(No Model.)

2 Sheets—Sheet 1.

D. C. STOVER.

GRINDING MILL.

No. 265,289. Patented Oct. 3, 1882.

Fig. 1.

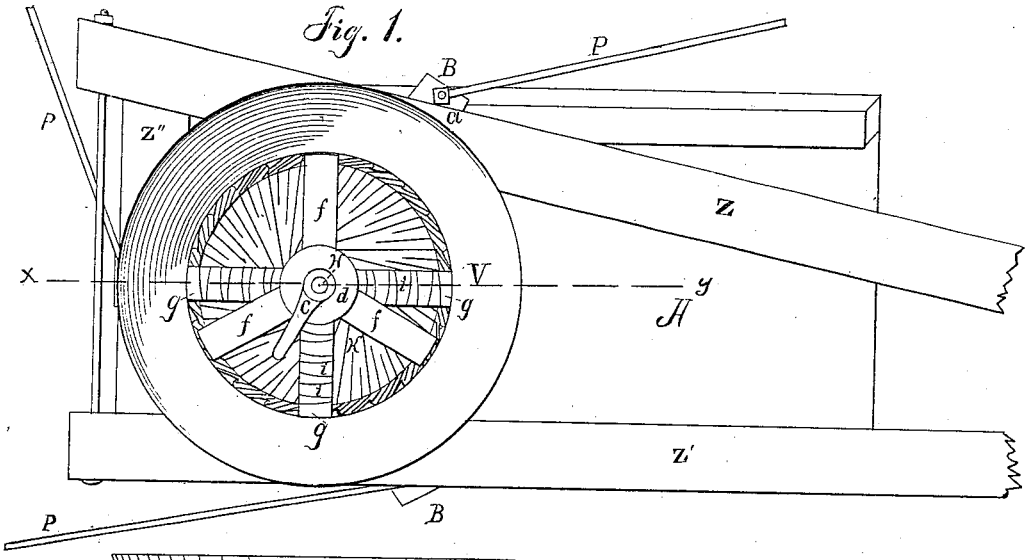
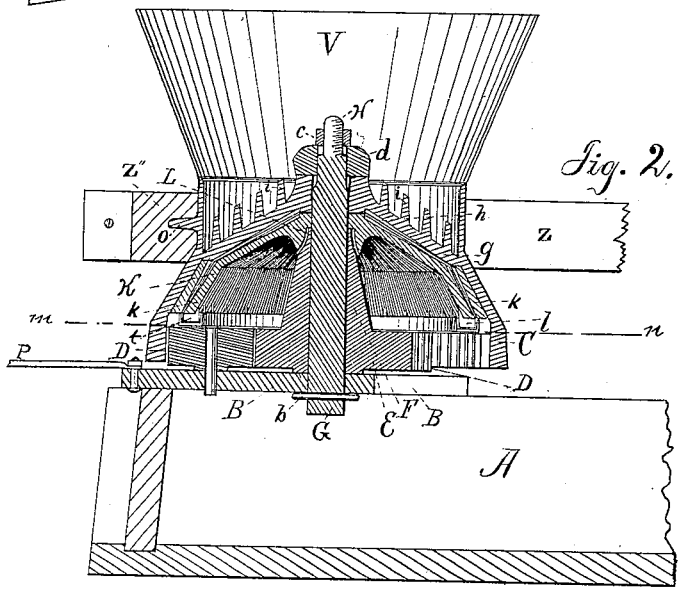


Fig. 2.



WITNESSES:

W. H. Braund

C. L. Taylor

INVENTOR

Daniel C. Stover

by Robt. H. Wiles

ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

D. C. STOVER.

GRINDING MILL.

No. 265,289. Patented Oct. 3, 1882.

