(Model.) 2 Sheets—Sheet 1.

E. SCHMEJA.

APPARATUS FOR GRINDING GRAIN, &c.

No. 248,509. Patented Oct. 18, 1881.

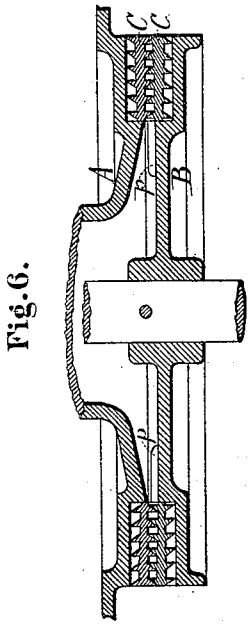


Fig. 6.

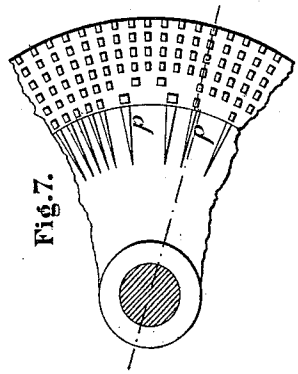


Fig. 7.



Fig. 3.



Fig. 4.



Fig. 5.

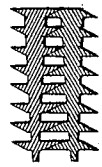


Fig. 8.

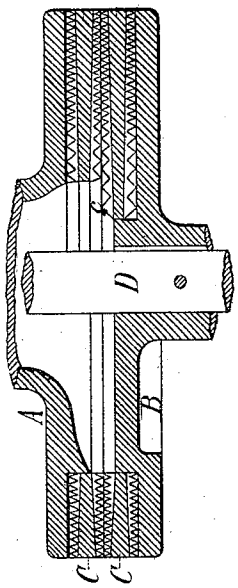


Fig. 1.

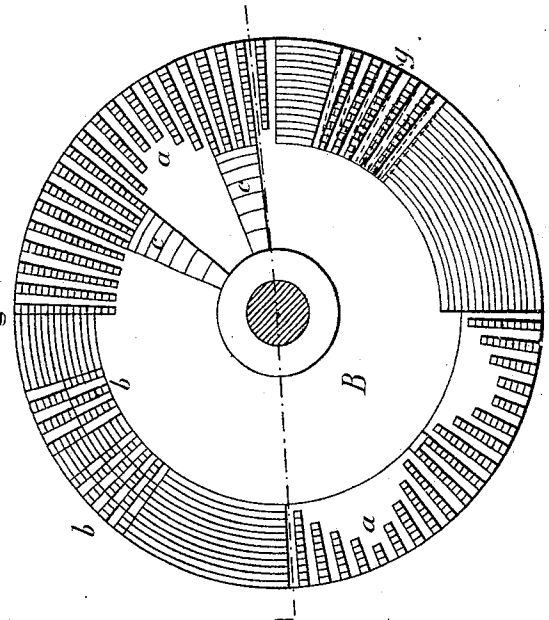


Fig. 2.

Witnesses:

George

Lucile Estock

Inventor:

Edmund Schmeja,

by M. Bailey

his Atty.

