(No Model.)

F. WILSON.

GRINDING MILL.

No. 311,626. Patented Feb. 3, 1885.

Fig. 1.

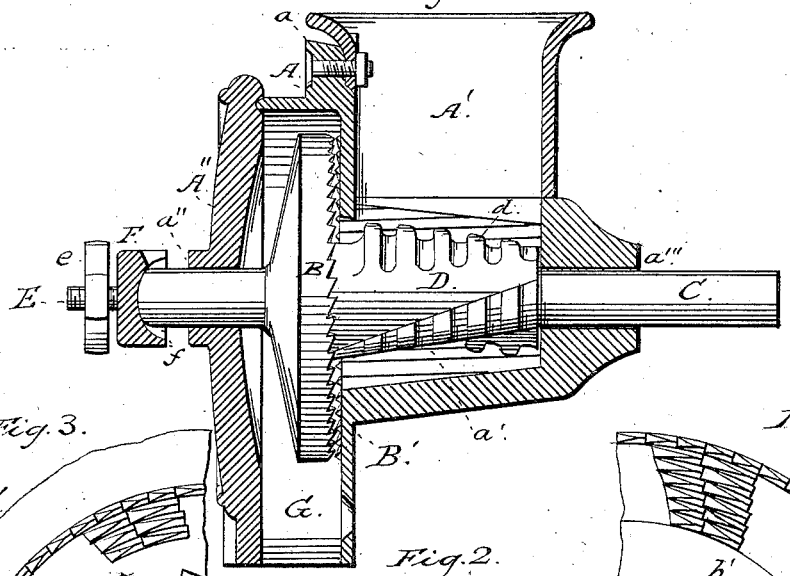


Fig. 3.

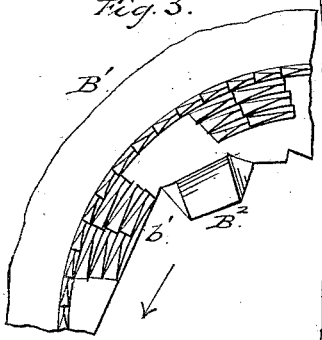


Fig. 4.

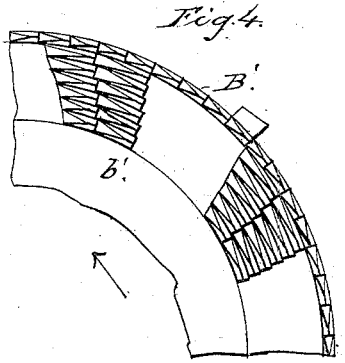


Fig. 2.

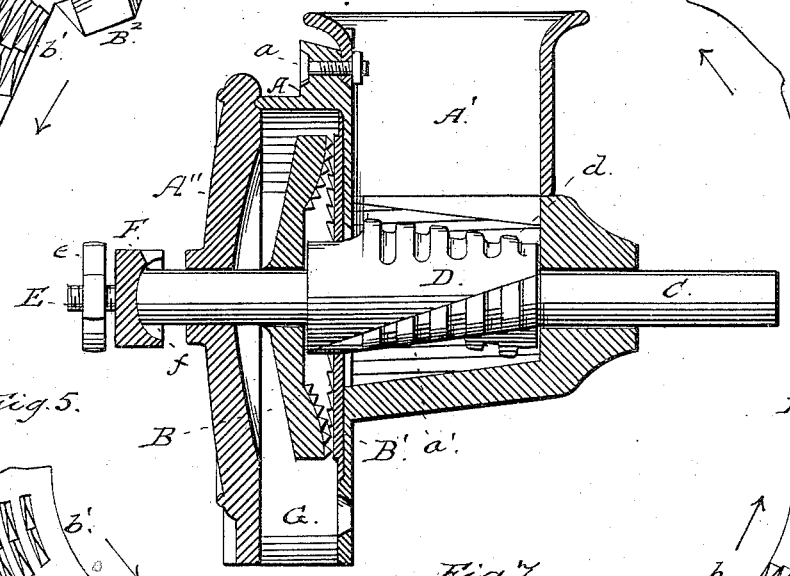


Fig. 5.

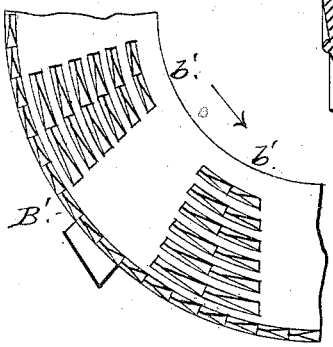


Fig. 6.

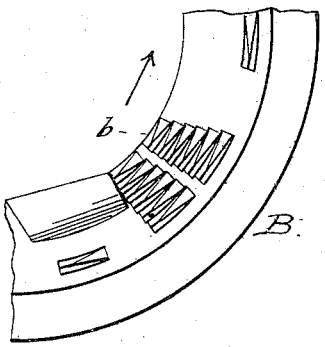
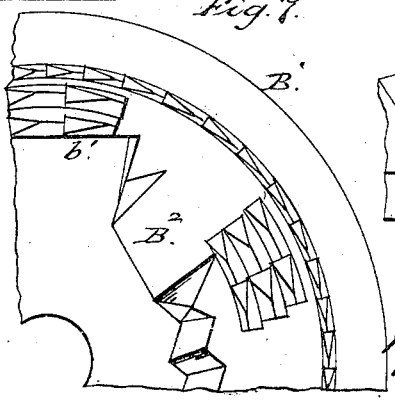


Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANK WILSON, OF EASTON, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS TO JOHN L. WILSON AND JAMES E. WILSON, BOTH OF SAME PLACE.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 311,626, dated February 3, 1885.

