No. 695,878. Patented Mar. 18, 1902.

C. E. GEIGER & J. E. TURNEY.

COMMINUTING MACHINE.

(Application filed Mar. 20, 1901.)

(No Model.)

Fig. 2.

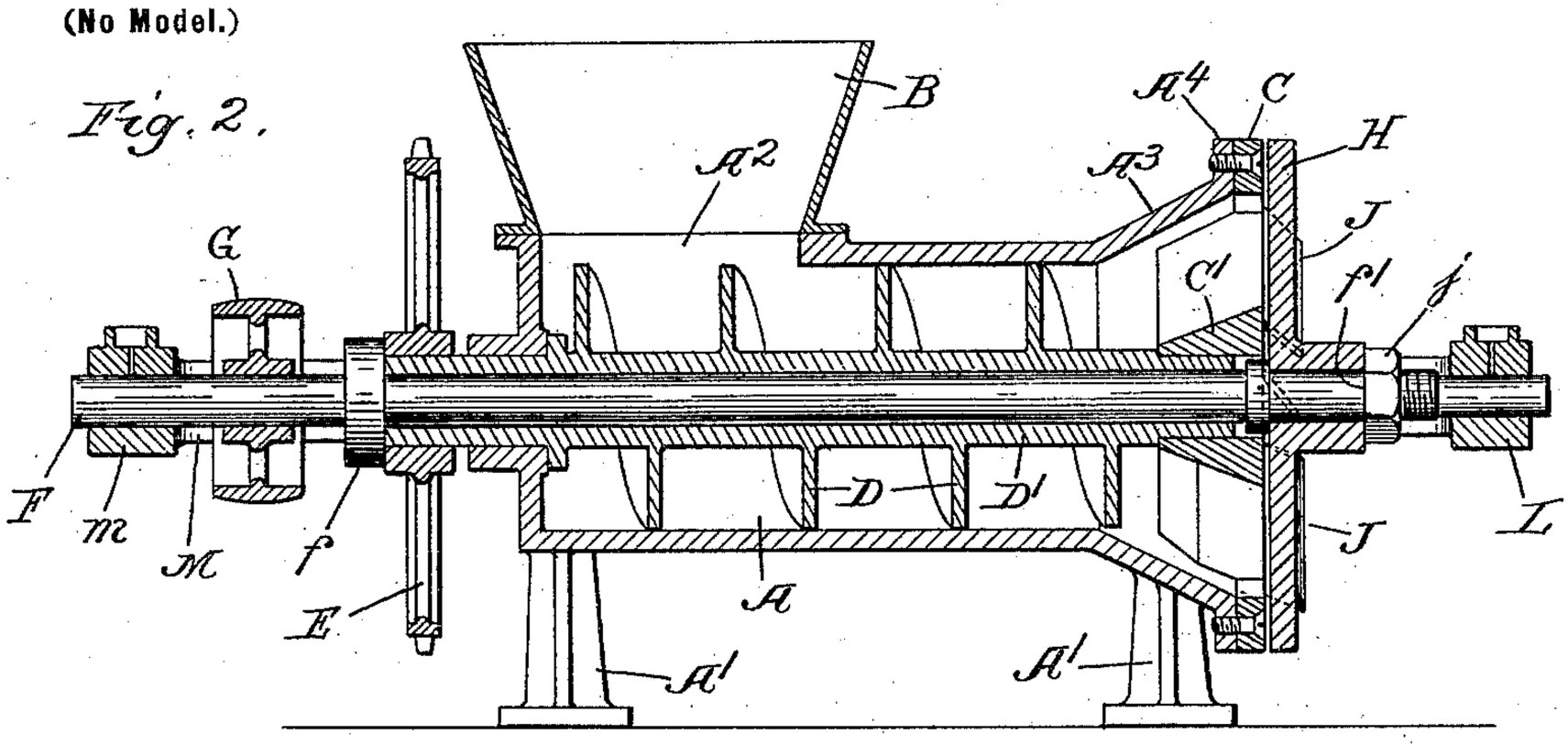


Fig. 1.

