No. 654,436. Patented July 24, 1900.

F. A. BURNHAM.

ROTARY MILLING CUTTER.

(Application filed Feb. 15, 1900.)

(No Model.)

Fig. 1.

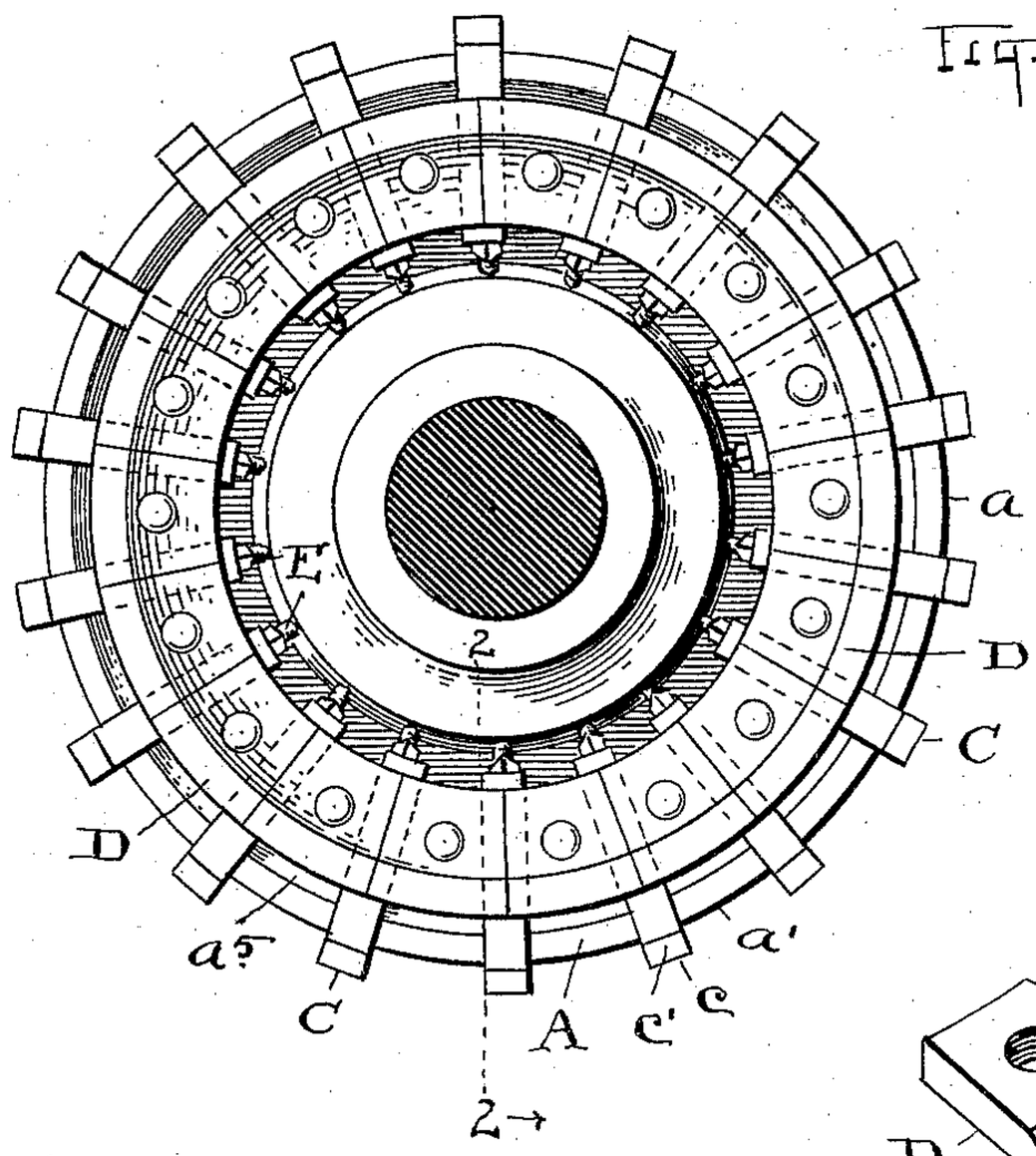
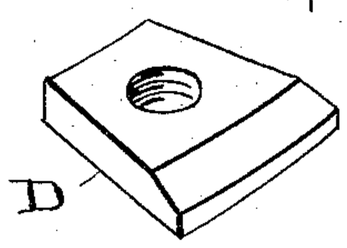


Fig. 4.



