(No Model.)

3 Sheets—Sheet 1.

O. E. WINGER.

FEED GRINDING MILL.

No. 252,165. Patented Jan. 10, 1882.

Fig. 1.

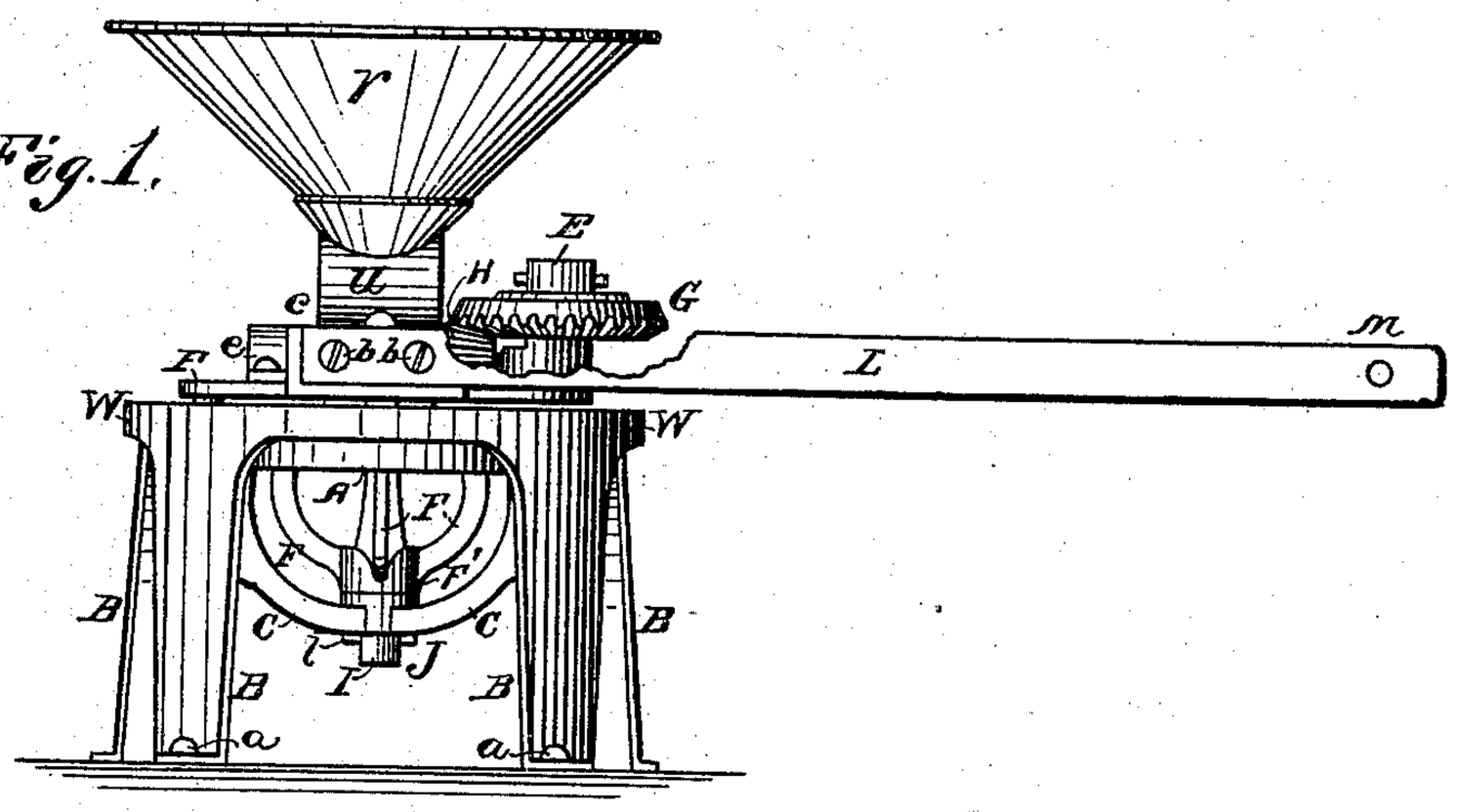


Fig. 2.