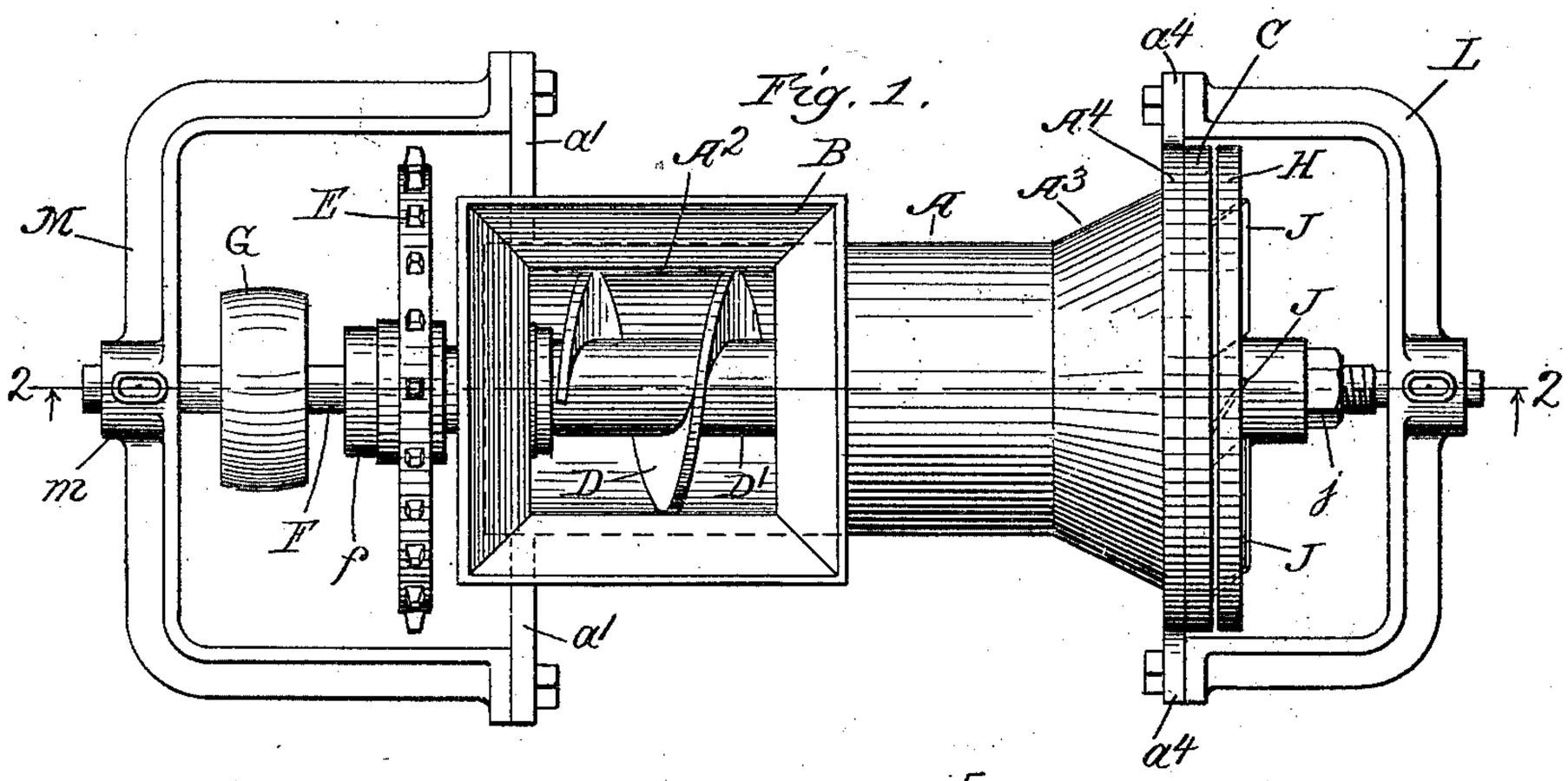
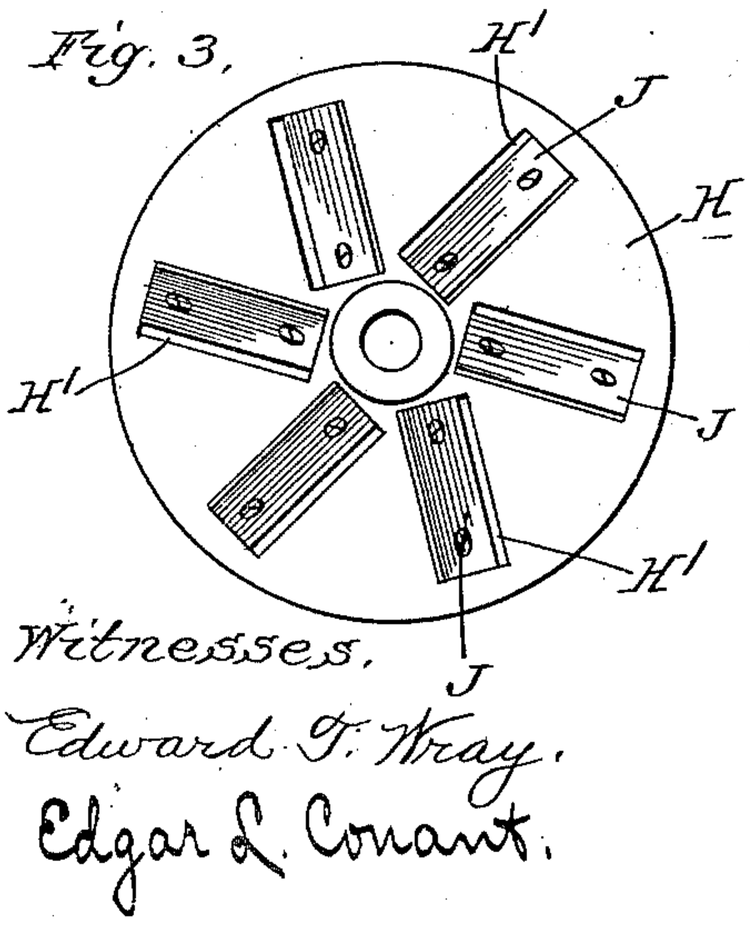


