(No Model.) 2 Sheets—Sheet 1.

A. W. STRAUB.

GRINDING MILL.

No. 260,062. Patented June 27, 1882.

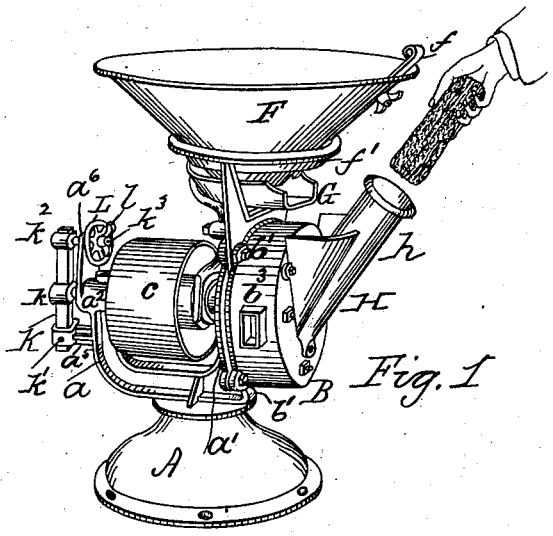

Fig. 1

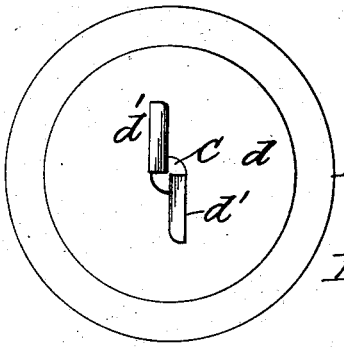

Fig. 3

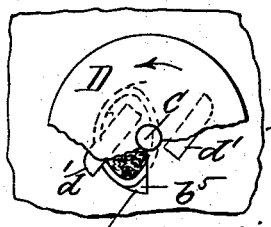

Fig. 4

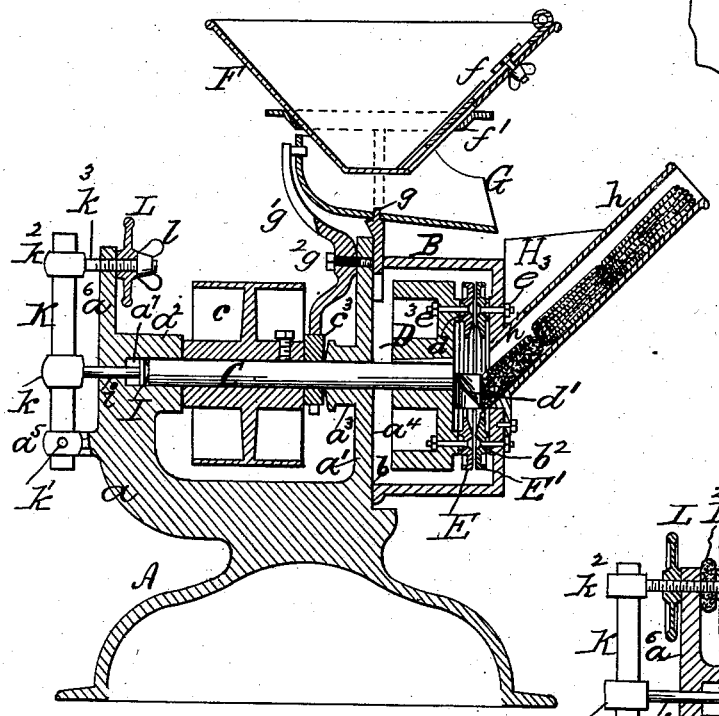

Fig. 2

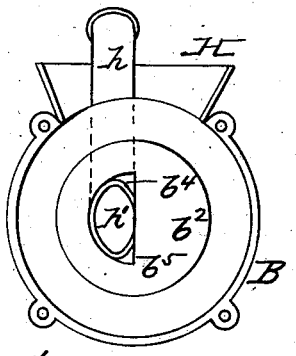

Fig. 5

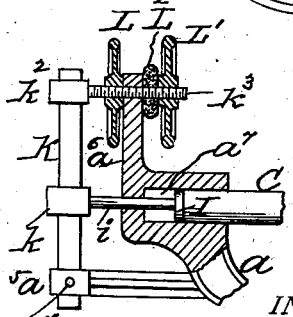

Fig. 6

WITNESSES:

R. H. Van Stavoren,

S. Oler

INVENTOR,

Ambrose W. Straub

By S. J. Van Stavoren.