Application filed June 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, FRANK WILSON, a citizen of the United States, residing in Easton, in the county of Northampton, in the State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Mills, of which the following, in connection with the accompanying drawings, is a specification.

The invention relates to that class of mills which are employed for grinding bones, charcoal, or other animal or vegetable substances, of which that shown in Patent No. 292,524, issued to me January 29, 1884, is a type, the essential features thereof consisting in a shaft revoluble in a vertical plane, and having a conical enlargement formed or fitted thereon, the cone being provided with projecting, cutting, or crushing teeth, which operate in connection with other more or less similar crushing projections which are formed upon the inner surface of a conical shell, within which the revoluble crushing-cone is retained.

My improvement consists in certain novel features in the construction of the mill, whereby the power applied in operating the mill is more effectively utilized in securing the certain and rapid disintegration or pulverization of the bones or other material which is being treated.

In the drawings, Figure 1 is a view, partly in elevation and partly in vertical longitudinal central section, of a mill which embodies my invention, one of the burrs being cast with the cone, and the other burr being cast with the shell of the mill. Fig. 2 is a view, partly in elevation and partly in vertical longitudinal central section, of a mill which embodies my invention, both of the burrs being cast separate from the shell and from the cone. Fig. 3 is a face view of a segment of the fixed inner burr detached from the upper portion of the same, and showing a crushing-tooth, which may be either formed thereon or attached thereto. Figs. 4 and 5 are face or plan views of segmental fragments of the fixed inner burr. Fig. 6 shows a segmental fragment of the rotary outer burr. Fig. 7 is a perspective elevation of the upper right-hand portion of the shell, looking toward the interior thereof from the larger end, the cap, the cone, and the shaft being removed.

A is the main body of the shell of the mill, preferably cast in one continuous piece, serrated or notched longitudinal grinding-surfaces *a'* being cast on the interior thereof. The feed-chute or hopper A' will ordinarily be cast separately, and then be securely attached to the main portion by a screw-bolt, *a*. The central operating-shaft, C, of wrought metal, extends through the mill from end to end, and has bearings in openings *a''* and *a'''* of the shell. Sleeved upon the shaft is a cone, D, of cast or wrought metal, and provided with grinding-teeth *d*, the shaft passing centrally through the two grinding-burrs B and B', which are provided, respectively, with serrations *b* and *b'*, arranged in series, as shown.

Upon the cap of head A'' of the shell are threaded arms E E, arranged one on either side of the same and equidistant therefrom. A cross bar or step, F, is provided with two perforations corresponding with the two arms, and with a central bearing-cavity, *f*, in which one end of the shaft C is received. The cross-bar F being fitted upon the two arms, the rotary burr may, by means of the thumb-nuts *e e*, be adjusted in such relation to the fixed burr as the nature of the work to be performed may require.

It will be observed that the crushing or grinding end of each of the teeth *b* and *b'* is made flat and perpendicular to the face of the burr, and that this flattened end of each is in a plane which is radial to the center of the cone and the shaft. This construction has been found to be very effective in its utilization of the entire power applied in the operation of the mill, the bones, shells, and other material already coarsely ground in the conical shell being brought directly in contact with the flat ends of the teeth upon both of the burrs.

It will be understood that the teeth upon the two oppositely-placed burrs do not interlock or intermesh, and that the burrs are placed at such distance apart that the projections upon them will not engage or overlap, the principle of action being that of the class of mills in which the substance which is subjected to grinding is on two of its faces engaged simultaneously by opposite grinding-surfaces which do not project far enough to come in contact with or to interlock with or

overlap each other. As the rotary burr is revolved those portions of the material which have been pulverized to a degree which will permit them to pass through the space between the two burrs near their peripheries will fall through the discharge-passage G, while the larger portions will be carried upward and brought into contact with the large crushing-tooth B^2 upon the fixed burr, near its upper extremity, and will be by it so broken that the process of comminution will be effectually completed by the smaller teeth *b* and *b'*.

It is apparent that the location of the crushing-tooth in the upper portion of the mill insures effective action of the tooth upon the larger pieces of the material, unobstructed by any smaller portions of the same.

In some cases, as when the mills are made of large dimensions, to be operated by steam-power, both the burrs will be made detachable, as in Fig. 2, for ready renewal when worn; but in small mills, for operation by a hand-crank applied to the shaft at the smaller end of the cone, one of them will be cast with the shell and the other with the shaft, as already stated, and as shown in Fig. 1.

Having thus described my invention, I claim—

1. In a grinding-mill, a vertically-placed fixed burr which is provided with a crushing-tooth which projects outwardly from the grinding-face of the burr beyond the plane of the surrounding teeth, and which is located upon the upper portion of the burr, in combination with a rotary burr.

2. In a grinding-mill, the combination of a vertically-arranged fixed burr, which is provided with grinding-teeth the grinding-face of each of which is radial to the center of the operating-shaft of the mill, and which is provided with a crushing-tooth upon its upper portion, with a vertically-arranged rotary burr, which is provided with grinding-teeth the grinding-face of each of which is radial to the axial center of the burr and its operating-shaft.

3. The combination of the shell provided with grinding-surfaces, the horizontal cone provided with grinding-teeth, the fixed burr provided with grinding-teeth and with an upper crushing-tooth, and the rotary burr.

FRANK WILSON.

Witnesses:
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EUG. A. BRUNNER.