Fig. 3.



Witnesses.
Edward T. Wray.
Edgar L. Conant.

Fig. 4.

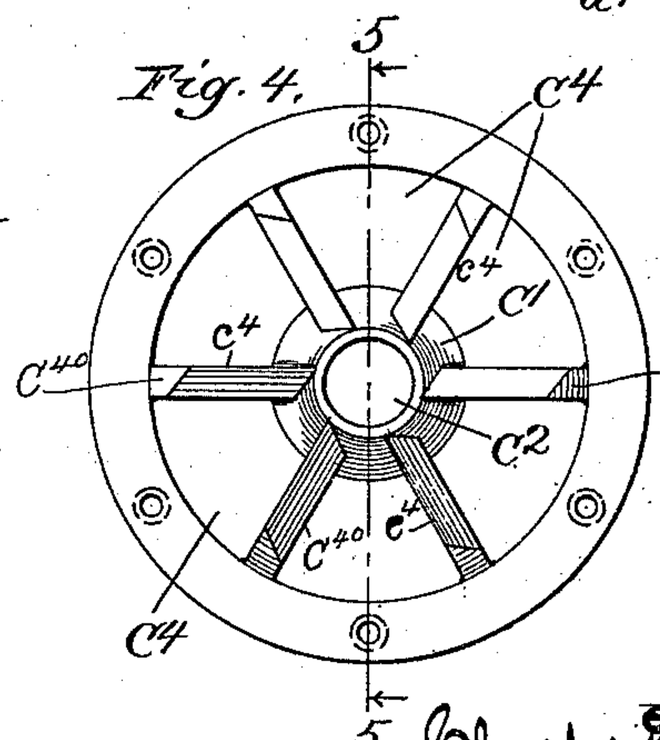
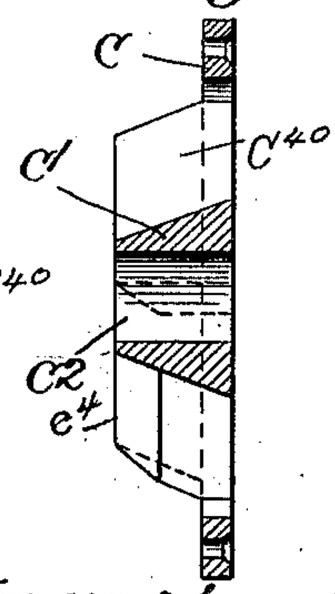