ATTORNEY.

(No Model.) 2 Sheets—Sheet 2.

A. W. STRAUB.

GRINDING MILL.

No. 260,062. Patented June 27, 1882.

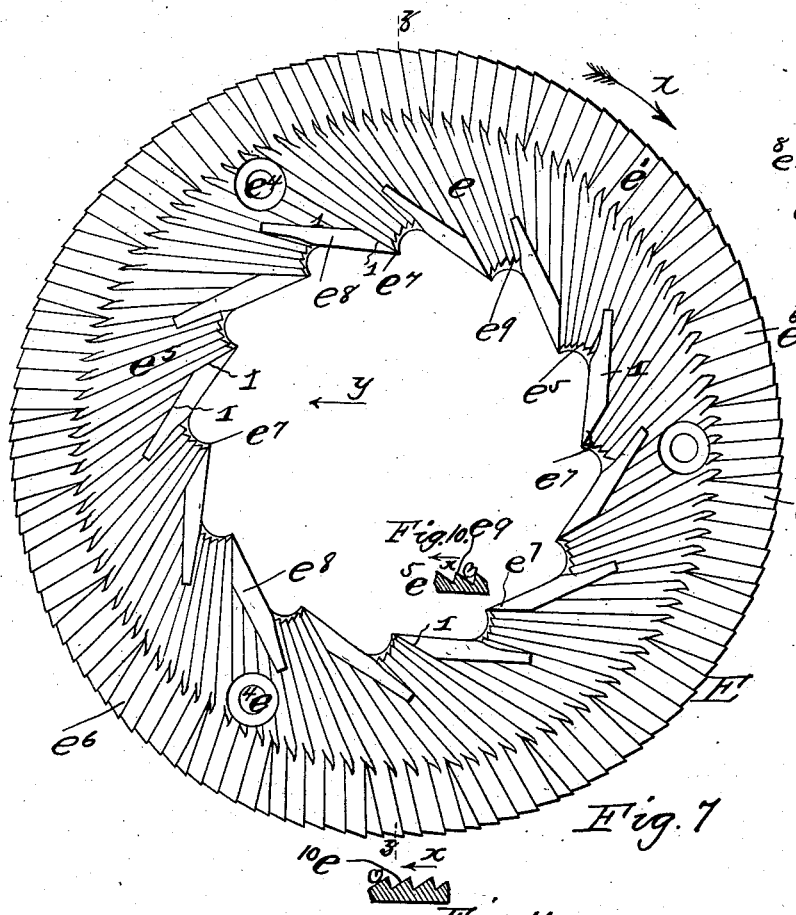

Fig. 7

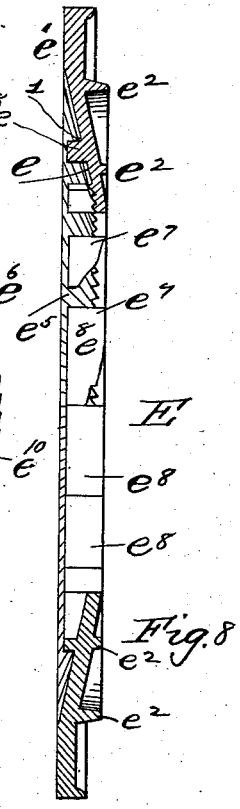

Fig. 8

Fig. 10

Fig. 11

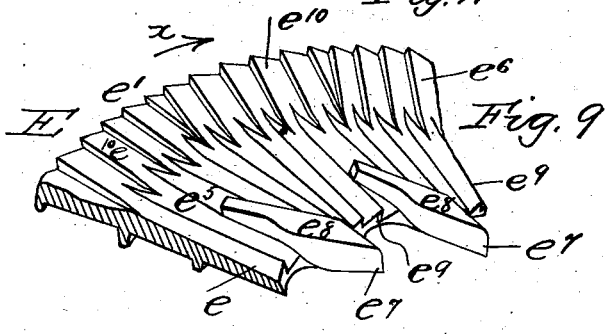

Fig. 9

WITNESSES:
R. H. Van Stavoren,
S. Oler

INVENTOR,
Ambrose W. Straub
By S. J. VanStavoren
ATTORNEY.

