(No Model.) 2 Sheets—Sheet 1.

D. C. STOVER.

GRINDING MILL.

No. 347,531. Patented Aug. 17, 1886.

Fig. 1.

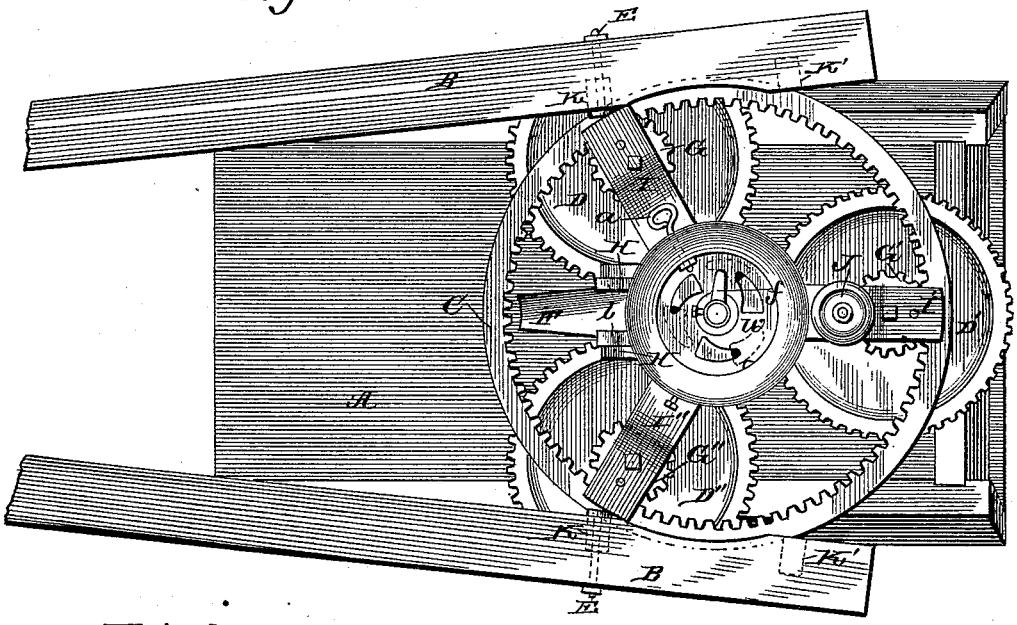


Fig. 3.

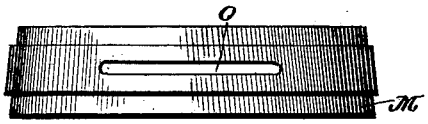


Fig. 4.

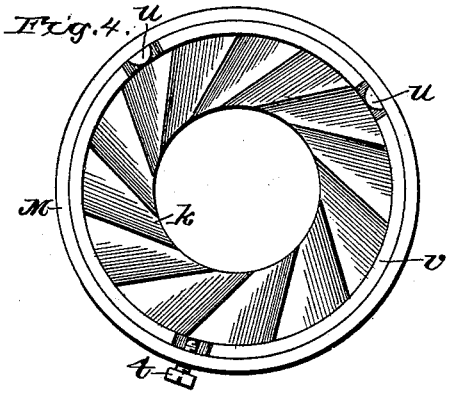


Fig. 5.

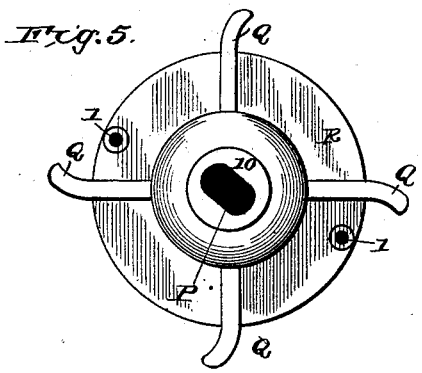


Fig. 7.

WITNESSES

Jos. A. Ryan.
D. P. Wright.