Fig. 5.



Inventors,
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their Atty's.

UNITED STATES PATENT OFFICE.

CHARLES E. GEIGER AND JOHN E. TURNEY, OF LOUISVILLE, KENTUCKY, ASSIGNORS TO THE TURNEY DRIER COMPANY, OF LOUISVILLE, KENTUCKY, A CORPORATION OF ILLINOIS.

COMMINUTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 695,878, dated March 18, 1902.

Application filed March 20, 1901. Serial No. 51,983. (No model.)

To all whom it may concern:

Be it known that we, CHARLES E. GEIGER, a citizen of the United States, and JOHN E. TURNEY, a subject of the King of Great Britain, both residents of Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Comminuting-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide a machine by which vegetable substance may be finely reduced. It is specifically designed for finely comminuting the residue of sugar-beet pulp after the treatment by which the saccharine elements are extracted, such residue being in shredded or filamentary form and such comminution being necessary in order that the pulp may be economically treated by subsequent steps depriving it of its moisture preparatory to reducing it to granular form or meal for the purpose of feed.

In the drawings, Figure 1 is a plan of our improved machine. Fig. 2 is a longitudinal vertical section at the line 2 2 on Fig. 1. Fig. 3 is a plan of a rotating cutter-head. Fig. 4 is a plan of a face-plate against which the cutter-head rotates. Fig. 5 is a section at the line 5 5 on Fig. 4.

Our improved machine consists of a hollow body or chamber A, the greater portion of whose length is cylindrical and which is designed to be mounted with its axis horizontal and to be suitably supported by legs A′ A′, &c. At the upper part toward one end it has an opening A^2, provided with a hopper B, through which the material to be treated is designed to be introduced. The opposite end of the body is conically expanded at A^3, and at this end it is open except as closed by the face-plate C. This face-plate at the periphery is adapted to be bound to the terminal flange A^4 of the body A, and at the central portion it has a tapering boss C′, projecting inward, the slope of its taper corresponding substantially to that of the conically-expanded portion A^3 of the body A, so that when the face-plate is secured in position, as seen in Fig. 2, said sloping surface of the boss is substantially concentric and parallel with the inner sloping surface of said expanded portion A^3 of the body. This boss has an axial aperture C^2 to afford a bearing for parts hereinafter mentioned. The central boss is connected with the annular peripheral portion of the face-plate by radial spokes C^{40}, separated by sectoral apertures C^4 C^4, &c., as seen in Fig. 4.

D is a spiral feeding device having a hollow shaft D′. The spiral is of such diameter as to fit closely, but with freedom to rotate, within the cylindrical portion of the body A. The shaft D′ extends out through the end of the body at which the hopper B is located, obtaining bearing in the head of the body at that end, while at the other end it obtains bearing in the central aperture C^2 of the boss C′ of the face-plate C. Suitable shoulders are provided on the tubular shaft D′ to stop it endwise between said bearings. The end which is journaled in the head of the body underneath the hopper protrudes beyond said bearing and is exteriorly provided with a sprocket-wheel E, by which the device may be rotated.