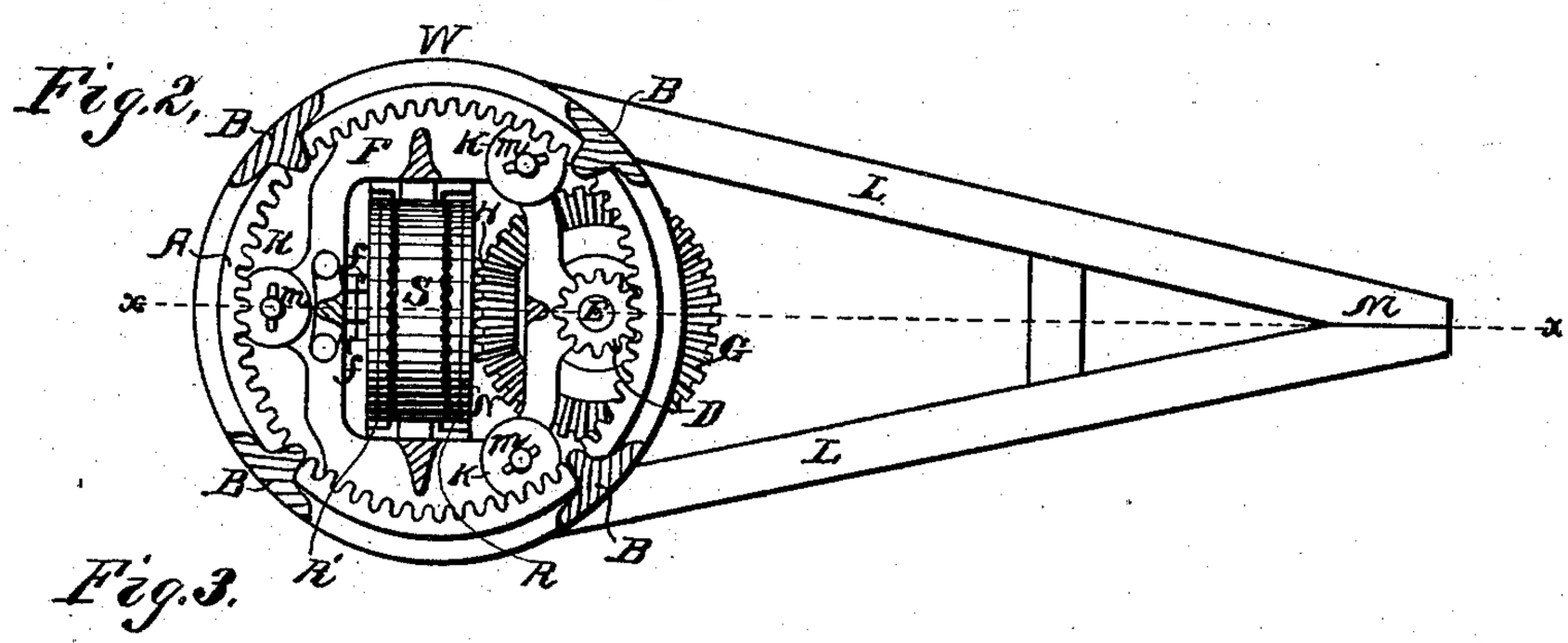
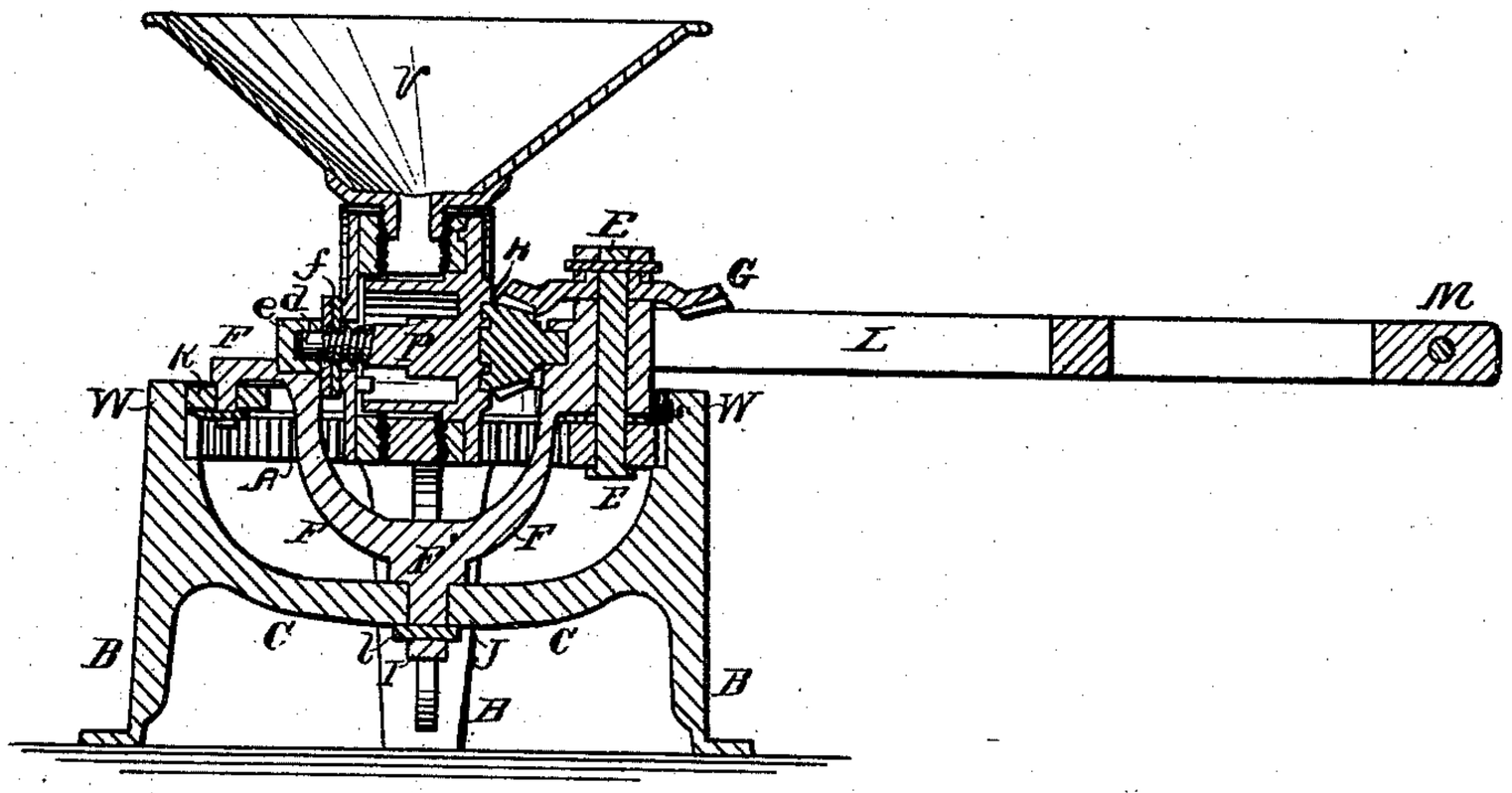