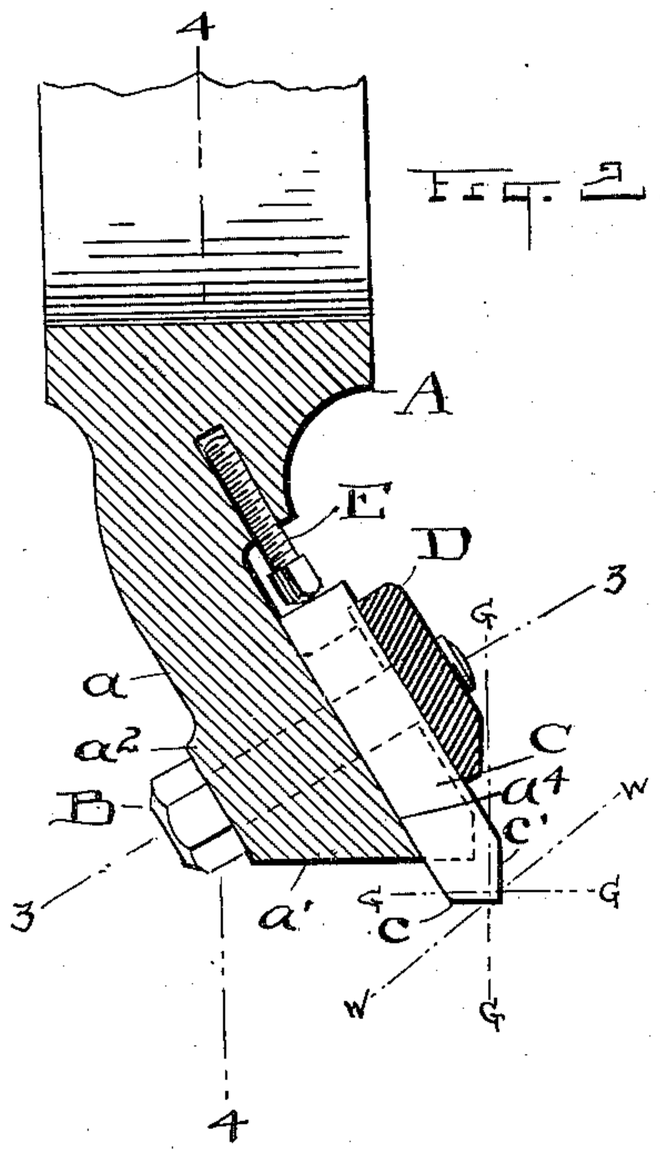
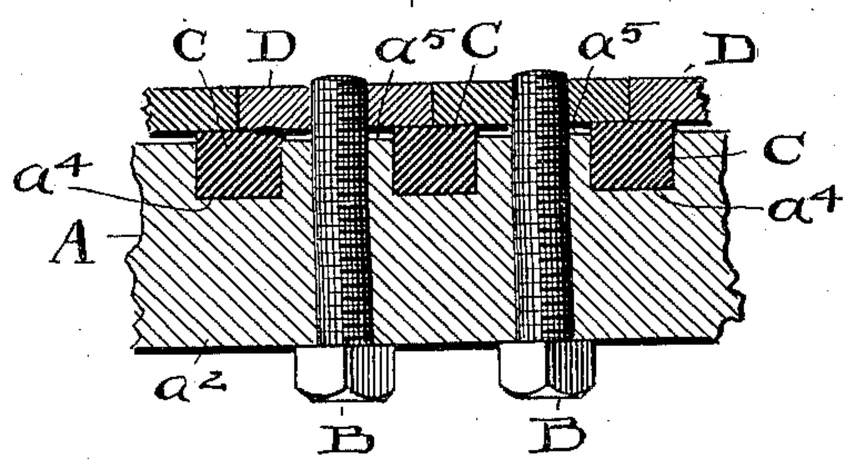


Fig. 2.

Fig. 3.



ATTEST.

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UNITED STATES PATENT OFFICE.

FRANK A. BURNHAM, OF CLEVELAND, OHIO, ASSIGNOR TO THE CHANDLER & PRICE COMPANY, OF SAME PLACE.

ROTARY MILLING-CUTTER.

SPECIFICATION forming part of Letters Patent No. 654,436, dated July 24, 1900.

Application filed February 15, 1900. Serial No. 5,268. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. BURNHAM, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rotary Milling-Cutters; and I do declare that the following is 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 improvements in what are known as "milling-cutters," the same being constructed and operating substantially as shown and described.

In the accompanying drawings, Figure 1 is a plan view of a form of cutter-head embodying my invention. Fig. 2 is a sectional elevation on line 2 2, Fig. 1. Fig. 3 is a cross-section of a part of the cutter-head on a line corresponding to line 3 3, Fig. 2. Fig. 4 is a detail of one of the segments for securing the cutters in the head.

