

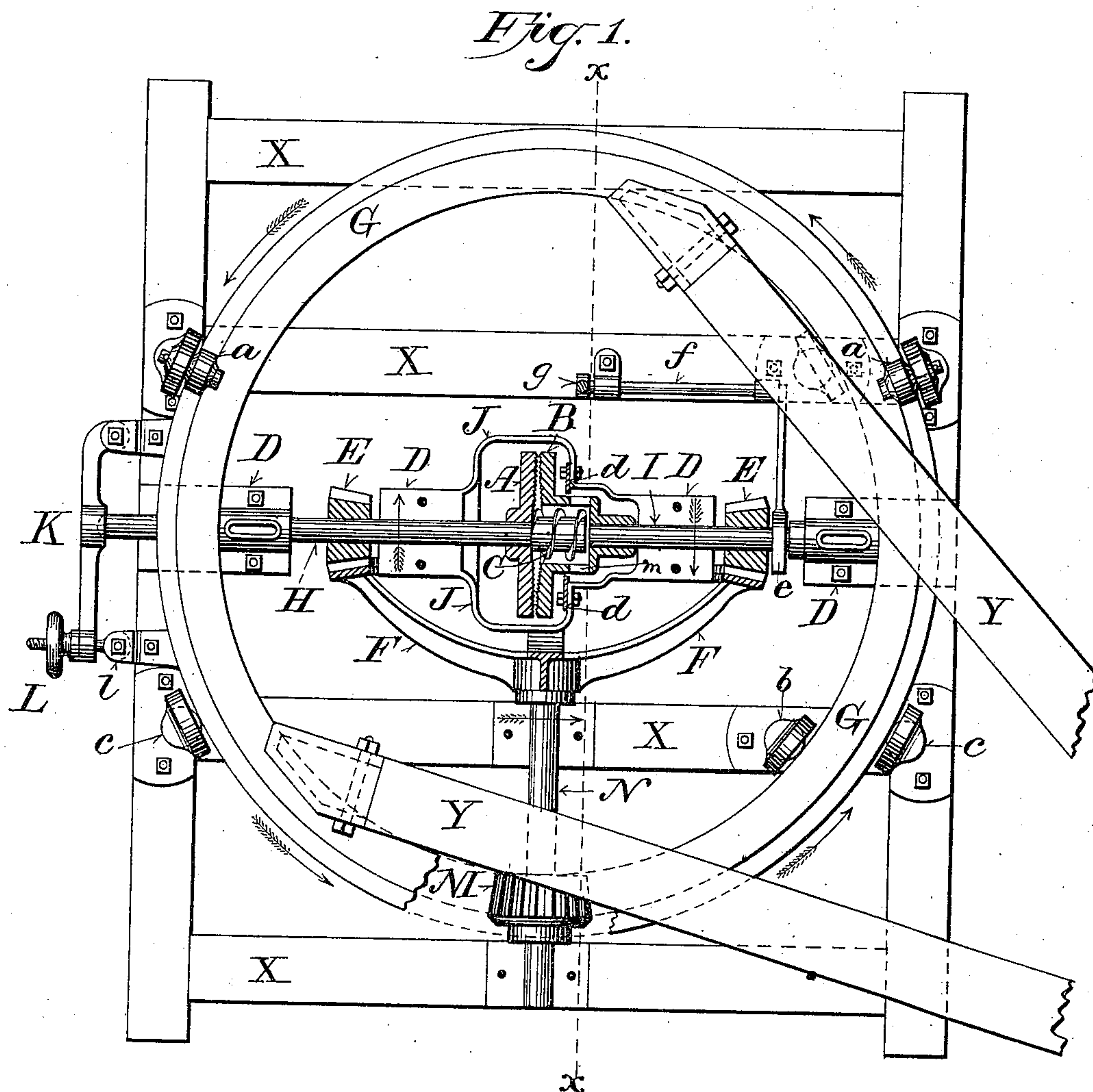
(No Model.)

H. F. STONE.
GRINDING MILL.

2 Sheets—Sheet 1.

No. 350,509.

Patented Oct. 12, 1886.



Witnesses:

Chas. L. Goss.
George Goll.

Inventor:

Herbert F. Stone,

By O. A. Pottum,
Attorney.