Fig. 3.



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(No Model.)

3 Sheets—Sheet 2.

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Fig. 4.

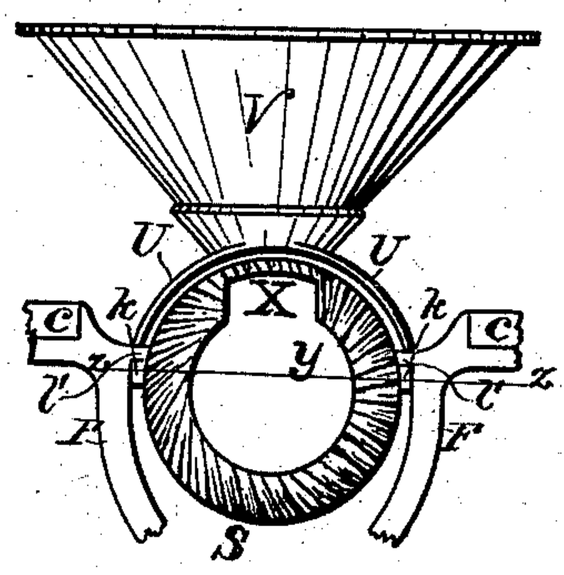


Fig. 5.

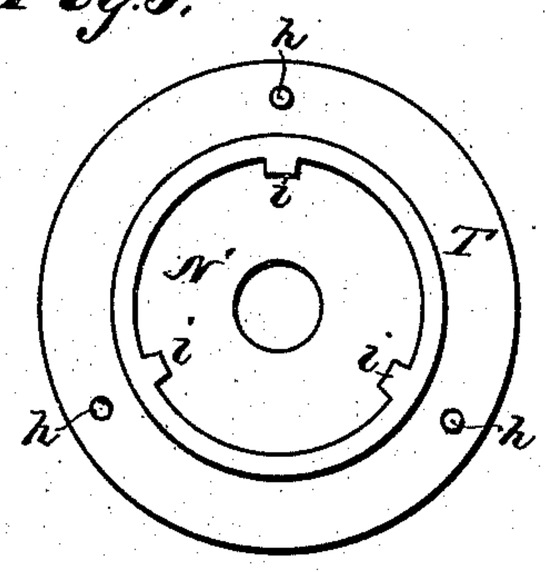


Fig. 6.

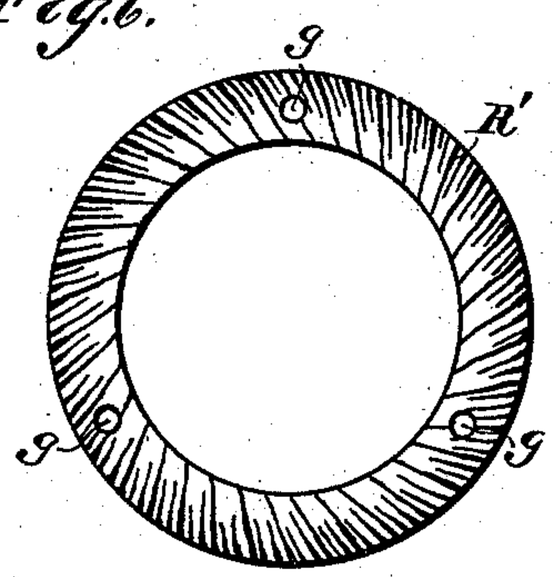


Fig. 7.

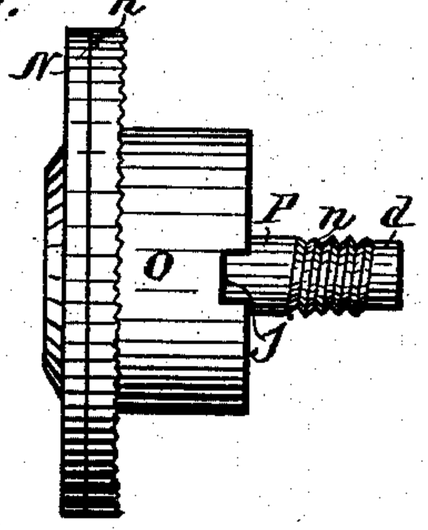
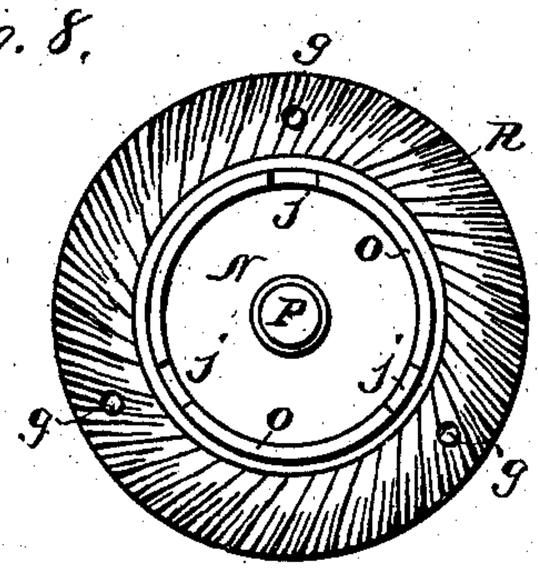


Fig. 8.



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(No Model.)

3 Sheets—Sheet 3.

O. E. WINGER.

FEED GRINDING MILL.