INVENTOR

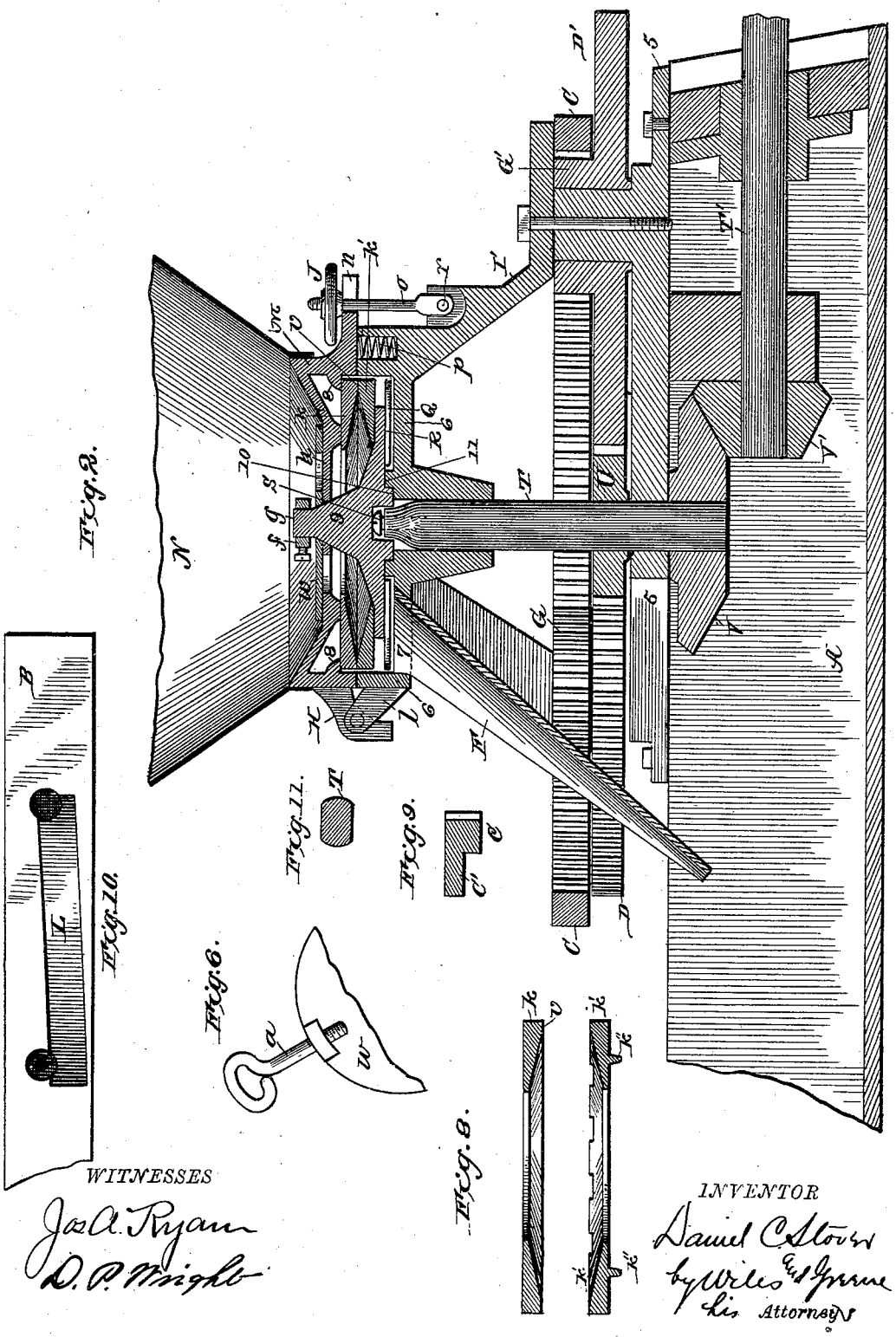
Daniel C. Stover
by Wiles and Greene
his Attorneys

(No Model.) 2 Sheets—Sheet 2.

D. C. STOVER.

GRINDING MILL.

No. 347,531. Patented Aug. 17, 1886.



WITNESSES

Jas. A. Ryan

D. P. Wright

INVENTOR

Daniel C. Stover

by Wiles & Greene

his Attorneys

UNITED STATES PATENT OFFICE.

DANIEL C. STOVER, OF FREEPORT, ILLINOIS.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 347,531, dated August 17, 1886.

