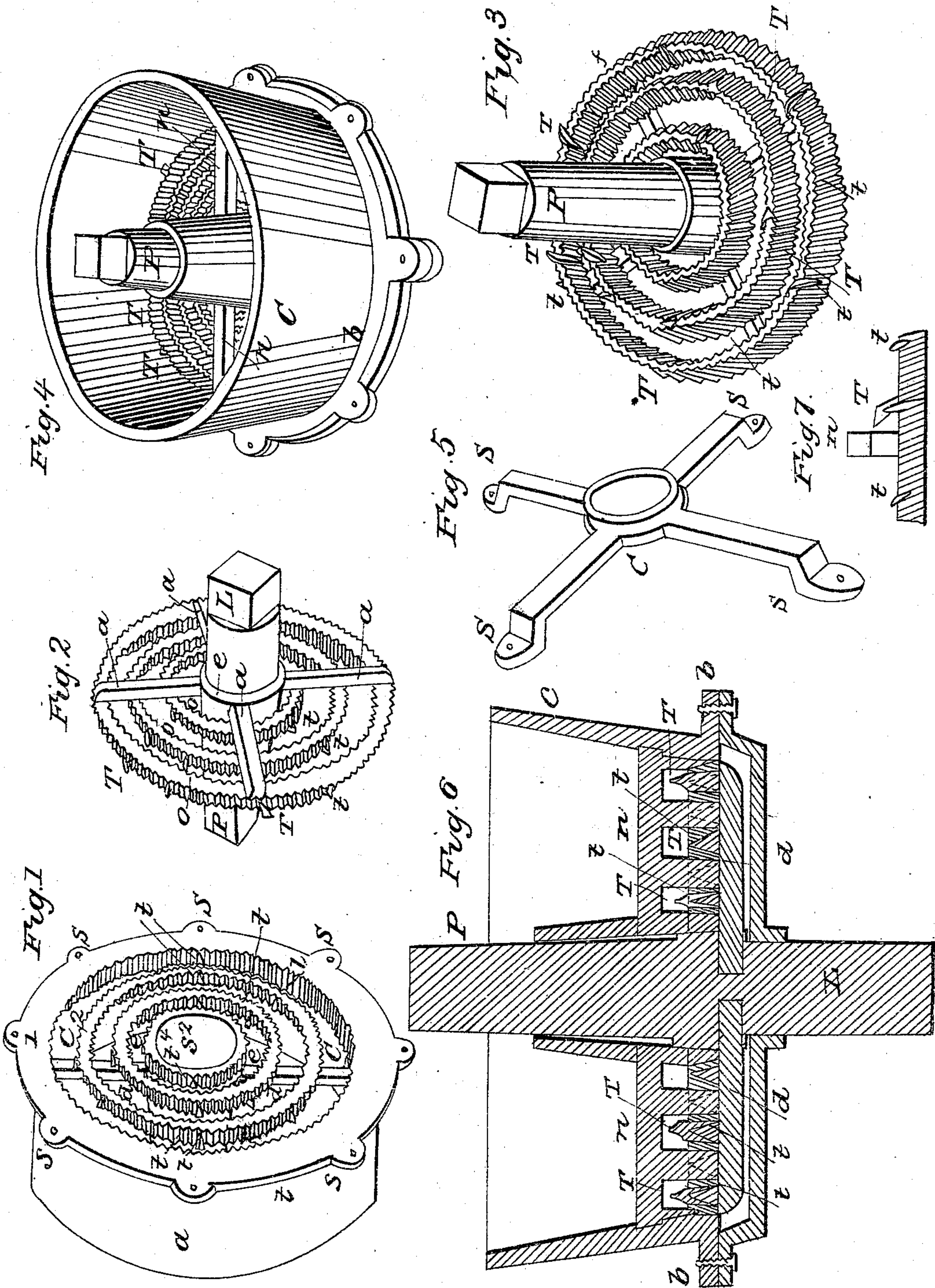


M. BEECHER.

Bark Mill.

No. 3,767.

Patented Sept. 27, 1844.



UNITED STATES PATENT OFFICE.

MATHER BEECHER, OF REMSEN, NEW YORK.

BARK-MILL FOR GRINDING TANNERS' BARK.

Specification of Letters Patent No. 3,767, dated September 27, 1844.