UNITED STATES PATENT OFFICE.

AMBROSE W. STRAUB, OF PHILADELPHIA, PENNSYLVANIA.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 260,062, dated June 27, 1882.

Application filed February 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, AMBROSE W. STRAUB, a citizen of the United States, resident of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a perspective of a grinding-mill embodying my invention. Fig. 2 is a longitudinal vertical section of same. Fig. 3 is a face view of the fly-wheel, showing attached cutters and turned seat formed thereon. Fig. 4 is a detail elevation of a portion of fly-wheel and side of hood, illustrating the means for effecting the shear-cut for cutting the corn-cob into particles. Fig. 5 is an elevation of hood, attached secondary hopper, and tube for corn-cobs or corn on the ear. Fig. 6 is an elevation, partly sectional, of a modification of devices for regulating the yielding pressure for the bridge-tree. Fig. 7 is a plan of grinding-disk. Fig. 8 is a transverse section of Fig. 7 on line *z z*, looking in the direction of arrow *y*. Fig. 9 is a broken perspective of the same; and Figs. 10 and 11 are detail sections of the cutting and mashing or crushing furrows, respectively, of said disk.

My invention has relation to grain-grinding mills having metal grinding-disks, and has for its object to provide an improved mill of simple and inexpensive construction.

My invention has for its further object to provide interchangeable metal grinding-disks for such mills, said disks being cheaply renewed when worn out, and are so formed that they may be secured in position in the mill so as to maintain their relative and due adjustment to and from each other without the aid of tramming-screws. Such disks are each provided with two distinct and separate series of concentric furrows, one series of which first cuts or chops the grain-berries, and the other series subjects the chopped grain to a mashing, crushing, or rolling action.

My invention accordingly consists in the peculiar combinations, construction, and arrangement of the parts of the mill, as hereinafter specifically described and claimed.

Referring to the accompanying drawings, A represents the base of the mill, having a vertical standard, *a*, and plate, *a'*, with journal-bearings a^2 a^3 formed integral therewith. The face a^4 of plate *a'* is turned, to provide a smooth surface for the hood B to seat against. The edge *b* of said hood is also turned, so that when said parts are connected together by bolts *b' b'* the hood B rests solidly on said face-plate.

C indicates the driving-shaft or spindle journaled in bearings a^2 a^3, and is provided with belt-pulley *c* and fly-wheel D. The latter is located within the hood B, its face *d* being turned to form a seat for the running grinding-disk E. The bed or stationary disk E' is secured to an inner seat, b^2, formed on hood B, which, being secured to plate *a'* of base A, and being provided with the seat b^2 for the bed-disk E', and the runner E being secured upon the seat *d* of fly-wheel D, said disks and parts are unalterably maintained true to each other. Such adjustment of the disks in relation to one another is accomplished and maintained without the aid of tramming-screws, heretofore used.

The hood B is provided with one, two, or more discharge-spouts, b^3 b^3, one on each side thereof, or they may be located at any other suitable or desirable points.

F is the main hopper, provided with cut-off *f* of any desired construction, and is supported in a frame or stool, *f'*, secured between plate *a'* and hood B by the bolts *b' b'*, so that said frame *f'* is held in place by one or more of the bolts that fasten together said hood and plate.