Application filed November 24, 1885. Serial No. 183,850. (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 mills of the class known as "feed-grinders," and is fully described, explained, and claimed in the following specification, and shown in the accompanying drawings, in which—

Figure 1 is a plan of the mill, the hopper being removed. Fig. 2 is a central vertical section of the complete mill; and the remaining figures are detail views hereinafter explained.

As illustrated in the views, A is an ordinary meal-box, forming the support of the entire mill, and 5, Fig. 2, is a base-plate resting on and fastened to the meal-box, and provided with three integrally-formed gudgeons, which serve as pivots for an equal number of pinions, D D′ D″, and for corresponding smaller pinions, G G′ G″, above, and formed integrally with said pinions D D′ D″, respectively. An internally-geared ring or open master-wheel, C, engages the small pinions G G′ G″, and is provided with lugs K K′ for the attachment of converging sweeps B, by means of which the mill may be operated, the forward lugs, K K, being bored longitudinally for the admission of sweep-retaining bolts E E. For the purpose of giving the sweeps a proper upward inclination the rearward lugs, K′, are formed in the plane of the master-wheel, while the forward lugs, K, are above said plane; and in order to bring the sweeps into proper position they are formed with segmental grooves L, Fig. 10, in their inner faces, which receive the rim of the master-wheel.

As shown in Fig. 1, the sweeps are cut back on arcs about the center of the mill to enable them to pass the ends of stationary arms I I′ I″, hereinafter mentioned; but if the master-wheel rim be widened and given the cross-section illustrated in Fig. 9, the sweeps will receive the horizontal flange C′ and rest against the vertical flange C, and will be so far from the center as to pass the ends of the arms without being cut away. The arms I I′ I″ already referred to, rest on and are securely bolted to the gudgeons at the centers of the pinions G G′ G″ and project outward over the master-wheel rim, which they secure against vertical displacement. From their points of attachment they extend upward and inward toward the axis of the mill, their inner ends forming the support of a horizontal cylindrical pan or box, 6, on whose lower surface is a central boss or hub, forming the upper bearing of a vertical shaft, T. Near its lower end the shaft T is journaled in the center of the base-plate 5, and a spur-gear, U, and beveled gear V are rigidly mounted on the shaft, the spur-gear being above the base-plate and in engagement with the pinions D D′ D″, while the beveled gear is below the base-plate and engages a second beveled gear, V′, mounted on a horizontal power-transmitting shaft, T′. The upper end of the shaft T is non-circular in cross-section, as shown in Fig. 11, which is a horizontal section through the upper part of the shaft and projects above the bottom of the cylindrical box, 6, and a plate, R, having a non-circular socket, P, in its lower face, rests on and is rotated by the shaft.

On the upper face of the plate R is a suitably-secured grinding-ring, *k′*, and on its lower face are a series of sweeps, Q, adapted to carry meal to a discharge-opening, 7, in the bottom of the box 6, whence it is carried by a spout, F, downward to the meal-box. Vertical adjustment of the plate R is secured by means of a preferably round-headed screw, S, in the top of the shaft T, forming the immediate support of the plate, and access of the meal from the pan to the shaft T is prevented by two co-acting annular flanges, 10 and 11, formed respectively on the lower face of the plate R and the upper face of the bottom of the box 6, the flange 10 being encircled by the flange 11. (See Fig. 5, bottom plan of plate R.)

Above the box 6 is a cylindrical cover, M, connected with the box at one point by a hinge, H*l*, consisting of suitable ears, H and *l*, joined by a horizontal pivot, which may be formed with one of the ears or separate from both. At a point diametrically opposite from the hinge

the cover M is provided with a lug, *n*, formed with a preferably radial vertical slot, and a rod, *o*, is hinged at *r* to the arm I′, and swings into or out of the slot in the lug. The upper end of the rod *o* is screw-threaded and provided with a hand-wheel, J, by means of which the lug may be pressed downward. A spring, *p*, resting on the arm I′, resists the downward pressure of the hand-wheel and holds the lug constantly against the lower face of the wheel.

