(No Model.) 2 Sheets—Sheet 1.

A. BALL.

CRUSHING AND GRINDING MACHINE.

No. 386,286. Patented July 17, 1888.

Fig. 4.

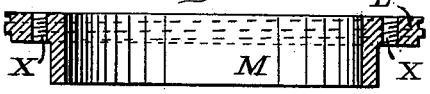


Fig. 3.

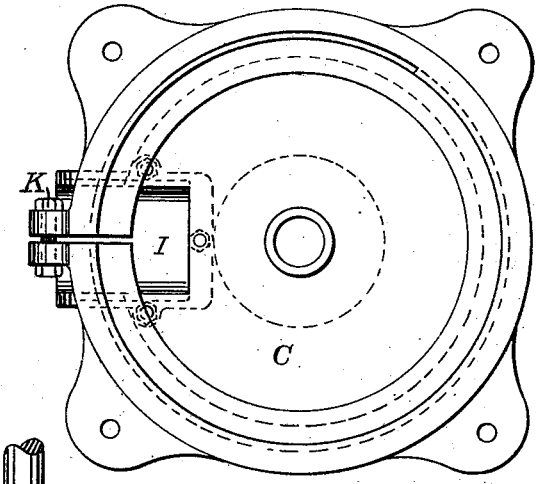


Fig. 2.

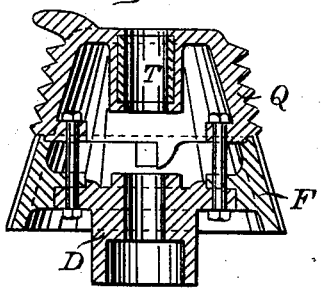


Fig. 6.

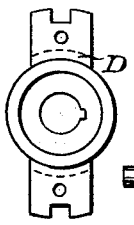


Fig. 1.

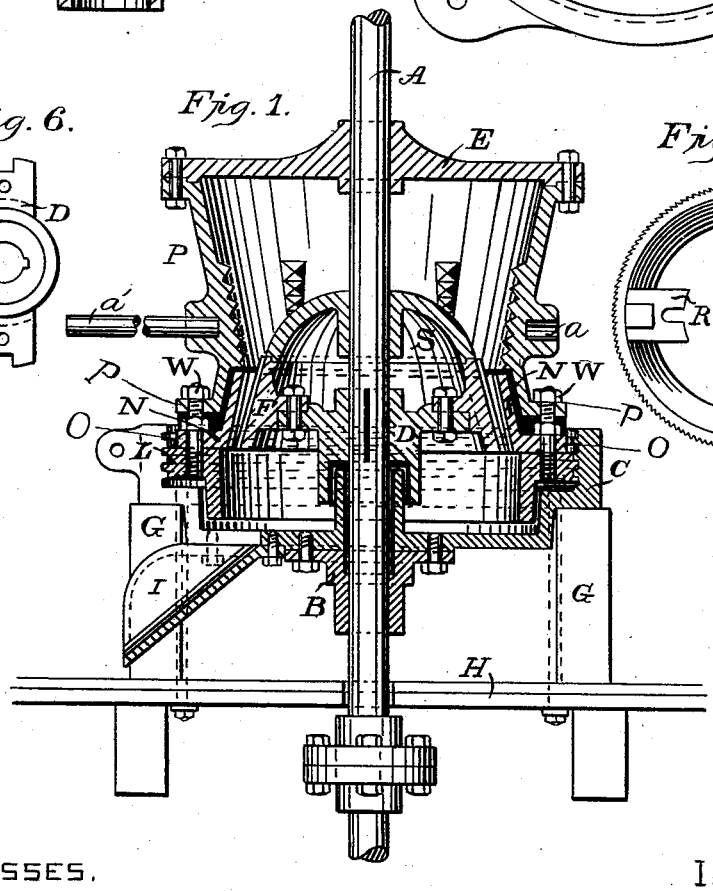
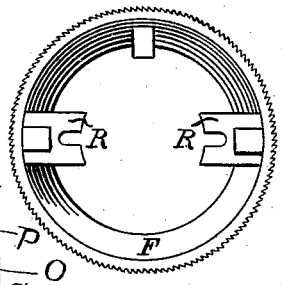


Fig. 5.



