T. A. CHANDLER.

Grinding Mill.

No. 6,583. Patented July 10, 1849.

Fig. 3

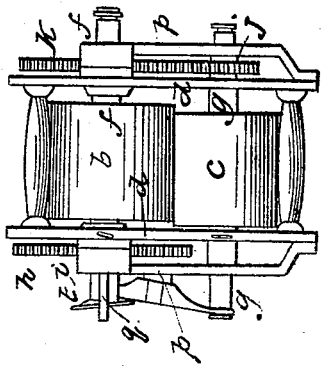


Fig. 6

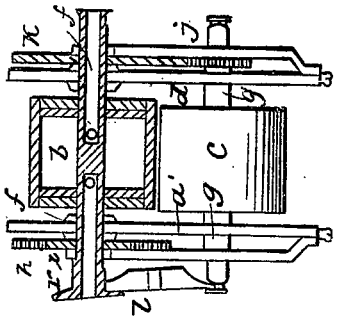


Fig. 2

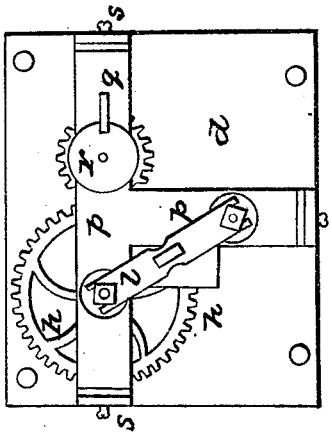


Fig. 5

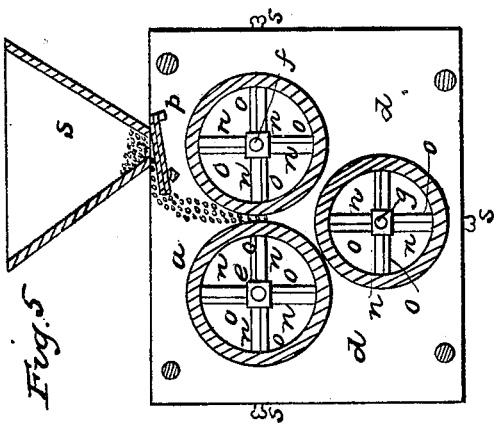


Fig. 7

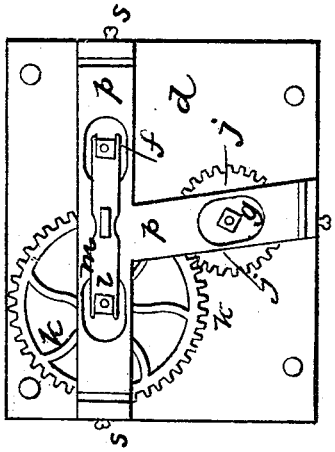
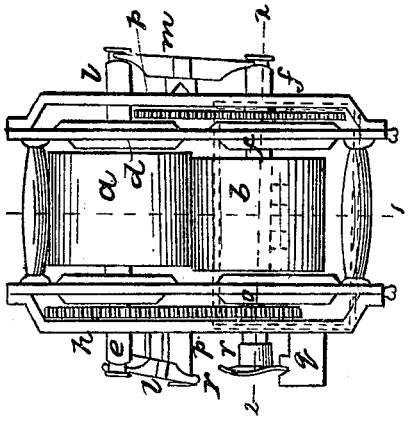


Fig. 4



UNITED STATES PATENT OFFICE.

THO. A. CHANDLER, OF ROCKFORD, ILLINOIS.

MILL FOR GRINDING.

Specification of Letters Patent No. 6,583, dated July 10, 1849.

To all whom it may concern:

Be it known that I, THOMAS A. CHANDLER, of Rockford, in the county of Winnebago and State of Illinois, have made certain new and useful Improvements in Machinery for Grinding Grain and other Substances, of which the following is a full and exact description, reference being had to the annexed drawings of the same, making part of this specification, in which—

Figure 1 is an elevation of one end, Fig. 2 is an elevation of the other, Fig. 3 is an elevation of one side, Fig. 4 is a top view, Fig. 5 is a section through the line 11, and Fig. 6 is a section taken through the line 22 of Fig. 4.

The same letters indicate the same parts in all the figures.

The nature of my invention and improvement consists in combining a series of two or more grinding cylinders running at unequal velocities, and vibrating in a direction parallel to their axes, with equal or unequal, and opposite motions, these rollers being placed nearly in contact, in order that grain passed between them may be crushed, and rubbed in opposite ways at the same time, and thus be uniformly and finely pulverized by the least possible contact with the grinding surfaces. The grinding cylinders, which are hollow, being kept cool by the circulation of a current of air through them, which is kept flowing by the action of oblique openings in their ends, those of one end being inclined in the contrary direction to those of the other, in order that one set of openings may favor the entry and the other the escape of the air.

