of the shell. From this channel the ground substance escapes through the spout G. By this arrangement of the grinding surfaces the substance to be ground is confined on the cone and in the concave by the concentric ridges *e*, and it finds its way to the eccentric ridges only after it has been reduced to a certain degree of fineness. That part of the work, therefore, which takes most power—namely, the cracking—is done nearer to the center and it causes not so much strain on the driving shaft than it does with ordinary mills where a portion of the substance escapes to that portion of the grinding surface farther from the center before it is properly cracked and a great amount of power is wasted.

After the substance has found its way to the eccentric ridges *f*, *f'*, it is exposed to the full and sure action of the surface of said ridges, and it is confined between the concentric ridges *e*, and the flanges *h*, until it is reduced to the desired fineness, when it escapes through the notches *i*. Without these notches it would clog between the eccentric ridges *f*, *f'*, and it would not only form an obstacle to the progress of the mill, but it would also be very liable to heat and become spoiled.

By extending the diamond-shaped notches *g*, only partially over the ridges *f*, *f'*, no portion of the substance to be ground is al-

lowed to escape without having been exposed to the full action of the grinding surfaces and the ridges *f*, *f'*, can be made of considerable depth, the flange *h*, preventing any particle of the substance escaping from the mill before it is reduced to the required degree of fineness.

A mill constructed according to my improvements not only lasts longer before the grinding surfaces have to be renewed but it can also be operated with less power and it produces a result of uniform fineness.

It is not necessary to use all the specified improvements in connection, although I believe all used together make a more perfect mill, but either alone applied to any grinding mill, will be found of advantage.

Notching the eccentric ridges partially across, on the grinding side will be found of great utility, as it adds vastly to the grinding surface, acting upon the grain or other material somewhat like a file or rasp, producing a cutting as well as crushing effect. These notches may be cut, in any form or at any angle desired with good effect, so long as the notch is not cut across the whole width of the ridge, in which case the good effect would be lost, by allowing the material to pass through it, to the next space, without reducing it much, thereby requiring more diameter of grinding surface to produce the same result, which of course would require more power, as a portion of the work would be done farther from the center of motion.

I do not claim broadly the invention of concentric grinding surfaces, but

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The arrangement of the eccentric ridges *f*, *f'*, concentric ridges *e*, and notched flanges *h*, with the disks B, F, and concave C as and for the purposes herein shown and described.

EDWD. J. HYDE.

Witnesses:
CHARLES D. FREEMAN,
ARTHUR COLBURN.