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Fig. 9

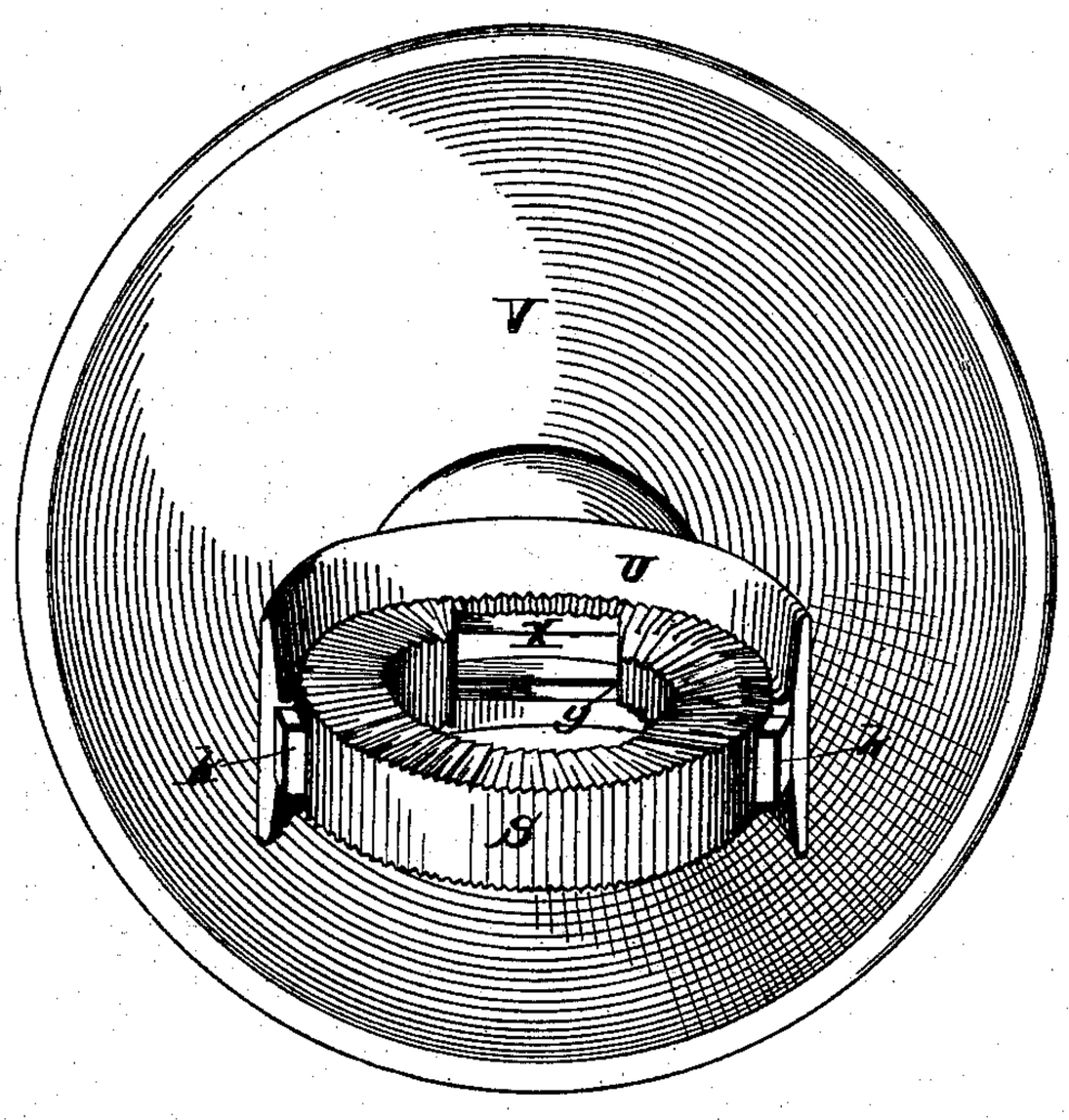
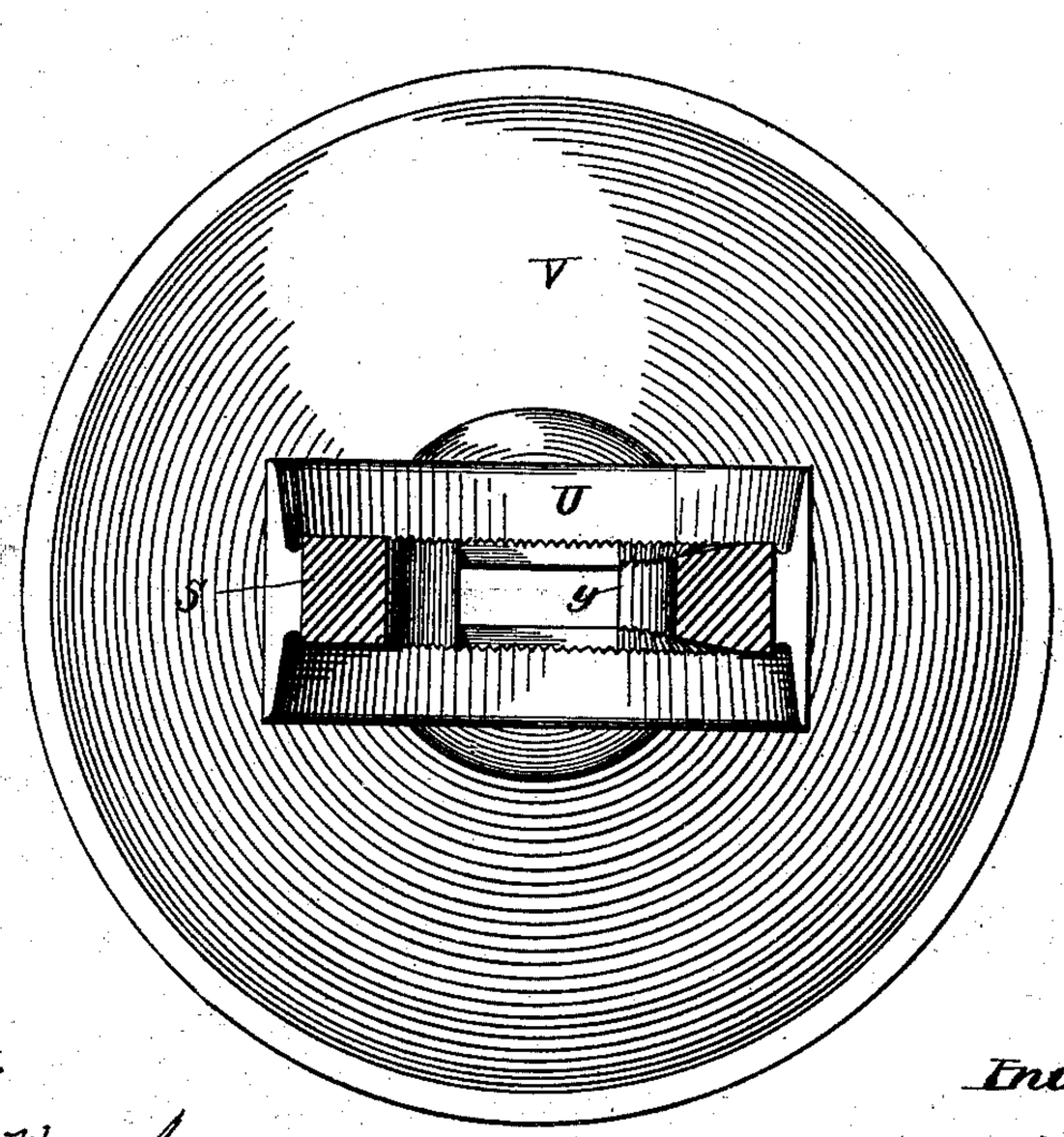