The accompanying drawings represent a machine with three rollers (*a*, *b*, *c*,) arranged in a frame (*d*). The frame, rollers, and other parts of the machine may be made of any material which the constructor deems it best to use, but I prefer cast iron, which on the periphery of the cylinder should be chilled, to increase their durability, as the constant attrition caused by the grinding would rapidly wear them away, if not made extremely hard.

The shafts (*e. f. g.*) are square where the heads of the cylinders are keyed to them, and also where the wheels (*h. i. j. k*) which connect them together are placed, and have grooves made round them near their ends, to receive the forked or slotted ends of the vibrating levers (*l* and *m*) which communicate a reciprocating motion from one shaft to the other. These shafts are also hollow from their ends to a point within the heads of the cylinders, where an aperture is made through their sides to communicate with the interior of the cylinder for the purpose of admitting a current of air to keep the journals from being unduly heated by friction when in motion. The cylinders may either be smooth or rough on the surface, as is preferred, but for most purposes a smooth surface would be preferable, for the last roller at least.

The sides of the cylinder project over their heads or ends, a distance equal to the projection of the lips (*n*) of the radial openings (*o*) which lips are inclined to the plane of the end, in opposite directions, at opposite ends, so that in whichever direction the cylinder turns, the lips on one end will be inclined so as to draw the air through the radial openings of the head into the cylinder, and at the other to favor its expulsion again, thus maintaining a constant circulation, which will keep the cylinder cool. The distance between the cylinders is regulated by the set screws (*s*) and as the fineness of the meal is in proportion to the distance between the cylinders, it can be made fine or coarse, as desired, by simply adjusting the set screws.

For convenience I have represented the shaft (*f*) as the driver of the others, although any other might be used for the same purpose with equal advantage; upon one of its ends I place the small wheel (*i*) which takes into and turns the larger wheel (*h*) on the axle (*e*) which turns the cylinder (*a*) as much slower than (*b*) turns, as the wheel (*h*) is larger than the wheel (*i*). On the opposite end of the shaft (*f*) I have placed the wheel (*k*) which is large and takes into a wheel (*j*) on the shaft (*g*) which it drives, and of course turns the shaft (*g*) with its cylinder (*c*) as much faster than the shaft (*f*) and the cylinder (*h*) turn, as the driving wheel (*k*) is larger than the driven wheel (*j*). These wheels have square eyes which are well fitted to the square part of the shafts, but not too tightly to prevent the latter from sliding freely through them, during their vibrations. The wheels are held in position against the frame, and prevented from oscillating with the shafts by the guide bars (*p*) between which and the side of the frame they are placed, if these wheels oscillated with their axes their teeth would wear so

rapidly as to render it almost impracticable to adopt this method of connecting the cylinders.

Upon one end of the shaft (*f*) is placed in an oblique position a disk (*r*) whose edge turns in a fixed notch in a projecting arm (*q*) in which it is confined so as to prevent any lateral motion, when therefore, this disk revolves, it moves the shaft (*f*) backward and forward in the direction of its length a distance directly proportioned to the degree of obliquity at which it is placed to the plane of its motion. The oscillation of the cylinder might be produced by making the disk sinuous on its edge, and causing it to turn in a notch like that in which the oblique disk turns. A lever (*m*) resting upon a fulcrum on the side of the frame, and having slots in both its ends placed over the necks formed by the grooves upon the end of the shafts, communicates the oscillating motion of the shaft (*f*) to the shaft (*e*), and the latter through another lever (*l*) similarly constructed and arranged communicates its oscillating motion to the shaft (*g*). By placing the fulcra of these levers at unequal distances from their ends the relative distance through which they cause the cylinders to oscillate may be varied to any required extent.

A hopper (*s*) and the other usual appliances for supplying the grain to be ground, and for receiving the meal, may be made and arranged in the usual or in any suitable manner.

To produce uneven wear in the surface of the cylinders and thereby improve their grinding qualities for some purposes I have deemed it advisable to embed in the cast metal, either rings of steel or cast metal of the same kind, but harder than the general mass of the cylinder.

Having thus described the construction and operation of my improved grinding mill what I claim therein as new and desire to secure by Letters Patent, is—

1. The combination of two or more revolving, oscillating cylinders, arranged and operated substantially as herein described for the purpose of grinding grain and other substances.

2. I likewise claim the manner herein described of preventing the cylinders, and the journals of their axes, from becoming unduly heated, by keeping a constant current of air circulating through them by the action of the oblique lips of the radial apertures in their ends, as herein described.

In testimony whereof I have hereunto set my hand this eighth day of January, A. D. 1849.

THOS. A. CHANDLER.

Witnesses:
BELA SHAW,
DAVID BIESED.