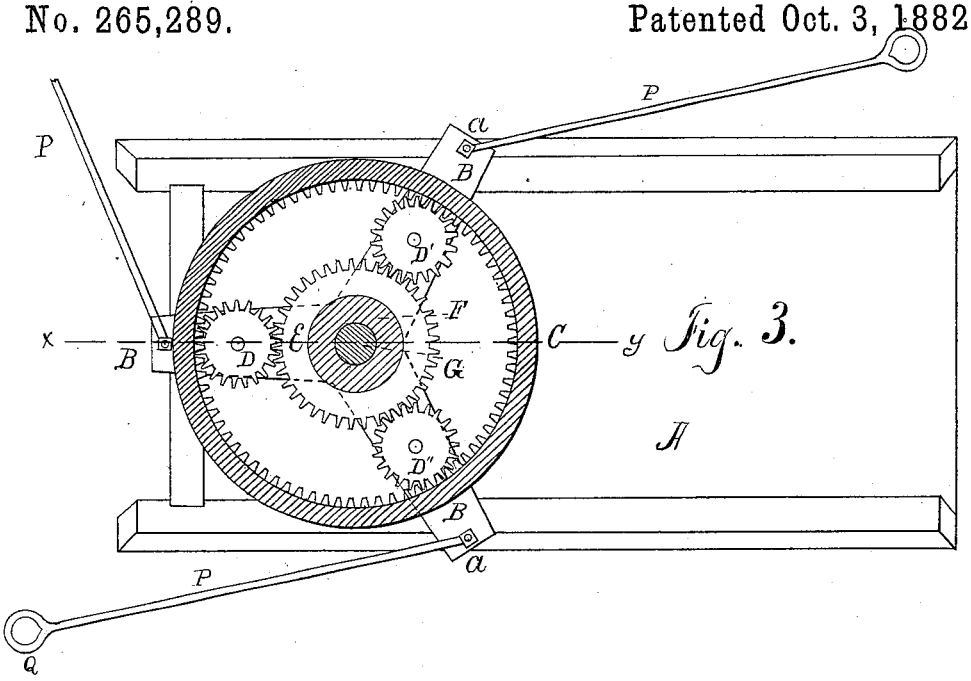


Fig. 3.

Fig. 4.

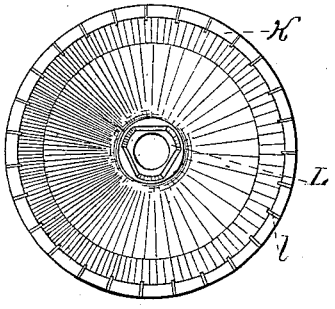


Fig. 6.

Fig. 7.

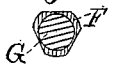
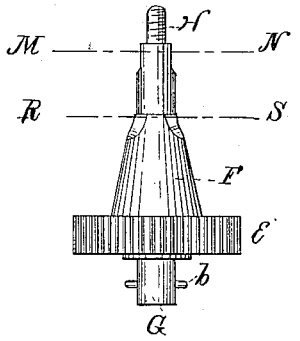


Fig. 5.



WITNESSES:

H. H. Brainard

O. L. Taylor

INVENTOR

Daniel C. Stover

by Robt. H. Eccles

ATTORNEY

UNITED STATES PATENT OFFICE.

DANIEL C. STOVER, OF FREEPORT, ILLINOIS.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 265,289, dated October 3, 1882.

Application filed July 31, 1882. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. STOVER, a resident of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Grinding-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in that class of grinding-mills in which the power is applied to an outer cone by means of sweeps, and the outer cone imparts a reverse rotary motion to an inner cone by means of intermediate gearing, the two cones having a common mathematical axis, and the grinding-teeth being on the inner and outer faces of the two cones respectively.

The details of construction of the mill are set forth in the following specification, and shown in the accompanying drawings, and those features which constitute my invention are set up in the claims forming a part of the specification.

In the drawings, Figures 1 and 2 are included in Sheet 1, and Figs. 3 to 7, inclusive, in Sheet 2. Of these, Fig. 1 is a top view of the entire mill; Fig. 2, a vertical section of the entire mill through the line *x y*, Fig. 1; Fig. 3, a horizontal section through the line *m n*, Fig. 2; Fig. 4, a plan of the inner cone as seen from below; Fig. 5, a view in perspective of the center-post of the mill, the sleeve which rotates thereon, and the cog-wheel, and the cog-wheel attached to sleeve; Figs. 6 and 7, horizontal sections of the center-post through lines M N and R S respectively.