To all whom it may concern:

Be it known that I, MATHER BEECHER, of Remsen, in the county of Oneida and State of New York, have invented a new and useful improvement in bark-mills or mills used for grinding tanbark, coarse grain, and other coarse articles; and I do hereby declare that the following is an exact description, reference being had to the annexed drawings.

Figures 1, 2, 3 and 5 of the annexed drawings show the different parts of the bark mill, as they appear when taken apart. Fig. 4 exhibits the entire mill when put together. Figs. 2 and 3 exhibit the grinder, or movable part of the mill as seen under different views. Fig. 6 is a vertical section, and Fig. 7 is a section of the large teeth.

Fig. 1, is the stationary part of the mill, exhibiting the stationary circles held in their proper positions by cross bars cast transversely on their upper edges and forming in one connected piece the entire stationary part of the machine, except the cross bars shown in Fig. 5. This figure (Fig. 1,) represents the stationary circles, connected as before mentioned and turned up so as to exhibit their interior from the under side. The outward one of these circles, or that marked by the Fig. 1, is slightly conical in its form, diverging upward in a right line from its base, or flange *b* to its top. This is more distinctly seen in Fig. 4. This outward circle is fluted on the inside by cutting the surface into fine vertical teeth to the height of about four inches. The circles marked 2 and 3 Fig. 1 are alike, except their diameter. These as well as the circles on the grinder Figs. 2 and 3 are similar, being about an inch and five-eighths in width at the base, and tapering to an edge at the top, and are about two and a half inches in vertical height. The interior circle, or that marked by the Fig. 4 is formed by the base or lower part of the hub through which the shaft of the grinder passes. This hub is about eight inches in height and contracts as it rises, so that the shaft that passes through it is of a conical form, and has a bearing both at the bottom and top; or through the whole length of the hub as may be desired. This hub, with the shaft protruding at the top is distinctly seen at *a* Fig. 4.

The grinder, or movable part of the mill is shown in Fig. 2 and also in Fig. 3. In the former it is turned down so as to exhibit its under parts, with three of its cross bars *a a a*, holding its three rings together; and in the latter it is shown standing upright as when in motion.

If Fig. 2 is moved to the left, its shaft *P*, passing through the hollow of the interior circle at *S*², its three rings will close into the circular cavities *c c*, *d d* and *e e*, leaving room sufficient for the bark in being ground to pass between the surfaces of the stationary parts, and the grinders when moving within the cavities. The parts Figs. 1 and 2 being thus put together, the transverse bars Fig. 5 are then bolted, or screwed on at the bottom, the extremities *S, S, S, S* fitting to the ears *S, S, S, S* Fig. 1, and the interior ring 4 Fig. 1 slipping over the shaft *P* Fig. 2. The mill is then set upright and bolted down on its foundation through the ears on the bottom Fig. 1, situate intermediate those marked *S, S, S, S*, the main shaft setting in the usual way on a pivot fixed to the foundation below and so adjusted that the circular grinders *o o o* Fig. 2 move easily within the circular cavities *c c*, *d d*, *e e*, Fig. 1, leaving the shaft *P L* free to be geared to, at either of its ends for the purpose of propelling the mill.

When the grinder Fig. 2 is placed in the stationary part of the mill as above described, six grinding chambers are formed between the grinding surfaces on the grinder, and those on the stationary circles, as the circular cavities *c c*, *d d*, *e e*, seen in Fig. 1 are divided into two each by the intervention of the circular grinders; and as these circular grinders are wide at their base, nearly filling the circular cavities at the bottom, and thin at the top, or upper edge, the grinding chambers are left wide at the top and narrow at the bottom, where the bark after being broken by the large teeth *T* above is pulverized as it escapes from the mill.

The stationary rings, Fig. 1, as well as those on the grinders, Figs. 2 and 3, are fluted into fine teeth, those on the stationary portion of the mill extending direct from the base to the apex, or top, each tooth occupying about half an inch on the surface, and rising to an edge in the center.