G is the feed-shoe pivoted at *g* to a frame, *f'*, and is provided with shaker-rod *g'*, pivoted at g^2 to plate *a'*, and operated by eccentric c^3 on shaft C. The hood B is also provided with a hopper, H, constructed as shown and for purposes hereinafter to be described. In the bearing a^2 is placed a hard metal button, I, which abuts against shaft C. *i* represents a step or rod, one end of which impinges against said button, passes through said bearing, and is designed to slide longitudinally therein. Said step connects to a ring, *k*, surrounding a white-pine or other elastic bridge-tree, K. The lower end of the latter is secured at *k'* to an arm or bracket, a^5, projecting from standard *a*, and its upper end passes into a ring, k^2, provided with a stem, k^3, which projects through an opening in a bracket, a^6, rising from bear-

ing a^2, and is threaded at its outer extremity, upon which screws a wheel, L, and jam-nut l. Said bearing a^2 is provided with play-space a^7, as shown. Such construction and arrangement of button I and bridge-tree K, in line with shaft C, allow said bridge-tree to yield when a nail or other similar or different hard substance enters unnoticed between the grinding-disks. The entrance of such nail or substance between said disks exerts a pressure upon shaft C, which in turn is communicated to button I, step i, and bridge-tree K. The latter bends or yields under such pressure, and thereby permits the outer or left-hand end of shaft C to pass into play-space a^7 in bearing a^2. Such movement separates the disks E and E′ farther apart from each other and allows said nail or substance to drop out from between them.

If a spike or other undue bulky or hard substance should obtain access between the grinding-disks, the shaft C is moved to the left to such an extent that the bridge-tree breaks under the pressure resulting therefrom, and the disks E and E′ thereupon move apart from one another to a distance equal to play-space a^7, and the spike or other substance falls out from between the same without injuring their dress. The broken bridge-tree would be more easily and cheaply replaced than the disks could be if their dress was impaired or broken by such spike. The bridge-tree is of only sufficient strength and so arranged that it will only resist the small or ordinary pressure to which the grinding-disks are subjected during the grinding operation, but will readily break when undue pressure is applied thereto.

In Fig. 6 I have shown means whereby the amount of yielding pressure for the bridge-tree is regulated and determined as desired. In said figure the wheel L is placed on the outside of bracket a^6 and an additional wheel, L′, is secured to stem k^3, with an interposed spring or rubber disk, L^2, between said wheel L′ and bracket a^6. By adjusting the wheel L′ to compress rubber or spring L^2, and screwing up wheel L to maintain such adjustment, the yielding or breakable pressure of bridge-tree K is varied, such variation being provided for by the operator to suit the material being ground.

The hood B is provided with a half-round opening, b^4, one side, b^5, of which is straight, or nearly so, as shown; and the hopper H is formed with a tube, h, its end h' aligning with opening b^4 in hood B, as shown in Figs. 2 and 5.

The tube h is provided for holding and feeding cobs of corn to the mill to be ground. Said cobs, as they emerge from the end h' of tube h, impinge or bear against the straight side of the opening b^4 in the hood B, as shown in Figs. 4 and 5. d' d' represent cutters secured in position on the face of fly-wheel D, as indicated in Figs. 3 and 4. As said wheel revolves the cutters d' cut off or slice away that portion of the cob protruding from opening h' of tube H, as illustrated in Fig. 2. The cobs of corn being placed in the inclined hopper h, and the direction of the cut being downward and across the cobs, the latter are during the act of cutting caused to move down said hopper or tube h. Hence the cutters not only sever the cobs into particles but also feed said cobs into the path of the cutters. Such described cut is in effect a shear-cut and not a chopping or breaking cut, as has heretofore been used in mills for grinding corn on the cob.

It will thus be seen that the aforesaid mill is adapted for grinding grain, shelled corn, and corn on the cob. Of course only one such article is ground at a time. When grain or shelled corn is designed to be reduced to flour or cracked it is placed in the main hopper F, and passes therefrom to feed-shoe G, thence into hopper H, and through end h' of tube h to the disks E E′. The latter are formed or cast of hard white-metal or iron and so configured as to be interchangeable, and are therefore readily replaced when both or one of them wear out. Each disk is formed with a bosom, e, and a flat or plane portion, e'. On the rear or under surfaces are annular ribs e^2 e^2, which rest against the turned seats on fly-wheel or hood B, as shown in Fig. 2, being secured thereto by bolts e^3 e^3, passing through openings e^4 in said disks.