N. PETERS. Photo-Lithographer. Washington, D. C.

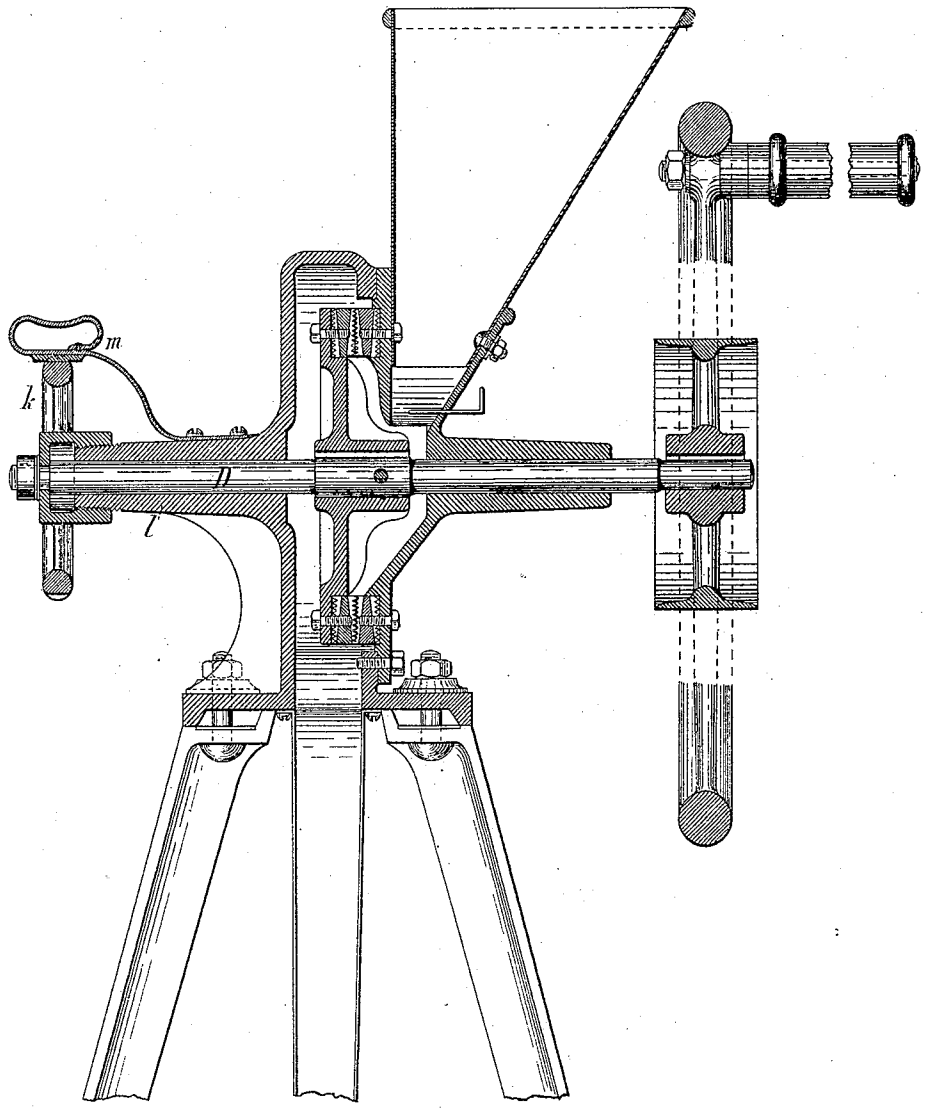
(Model.) 2 Sheets—Sheet 2.

E. SCHMEJA.

APPARATUS FOR GRINDING GRAIN, &c.

No. 248,509. Patented Oct. 18, 1881.

Fig. 9.



Witnesses:

Georgii

Ewell A. Dick

Inventor:

Edmund Schmeja,

by Thos Bailey

his Atty

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

EDMUND SCHMEJA, OF BIALA, AUSTRIA, ASSIGNOR TO HERMAN GRUSON, OF BUCKAU, NEAR MAGDEBURG, PRUSSIA.

APPARATUS FOR GRINDING GRAIN, &c.

SPECIFICATION forming part of Letters Patent No. 248,509, dated October 18, 1881.

Application filed March 23, 1880. (Model.) Patented in Austria December 21, 1877, in France July 8, 1878, in Italy September 30, 1878, in Germany November 20, 1878, and in Belgium February 21, 1879.

To all whom it may concern:

Be it known that I, EDMUND SCHMEJA, of Biala, in the Austrian Empire, have invented a new and useful Improvement in Apparatus for Grinding Grain, Pulse, Bones, Cement, and other Substances, of which the following is a specification.

This invention relates to improvements in apparatuses or mills for grinding grain and other substances, in which the reducing operation is carried out by means of two disks working with their faces against each other; and it consists in the combination, with the said disks, of plates provided with teeth or projections having similar rear and front cutting-edges, which teeth are arranged in concentric rows and in such a manner that the teeth of one disk are opposite to or project into the spaces between the concentric rows of teeth of the other disk, each tooth having one of its faces substantially in contact with the contiguous face of one of the adjoining teeth in the other disk, so that the edges of the teeth will act as cutters upon the substance to be reduced.

On the annexed Sheet 1 of drawings the said improvements are shown in detail, while on Sheet 2 a complete mill is represented in which they are applied.

Figure 1 is a vertical section of the two grinding-disks A and B, with the toothed plates C attached thereto. The disk A is stationary, whereas B is keyed on the rotating shaft D. Both disks may, however, be made to rotate in contrary directions, or with different speed in the same direction. The material to be ground is fed in through the neck of the disk A.

Fig. 2 is a plan of the disk B. The toothed plates C, with which the disks are provided, may cover the whole face of the latter, or they may form a ring, or, finally, they may consist of a number of segments, as may be preferred in any special case, and they are fastened to the disks by screws or other suitable means. The teeth are formed on the face of the plates by the intersection of circular and radial or other grooves, as shown in Fig. 2; but for the rest they may be modified in various manners with regard to their shape, size, &c. The teeth of the plates C, Fig. 1, form on the radial plane of section triangles having two equal sides, each of which constitutes a cutting-edge. This arrangement is, by preference, applied when a pulverulent product is to be obtained by the grinding process.