WITNESSES.

Frank L. Dyer.

Preston Phelps.

INVENTOR

Albert Ball,

by Geo. C. Dyer, Atty.

(No Model.)

2 Sheets—Sheet 2.

A. BALL.

CRUSHING AND GRINDING MACHINE.

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Fig 9.

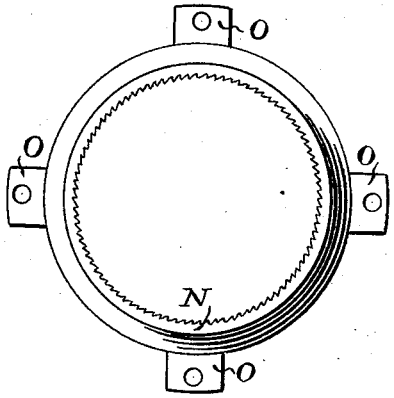


Fig. 8.

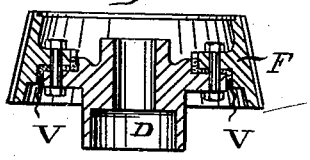
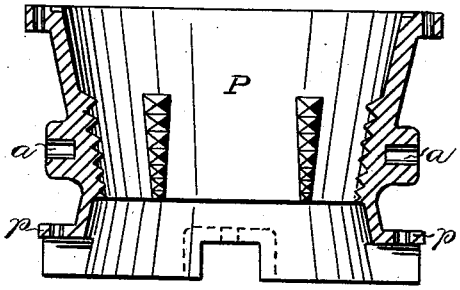


Fig. 7.



WITNESSES

Frank L. Dyer.

Preston Phelps.

INVENTOR.

Albert Ball.

by Geo. W. Dyer, Atty.

UNITED STATES PATENT OFFICE.

ALBERT BALL, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO THE SULLIVAN MACHINE COMPANY, OF SAME PLACE.

CRUSHING AND GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 386,286, dated July 17, 1888.

Application filed May 9, 1887. Serial No. 237,555. (No model.)

To all whom it may concern:

Be it known that I, ALBERT BALL, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Crushing and Grinding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved method of constructing a crusher and grinder adapted for crushing or cracking or grinding corn either with or without the cob, as well as rock, shells, or other substances; and my object is to have economical ways of adjusting the fineness of the product, of making the "cutting-cone" so as to set perfectly true on its shaft, and of replacing the part or parts of the grinder when dulled or worn without throwing away the parts that are not worn. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of the entire machine, showing the cone in one form. Fig. 2 is a vertical section of the cone in another form. Fig. 3 is a top view of the base. Fig. 4 is a vertical section of the elevating-screw attachment to the shell. Fig. 5 is a bottom view of the cone. Fig. 6 is a bottom view of the shaft-fit and arms of the cone. Fig. 7 is a vertical section of the shell. Fig. 8 is a vertical section of the lower part of the cone, showing it fitted to the arms by soft metal. Fig. 9 is a top view of the lower part of the shell.

Similar letters refer to similar parts throughout the several views.

A is the driving-shaft, which has a lower box or bearing, B, which is bolted to the base C, as shown in Fig. 1. The machine is set on a wooden frame, G, with the shaft passing through the floor H.

I is the spout for the discharge of the ground product, and is a part of the base. This base is split vertically on one side, (see Fig. 3,) and has a tightening-bolt, K. Its inside is screw-threaded to receive the screw-flange L of the bottom section of the shell M, which is used for raising and lowering the cutting parts of the shell. These cutting parts consist of the lower part, N, which is made of very hard chilled metal, with fine teeth arranged nearly vertically or spirally on its inside, and is provided with flanges O for receiving the bolts W, Fig. 1, and the upper part, P, which is also of hard chilled metal, and with coarse jagged series of teeth, which also have flanges *p* for receiving the same bolts, W.