Fig. 10



Attest,

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UNITED STATES PATENT OFFICE.

OSWALD E. WINGER, OF FREEPORT, ILLINOIS.

FEED-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 252,165, dated January 10, 1882.

Application filed April 1, 1881. (No model.)

To all whom it may concern:

Be it known that I, OSWALD E. WINGER, of the city of Freeport, county of Stephenson, and State of Illinois, have invented a new and useful Improvement in Feed-Grinding Mills; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, of which—

Figure 1 is a side elevation. Fig. 2 is a bottom view. Fig. 3 is a vertical sectional view cut through the line *x x*, Fig. 2. Fig. 4 is a view of the central stationary burr, showing its connection with the hopper and revolving frame. Fig. 5 is a face view of an adjustable plate-wheel for holding one of the revolving burrs in position and connecting the same with the driving mechanism. Fig. 6 represents a face view of the annular burrs. Fig. 7 is a longitudinal view of the shaft which revolves the burrs, showing one of the plate-wheels attached thereto, one of the annular burrs adjusted to the plate-wheel and upon the drum or flange extending therefrom and encircling the shaft, and upon which the three burrs are adjusted. Fig. 8 is a face view of one of the annular burrs and its drum and shaft. Fig. 9 is a perspective view of the central stationary burr and the hopper connected thereto; and Fig. 10 is a sectional view taken on the line *z z*, Fig. 4.