Fig. 3 represents a series of other forms which the teeth may have upon their radial plane of section, whereas on the periphery of the plates C they may present the various forms of Fig. 4. As regards the different arrangements of the teeth upon the face of the plates, the same may be seen from Fig. 2. At *a* the radial rows of teeth have been made of different length for the purpose of causing the teeth at the end of the longer rows to seize the grain, &c., more readily at the onset. At *b* short rows of teeth alternate radially as well as peripherically with spaces, so that no particles of material imperfectly reduced can pass through the spaces or radial grooves, especially when the disks are placed vertically. At *g* the grooves intersecting the circular grooves form an angle with the corresponding radii, so that, the opposite plate being cut in the same manner, the intersecting grooves of the two plates will cross each other, whereby the same object is attained as in the foregoing case. When the plates C extend to the boss of the disk they may be provided upon their central part with rows of larger and stronger teeth *c c*. (Also shown on the right-hand side of Fig. 1.) These are especially adapted for a preparatory reduction of coarse materials; but they may also serve to stop the machine, and to prevent a breakage of the finer teeth in case any foreign substance—such as a stone—should happen to come into the mill.

Another arrangement for facilitating the entrance of coarse materials between the teeth is shown by Fig. 5, where the distance between the teeth of the two disks is greater near the center of the latter than at their periphery. Materials of the said description may, however, be reduced to a suitable extent by spe-

cial teeth fixed on the shaft D, and working together with other teeth on the inside of the neck of the disk A; also, special crushing-rollers may be combined with the mill.

When the teeth are formed as shown in Figs. 1 and 2 the mill is specially adapted for reducing grain and other substances to fine meal or flour. If, on the other hand, it is desired to obtain a granular product with the least possible comminution to powder, the construction of teeth represented by Figs. 6, 7, and 8 is to be preferred. The teeth in this case act together with one of their edges only, whereas a space is left between the other edge of each tooth and the following tooth of the opposite disk. With regard to size, these teeth may also be made larger and stronger toward the center of the disks, and for the purpose of obtaining a fine granular product it is advantageous to let the points of the outer teeth of one disk project slightly into a circular groove at the bottom of the spaces between the teeth of the other disk, as shown in Fig. 8. The rotating disk may be provided with ribs *p*, which promote the conveyance of the grain, &c., toward the teeth. This arrangement of mill is mainly adapted for the granular reduction of grain in the Hungarian system of manufacture of flour, but may also be used with advantage for a similar reduction of sugar, animal-charcoal, &c.

The toothed plates C C are made of cast-steel hardened, of chilled cast-iron, or of any other sufficiently strong and hard material. By preference they are provided on both sides with teeth, so that they may be reversed after the teeth on one side have been worn off.

Considering that the teeth as described, and as shown by drawings, present cutting-edges at either end, the direction of rotation of the movable disk may be changed after the teeth have become blunt on one end. The teeth, moreover, present the advantage that they may be resharpened with facility. For this purpose emery or any other grinding substance is applied to the teeth, together with water or oil, whereupon the disks are adjusted close together and put into operation. With some materials the rear edges of the teeth will become sharp again during the very operation of grinding, wherefore it is of advantage to reverse the motion of the mill from time to time. After the teeth have been worn down to such an extent as not to be fit any more for resharpening the plates C are reversed and the teeth on their other side taken into use.

Fig. 9 represents, in section, a small mill provided with the described improvements. The same may be driven by hand or by engine-power. The shaft D of the rotating disk is in this case placed horizontally; but it may have any other position. The end of the shaft is provided with an adjusting arrangement consisting of a hand-wheel, *k*, whose boss screws on the end of the sleeve *l*, while it is free to turn on the end of the shaft. *m* is a spring-latch, which, by engaging with notches on the periphery of the hand-wheel, keeps the same locked. It will be seen that by this device the distance between the teeth of the two disks can be adjusted according to the fineness of the product required.

The described improved mill may be used for grinding grain, malt, Indian corn, gall-nuts, bones, bark, sulphur, cement, plaster-of-paris, coffee, pulse, sugar, roots, spices, wood pulp, paints, &c., and these substances may be reduced to desired any degree of fineness. The substances may also, when mixed with any liquid, be ground to pulp, when this is required.

I claim as my invention—

The combination, with the disks A B, of the plates C, provided with teeth on one or both faces, as set forth, said teeth having similar rear and front cutting-edges, and being formed, arranged, and spaced relatively to one another, substantially as herein shown and described, so that the teeth of one plate, when the plates are brought together, shall enter the circular spaces between adjoining teeth on the other plate, and each tooth shall have at least one of its faces in contact with the contiguous face of one of the adjoining teeth on the other disk, as and for the purposes specified.

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

EDMUND SCHMEJA.

Witnesses:

WILLIAM HÜNING,

VERNER S. TINGLEY.