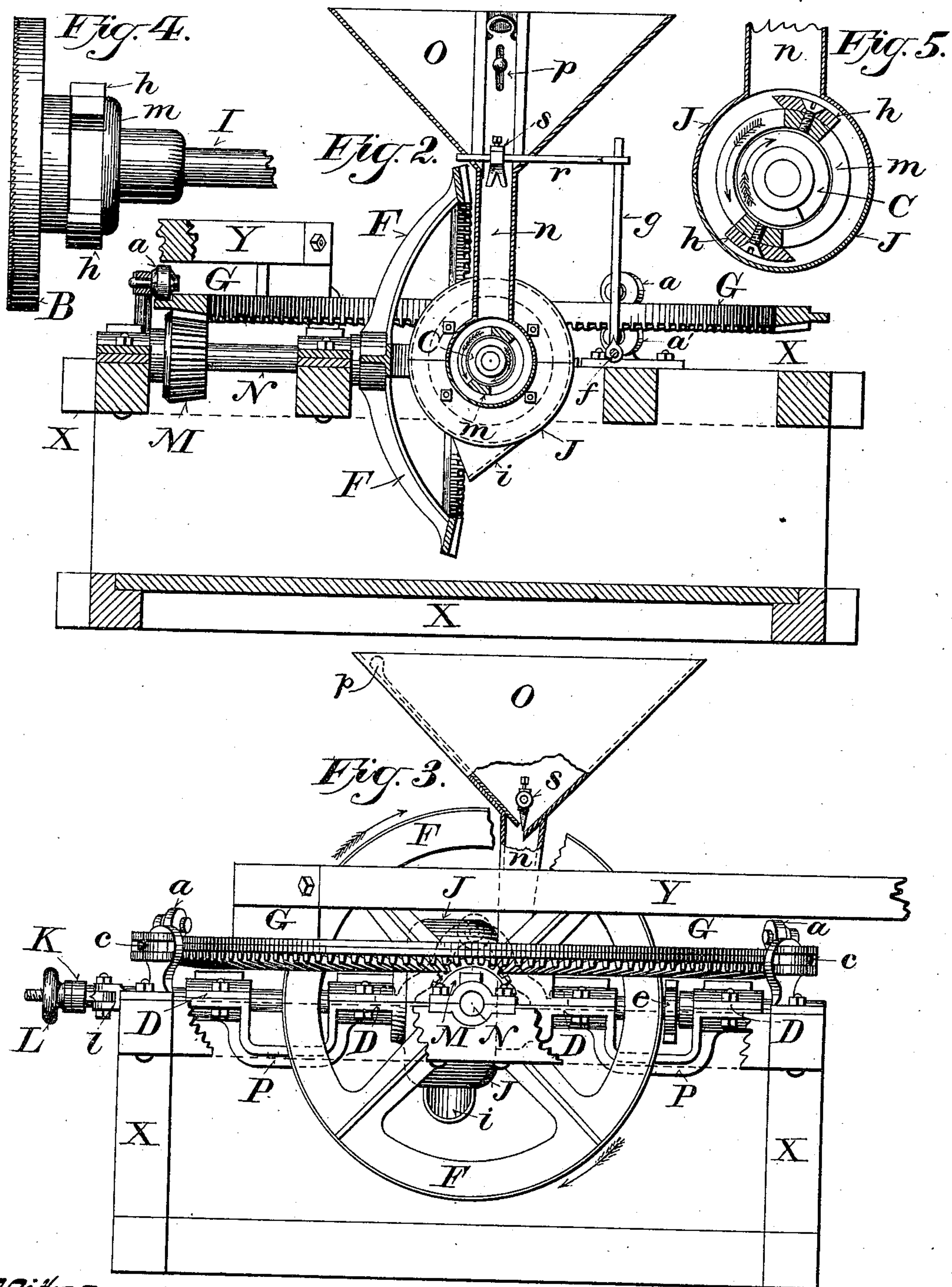
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UNITED STATES PATENT OFFICE.

HERBERT F. STONE, OF APPLETON, WISCONSIN, ASSIGNOR TO THE APPLETON MANUFACTURING COMPANY, OF SAME PLACE.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 350,509, dated October 12, 1886.

Application filed February 11, 1885. Serial No. 155,653. (No model.)