The bolt-holes through the flanges *p* are left large and free, so as to allow of nice adjustment of the piece P about the cone and shaft as a center before the nuts are screwed down. It will be noticed (see Fig. 1) that there are different nuts to hold N and P by the same bolts, W. This upper part, P, is also bolted to a cross-piece, E, which furnishes a top bearing for the shaft. Keyed to the shaft, as shown in Fig. 1, is the arm D, Fig. 6, of the cone F. This arm is made of softer metal that is turned true and to a gage. The cone F is made of very hard chilled metal and with fine teeth arranged nearly vertically or else spirally on its outside to work against the fine teeth of the shell N. It is cast with arms R, Fig. 5, approximately near to the fit, and these, while too hard to be turned, can be ground to a gage to fit the arms D. Instead of grinding these arms R, the arms can be cast a little short and soft metal *v*, Fig. 8, be melted in, so as to bring them to a gage and effect the same result, as shown in Fig. 8.

Bolted to the cone F is a top piece, S, Fig. 1, when the machine is to be used only for grinding small things, like shelled corn; but when large things are to be ground a top piece, Q, Fig. 2, with coarse jagged series of teeth, similar to those of the shell P, is used. This top piece S is not liable to be worn, and the top piece Q is not so soon worn as the part F. This is cast of hard chilled metal free enough at the shaft to allow soft metal to be poured in to make a true bearing or box, T.

The practical working of the device is as follows: The material to be ground or broken and ground is put in at the top of the shell, (if it is to be broken the form of cone shown in Fig. 2 is used,) whereupon the revolution of the shaft carries the cone around within the shell, which is held firm, and the material is ground between the edges of F and N. If for any reason the result is too coarse, these

edges are brought nearer together by unscrewing the bolt K, and with the lever *a'* turning the shell and the screw L around in the base C, and so driving down the screw and then retightening the bolt K. If the result is too fine, the shell and screw are turned the other way.

When from use the parts F and N are dulled, they are easily replaced without discarding any other pieces. Moreover, the bearings being perfectly true in every case, great saving of power and economy in wear are also gained, as well as a uniform size in grindings.

What I claim as my invention, and desire to secure by Letters Patent, is as follows:

1. In a crushing and grinding machine, the combination, with the grinding-cone and the internally-screw-threaded base-piece, of a shell composed of sections, the lower of which has an externally-screw-threaded flange engaging with said screw-threaded base-piece, the whole entirely surrounding and adjustable with relation to the grinding-cone, substantially as described, and for the purposes set forth.

2. In a crushing and grinding machine, the combination, with the shell and the grinding-cone rotating therein, of the half-arms R R, attached to said grinding-cone, and half-arms D D, keyed on the operating-shaft and locking said grinding-cone securely thereto, substantially as and for the purposes set forth.

3. In a crushing and grinding machine, the combination, with the grinding-cone and internally-screw-threaded base-piece, of a shell adjustable on the same and made in sections, and provided with a flange engaging with the internally-screw-threaded base-piece, substantially as and for the purposes set forth.

4. In a grinding and crushing machine, the combination, with the screw-threaded base, and shell provided with the externally-screw-threaded flange L and with projections formed with the cavities *a* therein, for the purposes set forth, of a grinding-cone rotating within said shell, substantially as described.

5. In a grinding and crushing machine, a coarse-toothed shell, P, with external flanges *p* at the bottom, said flanges having bolt-holes therein, a fine-toothed shell, N, also provided with external flanges O, with corresponding bolt-holes, an externally-screw-threaded elevating-section, M, also provided with external flanges L, with corresponding bolt-holes X, said parts P, N, and M being securely bolted together, in combination with an internally-screw-threaded base-piece, C, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT BALL.

Witnesses:
GEORGE O. BALL,
FRANK A. BALL.