The foundation of the mill is the horizontal base-plate B, consisting of three arms radiating from a common center. At their central point is rigidly attached the center-post G, which is the axis of rotation of the mill, and may be formed integrally with the base-plate, or held in place by a key, *b*, as shown, or by other suitable means. About the lower portion of the center-post G fits loosely a sleeve, F, formed integrally with or rigidly attached to a cog-wheel, E, at its base, and three pinions, D D′ D″, of equal size, are pivoted to the respective arms of the base-plate at such distances from the center as to engage with the cog-wheel E. The sleeve F at its upper end is polygonal in form and fits loosely in a polygonal recess in the under surface of the inner cone, K, of the mill, which rests on the top of the sleeve, the connection of the sleeve and cone being such that any rotary motion of the sleeve is imparted to the cone at the same time that the cone has sufficient rocking motion for adjusting itself to the outer cone. The cone K has grinding-teeth on its outer and upper surface, and the outer cone, C, is provided with corresponding teeth on its inner face. The cone C is pivoted at its vertex on the center-post G, and provided at its lower margin with an internal geared rim, either formed integrally with or attached rigidly to it, and this geared rim engages with the pinions D D′ D″, so that the rotation of the outer cone rotates the inner cone, K, in a reverse direction, the motion being transmitted through the pinions D D′ D″ and cog-wheel and sleeve E F. The outer surface of the cone C extends upward in a neck for the reception of an ordinary hopper, V, and four radial arms, *g*, provided with grinding-teeth on their under faces and breaking-teeth on their upper faces, extend from the vertex of the cone to the inner circumference of the neck. Above the cone the center-post is flattened, as shown in Figs. 5 and 6, and a stationary cap provided with three breaking-arms, *f*, and having at its center an opening corresponding to the flattened center-post, rests on the vertex of the cone and is held in position by the post. The arms *f* are provided with breaking-teeth on their lower faces, between which the breaking-teeth of the arms *g* pass when the shell C is rotated. The upper end of the center-post G is screw-threaded, and a wing-nut, *e*, serves to tighten or loosen the mill.

To the sides of the shell C are attached converging sweeps Z Z′, connected at their rear ends by a cross-piece, Z″, and a lug, *o*, projecting from the shell, enters the cross-piece Z″ and forms a rigid connection for the sweeps and shell.

Immediately under the opening between the cones K and C is attached an annular meal-trough, *t*, provided at one point with an opening in its bottom, through which the meal can

escape, and a series of scrapers, *l*, at the lower margin of the cone K, bring the meal to this opening.

The base-plate B of the mill rests on a meal-box, A, of ordinary form, to which the arms B B B may be bolted, or fastened by other suitable means. The ends of the arms project beyond the sides of the box, and to them are fastened rods P, which extend in lines tangent, or nearly so, to the periphery of the mill, and are staked to the ground at their outer ends. The rods P may be bolted to the arms B, as shown, or the ends of the arms may be hooked in form and pass through eyes in the inner ends of the rods, or vice versa. The ordinary method of anchoring mills of this class is to bolt them to the boxes on which they rest and stake the boxes to the ground. The entire strain is thus thrown on the box, and it is practically impossible to make a box of sufficient strength to bear it. By the use of the anchoring-rods P, as shown, the strain is thrown upon the mill almost entirely, and a very light box is found to be sufficient.

The operation of the mill is evident. Power being applied to the sweep, ear-corn is placed in the hopper. The outer shell, C, rotates in one direction and the inner shell, K, in the opposite direction. The breaking-teeth *i* of the arms *g* pass between the stationary breaking-teeth of the arms *f*, breaking the ear-corn into small pieces. These drop down between the arms *g* and are ground, first between the teeth on the under surface of the arms *g* and the teeth on the upper surface of the cone K, and afterward between the finer grinding-teeth on the contiguous faces of the two cones. The meal drops down between the cones into the meal-trough *t*, from which it escapes into the meal-box A.

As already stated, the inner cone, K, has sufficient rocking motion to permit its automatic adjustment to the outer cone. The outer cone is held in place at its vertex by the center-post and at its rim by the pinions D D′ D″, so that, except as to rotary motion, it is rigidly fixed. Were the inner cone rigidly attached to the sleeve, there would be no possibility of lateral adjustment of the two cones; but the loose connection of the cone and sleeve allows the cone to adjust itself perfectly to the shell.

I am aware that a geared mill in which the inner and outer cones rotate in opposite directions is well known, and that many features of the construction of the mill here presented are old.

What I claim as new, however, and desire to secure by Letters Patent, is—

1. In a grinding-mill, the combination of an internally-geared outer grinding-cone pivoted at its vertex upon a central vertical shaft, an externally-geared sleeve rotating upon said shaft, an inner grinding-cone hung on the vertex of said sleeve, and connected therewith by means adapted to impart rotary motion of the sleeve to the cone and yet permit rocking motion of the cone, and a series of pinions engaging with the gearing of said outer cone and sleeve and adapted to produce reverse rotary motion of said sleeve upon the rotation of said outer cone, substantially as shown and described.

2. The combination of a sweep-actuated grinding-mill, the meal-box on which it rests, and a series of anchoring-rods attached at one end to the stationary base of the mill at points without the periphery of the meal-box and at the other to the ground by means of stakes, said rods being adapted to relieve the meal-box of the torsional strain generated by the rotation of the sweeps, substantially as shown and described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

DANIEL C. STOVER.

Witnesses:
ROBT. H. WILES,
ROBT. M. KEEVER.