Like letters in different figures represent like parts.

The object of my invention is to obtain at a minimum cost a feed-grinding machine which may be operated by horse, steam, or other power, and which will do its work faster and with greater ease than those ordinarily in use, and at the same time by automatic devices so adjust its working parts that the grinding-surfaces cannot wear themselves upon each other, and thus not only impair the utility of the machine, but intermix the abraded metallic particles with the ground feed. It is obvious that such an adjustment of the grinding-surfaces must produce a more evenly-ground and better quality of meal.

To enable others skilled in the art to understand and utilize my invention, I will describe its construction and operation.

A, Figs. 1 and 2, represents a stationary annular master-wheel, cast solidly with the legs or standards B B B B, firmly secured to a proper foundation or bed by the bolts *a a* and the basket-frame C C, which constitutes the main frame-work of the machine.

Into the gear of the annular wheel A a pinion, D, engages, which pinion is attached to the lower end of the vertical shaft E, the latter running in a journal-bearing in the revolving frame F. On the other end of the shaft E, and revolving in a horizontal plane, is a bevel-wheel, G, which engages with a small bevel-pinion, H, the latter serving to revolve the grinding-burrs, as hereinafter described. The revolving frame F has four arms projecting downward and converging at the center of rotation F′, the downward extension of which forms a pivotal journal, I. In the stationary frame described the arms C C, of which there are four, two of which are not shown in the drawings, also converge in like manner as those of the revolving frame F, the point of convergence J forming a hub or journal bearing in the center of and below the plane of the annular wheel A, into which the journal I is pivoted. The revolving frame F turns upon this pivotal point I, being thereby held centrally in position. A shoulder at the upper end, F′, and a pin at *l* at the lower end of the journal I prevent the frame F from vertical movement. The frame F is further held centrally at the top by the anti-friction wheels K K K K, Fig. 2, which turn on journals or gudgeons cast to the frame F, and are secured thereto by the pins *m m m*. These wheels revolve on the inside of the flange W, which project vertically from the periphery of the annular wheel A.

The diverging ends of the sweep or lever L L are secured by screws or bolts *b b* to the flange *c* on opposite sides of the frame F. The lever-arms L L converge at a point, M, to which the horse is attached. As the horse traverses the circuit described by the sweep L L the frame F revolves upon the pivot I, carrying the pinion E around within the master-wheel A, causing the former to revolve. This likewise revolves the bevel-wheel G upon the same shaft, and the gearing of the latter, meshing in that of the pinion H, likewise causes it to revolve and to actuate in its turn the grinding-burrs. The pinion

H may be cast either separately or solid with the plate-wheel N, Fig. 7, the flange or drum O, and the shaft P.

On the end of the shaft P is a journal, *d*, which turns in the bearing *e*, Figs. 1 and 3. On the shaft P, next to the journal *d*, a thread, *n*, is cut, on which are screwed the nuts *f f*, Figs. 2 and 3, which serve to hold the adjustable plate-wheels N and N′ and the burrs R, S, and R′ together, and by loosening or tightening to adjust the latter to grind coarse or fine. The annular burrs R and R′ have three holes, *g g g*, Figs. 6 and 8, in each, equally distant from the center and from each other. Into these holes corresponding lugs or pins *h h h* upon the plate-wheels N and N′, Figs. 5 and 7, are fitted, for the purpose of communicating motion to the burrs R and R′. The plate-wheel N′ has a circular flange, T, Fig. 5, upon its inner surface, of the same diameter as the drum O and the same thickness as the burr R′. This flange serves to hold the burr R′ centrally in position. Inside of this flange are cast the lugs *i i i*, Fig. 5. When the plate-wheels N and N′ are adjusted on the shaft P the lugs *i i i* fit into corresponding depressions *j j j* in the flange or drum O, so that when N is driven N′ is driven, and the motion thereof being communicated, as shown, to the burrs R and R′, the latter are revolved in the same direction and the same plane.