To all whom it may concern:

Be it known that I, HERBERT F. STONE, of Appleton, in the county of Outagamie and State of Wisconsin, 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 invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The objects of my invention are, first, a simple compact horse-power mill for the rapid grinding of grain, canes, &c.; second, economy of space in the driving mechanism; third, an adjustable non-clogging feed; and, fourth, increase in the grinding capacity of burrs of any given size.

In the accompanying drawings like letters refer to the same parts in each figure.

Figure 1 is a plan view of the machine, showing the burrs and the gears by which they are driven in medial horizontal section, and the upper half of the inclosing casing or box removed. Fig. 2 is a vertical section of the machine on the line *x x*, Fig. 1. Fig. 3 is a side elevation of the same view from the back of the vertical gear which drives the burrs; and Figs. 4 and 5 are detail views on an enlarged scale, Fig. 4 showing the right-hand burr, as seen in Fig. 1, and Fig. 5 showing a transverse section of its hub and the casing inclosing it.

X X represents the frame-work of the machine, made of wood or any other suitable material. Upon an iron girder or yoke, *P*, near the center of said frame-work *X*, are mounted the two iron grinding disks or burrs *A B*, whose arbors *H I* are supported and have bearings in journal-boxes *D D*, formed upon said yoke *P*. The arbors *H* and *I*, upon the inner ends of which are mounted said burrs *A* and *B*, are provided outside of said burrs with small bevel-gears *E E*, so located upon said arbors as to mesh with the large vertical bevel-gear *F*, mounted upon the inner end of the shaft *N*, which is set in bearings on frame *X* at right angles to arbors *H* and *I*, directly opposite to the burrs *A* and *B*. The grinding-faces of the burrs may be formed integral with

said disks *A* and *B*, as shown in the drawings, or they may be made distinct and afterward attached thereto. The journal-boxes *D D* are disposed on each side of the small bevel-gears *E E*, and furnish firm steady bearings for the arbors *H* and *I*.

J represents a metallic box or casing supported by the yoke *P* and inclosing the burrs *A* and *B*. The burr or disk *B* is provided with a hollow cylindrical hub, *m*, Figs. 1, 2, and 5, open at the inner end and having openings about its outer curved face, through which the grain, &c., is fed between the burrs. The burr or disk *A* is formed with a small solid hub, by means of which it is secured to arbor *H*, the end of which projects through the same to receive the worm *C*, which extends into the hollow hub *m* of burr *B*. The casing *J* is contracted about said hub *m*, and to its inner face is secured the metallic ring *d d*, which forms a partition about the inner edges of the openings into said hub, separating the space inclosed about the burrs from that inclosed about the outer end of said hub, and preventing the grain, &c., fed into the chamber inclosed by the contracted portion of casing *J* from being forced into the chamber about the burrs.

To regulate the distance between the grinding-faces of burrs *A* and *B* for finer or coarser grinding, the end of arbor *H* has a bearing in a socket formed in lever *K*, which is pivoted at one end to the frame *X* of the machine, and secured thereto at the other end by a hand-screw, *L*, and an eyebolt pivoted to said frame at *l*. By turning said hand-screw *L* in or out the burrs may be adjusted for fine or coarse grinding.

G is a large bevel-gear or master-wheel mounted upon frame *X* in a horizontal position, so as to mesh with the small bevel-gear *M*, mounted upon the shaft *N* near its outer end. It is left entirely open inside of the rim, to give room for the centrally-located burrs, and bears upon and is braced and held in position by the friction-wheels *a, a', b*, and *c*, which are mounted in castings secured to the frame *X*. The wheels *a a'* bear upon the upper face of the rim of said master-wheel, *a' a'* upon its under face, *b b* upon its inner face, and *c c* upon its outer face, thereby holding said master-wheel rigidly in place

and relieving the rim of strain due to the absence of a central hub and radiating arms. To said master-wheel, at points diametrically opposite, are secured the sweep-bars Y Y by means of ears or plates which raise said bars above the top friction-wheels, *a a*. Said sweep-bars converge and are joined at the ends where the horse-power is attached.