The cover M consists of a cylindrical rim (on which the ear H and lug *n* are formed) and a top plate, *h*, provided with a series of openings, for the admission of grain to the box 6. A suitable hopper, N, is attached to the rim, and a feed-plate, *w*, rests on the top plate, *h*, and is formed with a series of openings corresponding in number, size, and arrangement with those in the top plate. A radial rod, *a*, fastened to the feed-plate, as shown in Figs. 1 and 6, projects through a horizontal slot, O, Fig. 3, in the rim of the cover M, and serves as a means of adjusting the feed-plate. The length and position of the slot O are such that when the rod *a* is at one end of the slot the openings in the feed-plate *w* exactly coincide with those in the top plate, *h*, and when the rod is at the opposite end of the slot the openings in the top plate are fully closed by the solid parts of the feed-plate. The available size of the openings in the plate *h* may thus be regulated by means of the rod *a* when the mill is in operation and the hopper is full of grain.

Below the top plate, *h*, is a grinding-ring, *k*, the upper surface of whose marginal portion rests against lugs S, formed on the inner surface of the rim of the cover, M. The lower surface of the margin of the ring is beveled upward at three points, and two of said points rest upon and are supported by lugs *u* on the rim of the cover M, while the third point is supported by a set-screw, *t*, passing through the rim. The grinding-ring is thus held rigidly between the lugs S, which are above it, and the lugs *u* and set-screw *t*, which are below it. The ring *k* has an annular margin, *v*, Figs. 2, 4, 8, extending slightly below the lowest points of its grinding-ridges, and the ring *k′* is formed with a similar annular margin extending slightly above its grinding-surface. The margin of the ring *k′* is cut away at suitable intervals to allow the escape of meal, but the two annular margins rest one on the other when the rings are brought together, and effectually prevent the striking or wearing of the grinding-faces. (See Fig. 4, bottom plan of cover M and ring *k*.)

On the center of the upper face of the plate R is formed a cone, 9, which extends upward through the top plate, *h*, and feed-plate *w*, and terminates in a short cylindrical part, *g*, on which is rigidly fastened an agitator, *f*. When the feed-plate *w* is in such a position as to expose the openings in the top plate, *h*, either wholly or partially, any grain in the hopper N tends to pass through said openings and onto the cone 9. The distance between the plate *h* and the surface of the cone is so slight that so long as the cone is stationary the columns of grain passing through the several openings in the plate *h* remain distinct, each column being, however, larger at its base than the opening through which it falls. So soon as the plate R and cone 9 begin to rotate, the grain passing through the openings in the plate *h* is carried away, its motion being partly circular in the direction of rotation of the cone and partly from the center outward toward the grinding-rings *k k′*, the centrifugal motion being assisted by the shape of the cone 9. It is evident that any increase of speed of rotation of the cone 9 will increase the rotary and centrifugal motions of the grain on the cone, and in fact I have found that in any given position of the feed-plate *w*, the amount of grain passing through the openings in the top plate, *h*, is substantially proportional to the speed of rotation of the cone 9 and the grinding-ring *k*, which is attached thereto. Each rotation of the master-wheel therefore grinds the same amount of grain, no matter what may be its time of rotation, and it is unnecessary to vary the position of the feed-plate *w* except to compensate for changes in the power applied to the mill or in the nature of the material to be ground.

The operation of the mechanism shown and above described, while evident from the foregoing explanation of the parts, may be briefly stated as follows: The rotation of the sweeps B and master-wheel C rotates the pinions G G′ G″, and the larger pinions, D D′ D″, formed therewith, and the rotation of the last-named set of pinions rotates the gear-wheel U and with it the shaft T and beveled gear V. The turning of the shaft T drives the plate R, grinding-ring *k′*, grain-sweeps Q, cone 9, and agitator *f*, and the rotation of the beveled gear V imparts motion to the gear V′ and shaft T′. The position of the feed-plate *w* regulates the speed at which grain is delivered through the top plate, *h*, to the grinding-rings, and the space between said rings is regulated either by means of the hand-wheel J on the rod *o* or by removing the plate R and the parts attached to it, and raising or lowering the screw S. The adjustment by means of the hand-wheel is sufficient for all ordinary purposes, the screw S being made use of only when it is necessary to compensate for wear of the parts. The raising and lowering of the hand-wheel J, together with the upward pressure of the spring *p* and the consequent swinging of the cover M about a fixed horizontal hinge-joint throws the cover slightly out of a horizontal plane, but the rounded head of the screw S gives the plate R sufficient rocking adjustment to keep the grinding-rings *k k′* parallel in all positions of the cover.