F is a shaft which extends within the tubular shaft D′, projecting from the same at both ends. At the receiving end—that is, beyond the sprocket-wheel E—the shaft is provided with a stop-collar *f*, and outside said stop-collar with a pulley G, by which the shaft may be rotated. At the discharge end there is secured to the shaft F the rotating cutter-head H, which is a disk having a plurality of apertures H′, preferably slightly diverging from radial direction and each having extending through it and rigidly mounted thereby in the cutter-head knives J J J, &c., whose cutting edges, suitably beveled correspond to the oblique direction in which the knives extend through the cutter-head, are substantially in the plane of the inner face of said cutter-head, so that when the cutter-head is mounted on the shaft in position to revolve close against the outer surface of the face-plate B the knives coöperate shearwise with the radial arms or edges of the sectoral apertures C^4 of said face-plate to sever and finely subdivide any material which may be fed or

forced through such apertures of the face-plate.

L is a yoke secured to suitable lugs a^4 a^4, projecting from the flange A^4 at the expanded end of the body A and extending diametrically across the end of the machine at a distance from the revolving cutter-head suitable to adapt it to afford a bearing for the shaft F, which is reduced at the end for that purpose, the cutter-head being bound to the shaft by a nut *j*, screwed onto the shaft back of the reduced portion at which same is journaled and binding the cutter-head against a shoulder *f'*, formed thereon, by suitable reduction from its maximum diameter. M is a similar but more extended yoke secured to suitable lugs *a' a'*, at the end of which the hopper is located and affording bearing for the shaft F at *m* beyond the pulley G. Means for rotating the pulley G and the sprocket-wheel E may be provided from any counter-shaft conveniently located (not illustrated) by means of wheels giving to the spiral feed device and to the shaft F suitable relative speeds. It will be understood that the rotation of the spiral feed device will be in a suitable direction to cause the material introduced through the hopper to be fed by the spiral toward the expanded end of the chamber and through the apertures in the face-plate, so that it may be cut and finely subdivided by the knives of the rotating cutter-head as they revolve past the apertures of said face-plate, and it will be understood that the speed of rotation of the cutter-head will be such as to cause the knives to follow each other past any given aperture at intervals corresponding to the fineness to which the material is to be cut, for the length of the particles severed from the filament of pulp will be the extent forced through an aperture after one knife passes it and before another reaches it. It will be noticed that the capacity of a machine will be dependent on the area of the discharge-apertures of the face-plate, and in order that this area may be as great as possible with a given size of machine the discharge end of the body is conically expanded, as shown. Thus the material which may be delivered to the hopper within the scope of the spiral feed device under such pressure as to be compactly forwarded by that device has opportunity to become relieved somewhat of the pressure upon it by the expansion which occurs toward the discharge end, and it is thus prevented from being protruded too forcibly through the apertures, which would tend to prevent the knives from cutting it as finely as would naturally result from the relative speed of the feed device and the cutter-head. In order that the action of the knives of the cutter-head upon the material may be as nearly as possible similar throughout the entire radial extent of the knives, it is desirable that they should not reach too near to the center, where their speed would be so much less than at the edge near the outer periphery, and for this reason the conical boss is provided on the face-plate, reducing the enlarged or flaring discharge end of the body to the annular form shown, while only slightly reducing the capacity.

The spokes C^{40} of the face-plate C are each extended inward substantially to the same distance as the central boss C', becoming thus radial webs, and at their inner edge they are beveled to sharpen them approximately to about a knife-edge, as shown at c^4, so that the material fed toward the face-plate by the spiral feed device shall not be crowded against a blunt edge, but may be all diverted easily into the spaces between the spokes C^{40}. It will be noted also that the space occupied by the spokes and hub diminishes by just so much the capacity of the chamber at the discharge end, which is compensated by the expansion of the chamber at that part and that such expansion to such extent as to effect such compensation would in any event be necessary to prevent excessive compression of the material in feeding it to the cutter-head.