O represents a feed-hopper provided with the regulating-slide *p*, which controls the opening of said hopper into the passage *n*, communicating with casing J directly above the openings in hub *m* of burr B. To prevent clogging in the feed-opening from said hopper, I provide the small bifurcated agitator *s*, mounted upon the horizontal rod *r*, to which a reciprocating movement is given by the eccentric *e* on arbor I through the rock-shaft *f* and vibrating arm *g*.

The hopper O may be made detachable from the feed-passage *n*, if desired, or formed integral therewith, as shown in the drawings.

The casing J, inclosing the burrs, is provided underneath the same with a delivery-spout, *i*, Figs. 2 and 3, for discharging the feed or product of said grinding-burrs.

When it is desired to use the machine for grinding canes or corn in the ear, I attach knives *h h* to the arms of hub *m*, as shown in Figs. 4 and 5. These knives may be straight or spiral, and attached to said hub parallel with its axis, or diagonally thereto, as desired.

My improved machine operates as follows: Suitable power having been attached to the sweep-bars Y Y, the master-wheel G is turned in the direction indicated by the arrows, thereby rotating with accelerated speed the vertical driving-gear F through the small gear M, as indicated by arrows in Figs. 1 and 3. The large gear F, meshing with the small gears E E on arbors H and I, drives the burrs mounted thereon with still greater speed and in opposite directions, as indicated by arrows crossing said arbors in Fig. 1. The grain to be ground, being turned into hopper O, is fed from the bottom through spout *n* into the chamber formed by the contracted portion of casing J about the hub *m* of burr B, the ring *d* retaining the same in said chamber until it is fed through the openings in said hub *m* upon the worm C, which, rotating in the opposite direction from hub *m*, as shown by arrows, Fig. 5, draws or forces said grain between the burrs A and B. Said burrs revolving rapidly in opposite directions quickly reduce the grain, as desired, to flour or meal, which falls from the edges of said burrs into the chamber formed by the casing J about them, and is thence discharged through spout *i*.

For grinding or reducing cane or corn in the ear, the cutters *h h* are attached to hub *m*. As the ears or cane pass between said cutters into said hub and are caught by the oppositely-rotating worm C, which forces them against the sharp edges of said cutters, they are thereby reduced sufficiently small for the burrs.

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

1. The combination, in a grinding-mill, of the burr A, arbor H, the burr B, having hollow hub *m*, with lateral openings, arbor I, feed-worm C, mounted upon arbor H and projecting into hollow hub *m*, and the casing J, having the contracted portion, substantially as and for the purposes set forth.

2. In a grinding-mill, the combination of the burr A and the burr B, the latter having a central opening and a hub with openings communicating with the opening in its face, arbors I and H, worm C, secured to the latter and projecting into the central opening in burr B, casing J, inclosing said burrs and hub *m*, and a hopper, O, communicating with said casing J adjacent to the openings in hub *m*, substantially as and for the purposes set forth.

3. In a grinding-mill, the combination of the burrs A and B, means for forcing the feed between said burrs, arbors H and I, provided with gears E E, and driving-gear F, meshing with both of said gears E E, substantially as and for the purposes set forth.

4. In a grinding-mill, the combination of the burrs A and B, arbors H and I, gears E E on said arbors, gear F, meshing with gears E E, master-wheel G, gear M, and shaft N, upon which said gears F and M are mounted, substantially as and for the purposes set forth.

5. In a grinding-mill, the combination of the oppositely-rotating arbors H I and burrs A and B, the burr B being formed with a central opening, and the hub *m* having lateral openings, feed-worm C, secured to the arbor H and projecting into the said central opening in burr B, casing J, inclosing said burrs and hub, hopper O, opening into said casing adjacent to hub *m*, regulating-slides *p*, and reciprocating agitator *s*, substantially as and for the purposes set forth.

6. In a grinding-mill, the combination of the yoke P, furnished with bearings D D, arbors H and I, mounted therein and provided with gears E E, burrs A B, gear F, meshing with gears E E, and casing J, inclosing said burrs and supported upon yoke P, substantially as and for the purposes set forth.

7. The combination, in a grinding-mill, of the burrs A and B, the latter having a hollow hub, *m*, arbors H and I, worm C, by which the feed is forced between said burrs, casing J, dividing-ring *d*, separating the space within said casing about the hub *m* from that about said burrs, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HERBERT F. STONE.

Witnesses:

F. E. HARRIMAN,
FLO. J. HARRIMAN.