The ring *k′* may be fastened to the plate R in any desired manner; but to secure convenient attachment and detachment of the ring I prefer to use the fastening device illustrated in Figs. 8 and 5, in which *k″* are lugs on the

lower face of the ring, and 1 are openings in the plate to receive said lugs and insure the rotation of the ring with the plate.

I am aware that it is not broadly new to combine with a grinding mechanism and suitably perforated feed-plates a distributing-plate placed beneath the feed-plates and adapted by its rotation to expedite and equalize the flow of grain to the grinding-surfaces. So far as I know, however, the plates so employed have heretofore been flat horizontal disks, and while a flat plate, by its centrifugal action on the grain, is a useful element in such a combination, a conical distributer such as I have shown and described is much more effective and satisfactory.

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

1. The combination, with the shaft T and means for rotating the same, of the screw S, set in the top of the shaft, a plate, R, resting on the head of the screw and adapted to be raised and lowered by means thereof, a grinding-ring on the upper surface of the plate, and a second grinding-ring above and coacting with the first, said plate being connected with the shaft by means insuring their simultaneous rotation, substantially as shown and described, and for the purpose set forth.

2. The combination, with the shaft T and means for rotating the same, and a screw, S, set in the top of the shaft, of a suitably-supported box or case, 6, inclosing the upper end of the shaft, a plate, R, within said box and resting on the head of the screw, whereby it may be raised and lowered, a grinding-ring rotating with said plate, a cover connected with said box or case at one point by a hinge-joint, and at an opposite point by an adjustable fastening, substantially as shown and described, and a second grinding-ring fastened to said cover, and co-operating with the ring fastened to said plate, the plate R being connected with the shaft T by means insuring their simultaneous rotation, and the grinding-rings having independent means for vertical adjustment, substantially as shown and described, and for the purpose set forth.

3. The combination, with the shaft T, and means for rotating the same, of a suitably-supported box, 6, a screw, S, set in the top of the shaft, a plate, R, resting on and adjustable by means of said screw and rotating with the shaft, a grinding-ring, k', resting on the plate and connected therewith by means of lugs k'', on the ring entering openings 1 in the plate, the cover M, connected with the box by the hinge-joint H l, and having the slotted lug n, the swinging-rod o, and the hand-wheel J, and the grinding-ring k, fastened to the cover M, and coacting with the ring k', substantially as shown and described, and for the purpose set forth.

4. The combination, with the cover M, having the two sets of lugs 8 u, and the grinding-ring k, resting against the lower faces of the lugs 8, and having a series of upwardly-beveled spaces on its margin, of a set-screw, t, passing through the rim of the cover in the plane of the lugs u, two of the beveled spaces on the grinding-ring being supported by the lugs u, and a third by the set-screw t, and the ring being rigidly held between the lugs 8, and the lugs u, and screw t, substantially as shown and described, and for the purpose set forth.

5. The combination, with the box 6, shaft T, plate R, supported by and rotating with the shaft, grinding-ring k', fastened to the plate, cover M, resting on the box and having perforated top plate, h, feed-plate w, resting on the top plate, and grinding-ring k, fastened to the cover, and co-operating with the ring k', of the cone 9, formed on the upper surface of the plate R, and adapted to distribute the grain passing downward through the openings in the top plate, h, and feed-plate w, substantially as shown and described, and for the purpose set forth.

6. The combination, with the shaft T, box 6, cover M, having perforated top plate, h, grinding-ring k, fastened to the cover, and feed-plate w, resting on the top plate, of the plate R, resting on and rotated by the shaft T, and having the distributing-cone 9 on its upper face, the grinding-ring k', fastened to the upper face of the plate R, and the grain-sweeps Q, fastened to the lower face of said plate, and adapted to clear the bottom of the box 6, substantially as shown and described, and for the purpose set forth.

7. The combination, with the grinding-rings k k', each having a plane marginal ring, v, projecting beyond its grinding-face, and the margin of one of said rings being notched at intervals to permit the escape of meal, of means for supporting said rings, and means, substantially as shown and described, for rotating one of them.

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

DANIEL C. STOVER.

Witnesses:

CHAS. GILBERT,

J. A. CRAIN.