Hitherto in this class of machine, so far as I am aware, it has been the invariable practice to dispose the tools radially from the center of the head at right angles to its axis, and the tools themselves have been plain and straight, with their ends square and forming cutters of their edges. The cutting was therefore across the end, or rather by one edge of the end, of the tool, and of course the whole tendency and effect of this was to more or less quickly dull that particular edge and to round the leading edge which first entered the land, thus soon leaving the tool dull and inefficient. Frequent sharpening was therefore necessary, and to accomplish this one of two ways was open, either to grind off the entire end of the tool square across the full depth of the rounding or to divide the grinding between the end and the full length of the affected side of the tool. If the latter was done, the tool was each time narrowed by that much, as well as shortened, while if the end only was cut away it was soon so shortened as to be worthless. Either way, therefore, was objectionable, and yet there was no escape from this practice. Hence the keeping in order of the old style of tools was both expensive and laborious, as must now be obvious.

The present invention is designed to be remedial in a very large measure of these several objections and to present what I claim to be a much more practical, economical, and advantageous construction. To these ends I employ a cutter-head A, which in cross-section is in a sense dish-shaped or what may be termed "concavo-convex," having what really is a rim or outer portion a, curved laterally and outwardly uniformly all around, so that a radial line centrally from the hub at right angles to its axis will about intersect the back edge of the rim, as denoted by line 4 4, Fig. 2. However, the outer edge a' or periphery of the head or rim is shown here as parallel with its axis, and there is also a rear face portion a^2 for the heads of the locking-bolts B and an inclined inner face portion or seat a^4 for each tool C at an inclination to the axis of the head of about thirty degrees to a right-angled line, as 4 4. This inclination of tool C expresses the relative inclination of what is termed the "rim" or dished portion of the head. This term "rim" is, however, a somewhat arbitrary term, serving the purposes of this description, but, in fact, involving also what is a part at least of the essential body of the head. Hence the tools C are practically in direct line with the inclination of the so-called "rim" and are seated in open slots having the land or ribs a^5 of slightly-less depth than said tools between them and forming walls within which the tools are closely engaged laterally. The said tools are furthermore held or engaged by segments D on their inner sides, adapted each to half-way overlap a single tool at each side, so that there are as many segments as tools and one segment for each tool, though each segment engages two tools, and a single bolt B for each segment. The said segments are threaded, so that they serve as nuts for the bolts; but separate nuts might be used on their outside, and their bearing on both sides or edges is exclusively upon the tools and not on the land or ribs between them. This makes separate fixtures for each tool, practically, for removal or adjustment, and as a feature for lengthwise adjustment and abutment each tool is also provided with a set-screw E in its rear threaded into the body of the head at the same inclination as that sustained by the

tool itself. The endwise thrust or pressure upon the tool is, therefore, against this adjustable screw abutment, less, of course, such grip as the segment D may afford. The advantage of this construction and arrangement of parts will now appear more clearly as we consider the tool itself. The said tool is substantially square in cross-section from end to end and presumably of the usual length; but instead a right-angled cutting edge, as before, it is fashioned with two beveled surfaces, forming together substantially a V shape to the cutting end, but with the lower bevel *c*, lying in a parallel plane with the axis of the head A, so that this furnishes the real cutting edge or portion of the tool. The bevel *c'* is preferably more acute than bevel *c* and is what may be regarded as a sharpening-bevel. This construction slightly reduces the full cutting width of the tool as compared with the width of the tool above, but not much, and it has this further advantage, that this width can be maintained through all the sharpenings of the tool to the end, because the inclination of the bevels to the tool are such as to make this possible. Furthermore, when sharpening occurs it is only necessary to dress down the bevels to take out dullness and rounding of the edges, and this can be done by revolving the head A against the face of a grinder arranged to act on either bevel of all the tools at once and all will be sharpened at the same time and alike.

Assuming that the front edge of the tool is rounded to, say, the line W W, more or less, the grinding of the two bevels would be back to the lines G G on both bevels. Then the cutting edge will be the same again as originally, and so on after each sharpening in the same manner. Less grinding on bevel *c'* would widen the edge of *c*.

The tools as herein disposed have been described as inclined to the axis of the head A, Fig. 2, so that in this respect they are not radial, because they traverse the radial lines from this point of view; but when viewed in plan, Fig. 1, the said tools are radial, as are also their slots or seats in the cutter-head.

What I claim is—

1. A rotatable milling-head substantially concavo-convex in cross-section with radial seats on the inner side thereof for the cutting tools inclined to the axis of the head, and tools in said seats having abutments at the middle of the head, substantially as described.

2. A substantially concave-convex milling-head having a series of radial slots in its outer portion inclined to the axis of the head, and cutters in said slots having oppositely-beveled cutting ends, the outer bevel being parallel to the axis of the head and the inner bevel substantially at right angles to the outer bevel, substantially as described.

3. The cutter-head having radially-disposed and axially-inclined seats for tools, and tools in said seats having cutting edges across their extremities and adjustable abutments for the said tools to take the end thrust, and clamps to hold the tools in place, substantially as described.

Witness my hand to the foregoing specification this 10th day of February, 1900.

FRANK A. BURNHAM.

Witnesses:

H. T. FISHER,

R. B. MOSER.