Each disk is provided with two series of furrows, e^5 and e^6, a series of saw-teeth, e^7, or teeth for cutting up the severed parts of cobs of corn into still finer particles, and a series of conveyer-flights, e^8, placed tangentially to the eye of the disk, as shown in Fig. 7, and which project some distance above the bosom e, as represented in Fig. 8, so that grain fed to said disk is conveyed or caused to move across said bosom by the sides 1 1 of said flights.

The furrows e^5 are formed on the bosom part e of each disk, and are arranged somewhat tangentially to the central opening of disk, as shown. They are formed and arranged with their sharp angles or cutting-edges e^9 in front, or such cutting-edges form the leading edge of such furrows, the disk being designed to be rotated in the direction indicated by arrows x. Such arrangement of the cutting-edges e^9 is more plainly shown in Fig. 10, which also illustrates a grain-berry in position to be cut by said edges.

The furrows e^6 are formed on the plain or flat part e' of said disks, and are arranged more nearly radial than the furrows e^5. Said furrows e^6 are formed and arranged with their inclined or crushing sides e^{10} in front or forming the leading or crushing edge, such arrangement being directly the reverse of that of the furrows e^5, and is more plainly shown in Fig. 11, which also shows a grain-berry in position to be crushed by the furrows e^6. The result is that when two such disks are placed in a grinding-mill and grain fed thereto the sides 1 1 of the conveyer-flights e^8 feed and conduct the same into and across the bosom part of said disks. Here it is presented to the sharp angles e^9 of the furrows e^5, and thereby chopped or cut into small particles. When the latter

pass to the furrows e^6 the inclining sides of said furrows crush, roll, or mash said particles and reduce them to flour. Hence the latter is not "sandy" to the touch, but is soft and mellow. Grain or corn so ground is subjected to a double reduction, first chopping or cutting it to reduce it to small particles; secondly, such small particles are then subjected to a crushing, rolling, or mashing action, and are thereby reduced to flour. Such crushing or rolling action so mellows the flour that every atom of the same is crushed or pulverized, and the flour does not have that sandy or gritty feel so noticeable in flour ground with iron grinding-disks having the dress heretofore used. When corn on the cob is ground by said disks the cutters d' shear the cob into blocks or pieces, as above described. As the latter enter or find their way between the disks E E′ the saw-teeth e^7 reduce or break up said blocks into still finer particles to enable the same to pass to the furrows e^5 and e^6 to be ground into meal.

What I claim as my invention is—

1. The grinding-mill comprising the hood B, having seat b^2, shaft C, fly-wheel D, interchangeable grinding-disks E E′, base A, having spindle-bearings and vertical disk a', bridge-tree K, bracket a^5, rings k k^2, button I, stem or step i, rod k^3, bracket a^6, wheel L, and nut l, substantially as shown and described.

2. In a grinding-mill, the combination, with a spindle and grinding-disks E E′, of a breakable bridge-tree, K, substantially as shown and described.

3. In a grinding-mill, the combination of base A, having brackets a^5 a^6, rings k k^2, bridge-tree K, rod k^3, wheel L, nut l, stem or step i, button I, shaft C, and grinding-disks E E′, substantially as shown and described.

4. The combination, with spindle C, disks E E′, plate or fly-wheel D, and cutters d' d', of hood B and hopper H, having inclined feed-trough h and semicircular opening b^4, substantially as and for the purpose set forth.

5. A cast-metal grinding-disk provided with a series of saw-teeth, a series of conveyer-flights, and two series of furrows, one of which has its sharp or cutting angles front and the other its inclined or crushing sides front, substantially as shown and described.

6. A breakable bridge-tree, K, in combination with a step, i, button I, spindle C, and grinding-disks, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 10th day of February, 1882.

AMBROSE W. STRAUB.

Witnesses:
CHAS. T. SCHIVELY,
S. J. VAN STAVOREN.