The teeth on the movable part of the mill Figs. 2 and 3 are like those just described except that they lie obliquely on the surface, inclining at the top in the direction of the movement, as is seen in Fig. 3. On each side of these circular grinders there are at intervals of about eight inches standing alternately on the inner and outer side, teeth *t* standing more prominently as seen on Fig. 1. These extend above the edges of the rings, and are pointed at the top. They lie obliquely on the surface, corresponding to the inclination of the flutes thereon, and inclining in the direction of the motion of the grinder, so that the points at the top form hooks calculated to draw down the bark when the grinder is in motion. Each fourth or fifth one of these prominent teeth, is still larger at the top, and projects still higher inclining forward as before described in the direction of the motion of the grinder, forming strong hooks or breakers *T* which at once break and draw down the bark. Four connecting arms, which are seen at *a, a, a, a*, Fig. 2, are cast solid on the bottom of the grinder, as seen in the figure, holding them firmly to their places. The shaft *P L* may either be cast solid with them, or separately and in the latter case it is well fitted and made secure by wedging or otherwise to a corresponding aperture through the center or junction of the connecting arms *a, a, a, a*. In either case the shoulder, or offset *e*, is formed on the shaft *P L* which is situated on the shaft immediately above the hub *c* formed by the junction of the cross bars, Fig. 5, when the parts are put together as before described. Each alternate ear cast on the bottom of the outer shell Fig. 1, and situated intermediate those marked *S, S, S, S*, are used to bolt down the mill to the foundation on which it is to stand.

The whole machine when put together and set upright presents the appearance seen in Fig. 4.

The whole interior diameter of this mill measuring from *c* to *c* Fig. 1, as I have used it, is twenty two inches. The interior stationary ring, measuring from *e* to *e* is five inches, and the height of the mill outside, measuring from *b* to *c* Fig. 4, is ten inches. The greater part of the height of the mill is devoted as a curb, or hopper to receiving the coarse bark as it is thrown in to be ground.

The object of that invention is to increase the power of the bark mill for fine grinding, believing that the bark mills now in use, are capable of breaking up and preparing more bark than can be properly pulverized by the limited capacity of those mills for performing this important part of the work. From the shape of the grinding chambers of all bark mills composed of concentric circles, most of the fine grinding

is necessarily performed at the bottom of the circle where the grinding surfaces run near to each other. The capacity therefore of the bark mill for fine grinding is not much increased by the vertical height of the grinder, or by the increase of the superficies of the opposite grinding surfaces by extending them in width upward, inasmuch as they necessarily recede from each other as they rise, and that destroys their power of execution. The fine grinding therefore being chiefly confined to a narrow strip or circle at the bottom of the chamber, it follows that the linear extent of these circles must determine the power of the mill for this part of the work. This linear extension can only be available by a multiplication of the circles, and this is again limited by the size of the mill which would be convenient, and also by the greater power required to grind at a distance from the center of gyration. It follows that a mill possessing the maximum power in fine grinding, is that wherein the greatest possible number of circular grinders are thrown into a given diameter. In the mill above described there are three circular grinders, or three concentric rings which form the grinder, and three stationary circles, besides the outside shell which both assists in grinding and forms the hopper of the mill. These when put together as above described, form six circular grinding chambers, within a circle of twenty-two inches in diameter. The stationary circles, as well as the rings upon the grinder have only width enough at their base to insure sufficient strength and therefore occupy the least possible space. This number is admitted within the compass mentioned, and suitably shaped chambers preserved only by leaving off an extra height which was found of little value.

The coarse teeth *T* or those extending above the rest, and some of them above the top of the rings as are seen in the figures, together with the four cross arms connecting the stationary circles, two of which are seen at *n n* Fig. 4, and also behind the circles in Fig. 1, are designed to break up the bark suitably to be received into the grinding chambers. These large teeth may be increased if it is desired that the bark be more rapidly prepared for the chambers. If coarser grinding is desired the number of stationary circles may be diminished one and the movable circles one, leaving one intermediate stationary circle only, as that marked 3, Fig. 1, and the two inner movable circles Figs. 2 and 3. These circles, both stationary and movable, being increased in height to about four inches, and in breadth at the bottom to four inches, the same diameter of mill is preserved, and very rapid, but coarser grinding is performed.

In this construction, the intermediate stationary circle, as that marked 3 Fig. 1 may be made thinner than the movable circles, running to an edge at the bottom instead of
5 the top and preserving a thickness at the top, or upper edge only sufficient for the necessary strength. In this way less room is occupied by it, and more room is left for the movable circles, and the latter in this
10 case may extend higher, increasing the height of the chamber. In this way by the application of more power to propel the mill, a larger quantity may be ground.

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

The addition of the hooks T extending
15 above the edges of the rings of the grinder, and presenting their points forward in the direction of the motion of the grinder, the whole being arranged, constructed and com-
20 bined substantially as hereinbefore described.

MATHER BEECHER.

Witnesses:

WILLIAM BAKER,
JEROME BEECHER.