We claim—

1. A comminuting-machine, comprising a cylindrically-chambered body having its chamber conically expanded toward the discharge end; a face-plate at the expanded end having a tapering boss projecting inwardly at the center, and having radially outward from such boss apertures separated by radiating-bars; a cutter-head outside the face-plate having cutters whose cutting edges are substantially in the plane of the outer surface of the face-plate, and apertured adjacent to the cutters respectively; means for advancing the material through the chamber toward the face-plate; and means for rotating the cutter-head.

2. A comminuting-machine comprising a cylindrically-chambered body having the chamber conically expanded toward the discharge end; a face-plate at the expanded end, having a tapering boss projecting inwardly at the center, substantially to the extent of the expanded portion, and having between the boss and the periphery apertures separated by radiating-bars extending inwardly in said expanded portion; the cutter-head outside the face-plate having cutters whose cutting edges are substantially in the outer plane of the face-plate, and apertures adjacent to the cutters respectively; means for advancing material through the chamber toward the face-plate into the expanded portion of the chamber and means for rotating the cutter-head.

3. A comminuting-machine comprising a cylindrically-chambered body having the chamber conically expanded toward the discharge end; a face-plate at the expanded end, having a tapering boss projecting inwardly at the center, and having radially outward from such boss apertures separated by radiating-bars extended inwardly in said expanded portion; a cutter-head outside the face-plate, having cutters whose cutting edges are sub-

stantially in the plane of the outer surface of the face-plate and apertured adjacent to the cutters respectively; a spiral element occupying the chamber from the receiving end to the commencement of the expanded portion but not within the latter, and means for rotating it to feed the material into said expanded portion, and means for rotating the cutter-head.

4. A comminuting-machine comprising a cylindrically-chambered body having its chamber conically expanded toward the discharge end; a face-plate at the expanded end, having a tapering boss projecting inwardly at the center, substantially to the extent of the expanded portion, and having between the boss and the periphery apertures separated by radiating-bars extending inwardly in said expanded portion; a cutter-head outside the face-plate and means for rotating it; a spiral element occupying the cylindrical portion of the chamber from the receiving end substantially to the commencement of the expanded conical portion of the chamber and having a hollow shaft; means for rotating the same to feed the material by the spiral into the expanded portion of the chamber; a second shaft extending through such hollow shaft and through the face-plate and carrying the cutter-head on its protruding portion; and means for rotating such interior shaft independently of the hollow shaft.

5. A comminuting-machine, comprising a cylindrically-chambered body having its chamber conically expanded toward the discharge end; a face-plate at the expanded end, having a tapering boss projecting inwardly at the center substantially to the extent of the expanded portion, and having between the boss and the periphery apertures separated by radiating-bars extended inwardly in said expanded portion, substantially as far as the boss, the cutter-head outside the face-plate, having cutters whose cutting edges are substantially in the outer plane of the face-plate, and apertures adjacent to the cutters respectively; means for advancing the material through the chamber toward the face-plate to the expanded portion of the chamber, and means for rotating the cutter-head.

6. A comminuting-machine comprising a cylindrically-chambered body having its chamber conically expanded toward the discharge end; a face-plate at the discharge end having a tapering boss projecting inwardly at the center, having between such boss and the periphery a plurality of apertures separated by radiating bars or spokes extending inward substantially to the extent of the boss within the expanded portion of the chamber, and beveled or sharpened at their inner edges; and a cutter-head outside the face-plate; means for advancing material through the chamber to the expanded portion and means for rotating the cutter-head.

In testimony whereof we have hereunto set our hands, in the presence of two witnesses, at Louisville, Kentucky.

CHARLES E. GEIGER.
JOHN E. TURNEY.

In presence of—
OVERTON B. MCMEEKIN,
OWEN G. STROTHER.