The burr S, Fig. 4, which is placed between the annular burrs R and R′ and has both of its sides furrowed, (the draft of the central and revolving burrs being in opposite or nearly opposite directions—that is to say, being tangential to the circle formed by the drum O and the flange T to facilitate grinding,) has a circular opening in the center which fits over the drum O. On this central burr, S, are cast the lugs *k k* and a wide flange, U, which latter is intended to prevent the feed from being thrown out from the burrs and scattered while being ground, as well as to serve as a base and support to the hopper V. On opposite sides of the revolving frame F, Fig. 4, are also lugs *l′ l′*, which fit into the notches formed between the lugs *k k* and the lower extremities of the flange U of the central burr, S, and serve to support the same in position, as well as to prevent it from revolving. This device permits such lateral movement of the central burr, S, as may be necessary to adjust its surface to those of the burrs R and R′ as they revolve, and by this means all unnecessary wear which might otherwise be produced by inequalities of surface is obviated.

Another desirable feature of my invention is the fitting of the annular burrs R and R′ upon the plate-wheels N and N′ by means of the lugs or pins *h h h*, instead of having the plate-wheels solid with the burrs. By this device the burrs R and R′, when worn away, may readily be removed and replaced by new ones at a minimum of cost and trouble.

In the top of the central burr, S, is an oblong orifice, of nearly the width of the burr, into which the material to be ground is fed from the hopper. Corresponding to this orifice a segmental notch, X, Fig. 4, is cut upward in the burr S from its inner circle nearly to its periphery. This permits lateral contact of the material from the hopper immediately with the face of the revolving burrs R and R′, passing readily into the "bosom" of the latter. At the point Y, where the grain first comes in contact with the middle burr, it is made thinner, and the furrows are deeper than at the opposite side of the opening X. From the point Y to the opposite side of the opening X the furrows are graduated, being made shallower as they near the latter point, thus enabling the feed, which may first be introduced in large grains or particles, to be constantly ground finer as it approaches the point last named. This arrangement enables the machine to feed more readily and prevents clogging.

To form the bosom, the inner surfaces of the burrs are beveled in the usual manner, a flat furrowed surface or skirt being left near the periphery of each burr, as shown in Figs. 9 and 10.

It is obvious that the vertical revolving interchangeable burrs must overcome many of the objections to the machines heretofore in use.

It is a well-known fact that the weight of the sweep in the ordinary cone grinding-machine produces a constant deflection of the revolving burr from the plane of its revolution, thus producing a constant friction of the surfaces where the weight is applied and an unnecessary and useless wearing of the same, while the opposite surfaces of the burrs are separated from each other and prevented from fulfilling their purpose. Thus the grinding-surface is constantly lessened, while the wear is increased. All of the gearing in my machine being adjusted to the revolving frame F, the weight of the sweep cannot affect it.

It is obvious that by the use of the two revolving burrs with the double-faced stationary burr the grinding-surface of the machine is doubled. The automatic adjustment of the burrs described serves also to prevent the "killing" and "gumming" of the meal, so common and objectionable in the usual mode of grinding.

My machine may be readily adapted to the use of other than horse-power by connecting gearing or a pulley to the lower extremity of the pivoted journal I and actuating the same by a shaft or belt from an engine, windmill, or other motive power.

Having described my invention, what I desire to secure by Letters Patent is—

1. In a feed-grinding machine, the combination, with a middle double-faced non-rotating burr having a slight lateral play in its supports, of two revolving burrs co-operating with said middle burr, whereby the space between the burrs is automatically regulated, substantially as described.

2. In a feed-grinding machine, the adjusta-

ble revolving burrs, in combination with the automatically-adjustable stationary center burr, substantially as and for the purposes set forth.

3. In a feed-grinding machine, the combination, with the revolving burrs, of the stationary but laterally-adjustable double-faced grinding-burr having an opening at the top through which the material to be ground may pass directly to the bosom of the burrs, substantially as and for the purpose specified.

4. The stationary double-faced burr, thinner where the grain is introduced and gradually thickened to a point at or near the completion of the circuit, in combination with the co-operating revolving burrs, substantially as described.

5. The stationary double-faced burr, the furrows of which are deeper at the point where the grain first comes in contact with it and grow gradually shallower to a point at or near the completion of the circuit, in combination with the co-operating revolving burrs, substantially as described, for the purpose specified.

OSWALD E. WINGER.

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