

(No Model.)

E. A. WALL.

CRUSHING ROLL.

No. 332,978.

Patented Dec. 22, 1885.

FIG. 1.

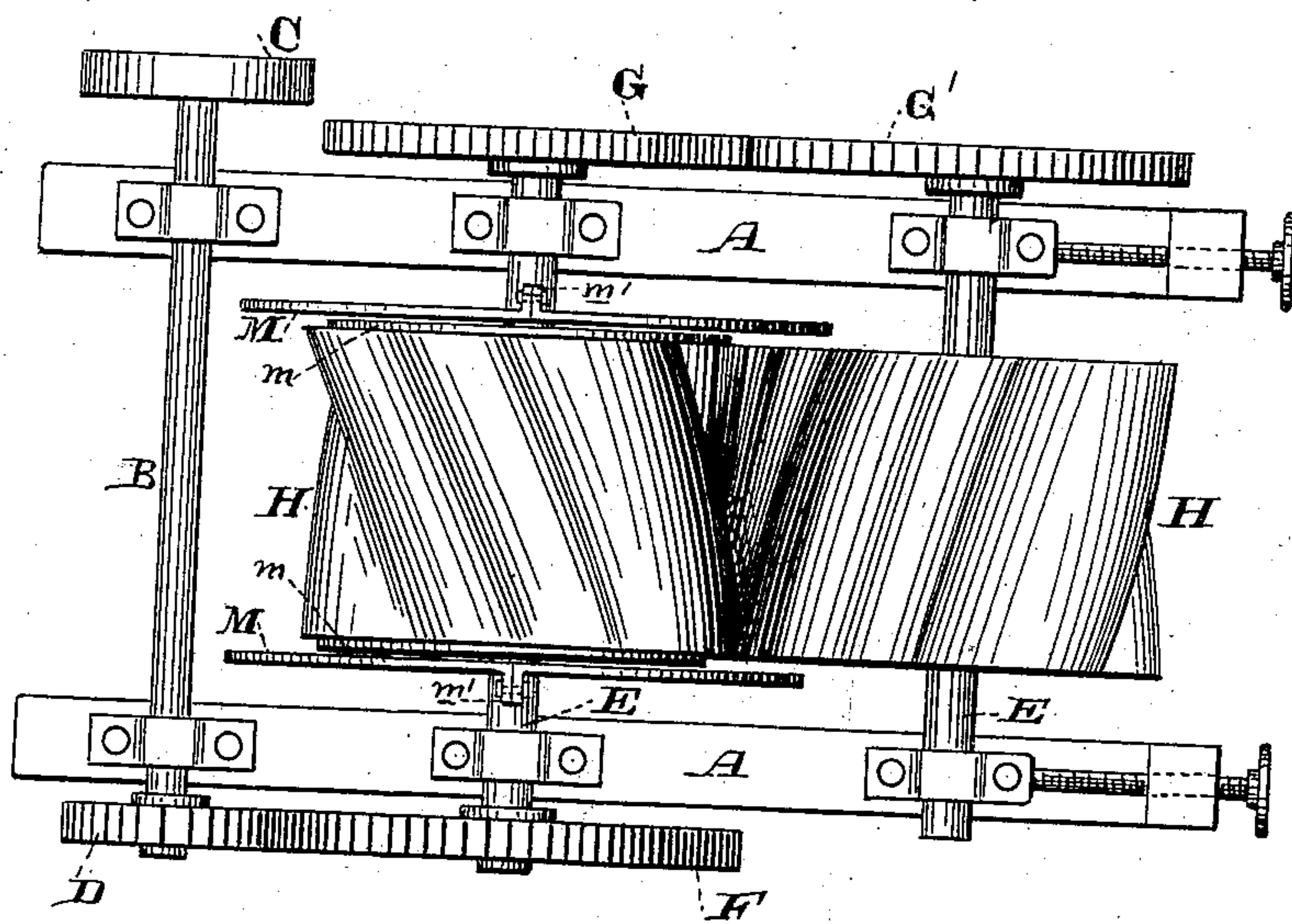


FIG. 2.

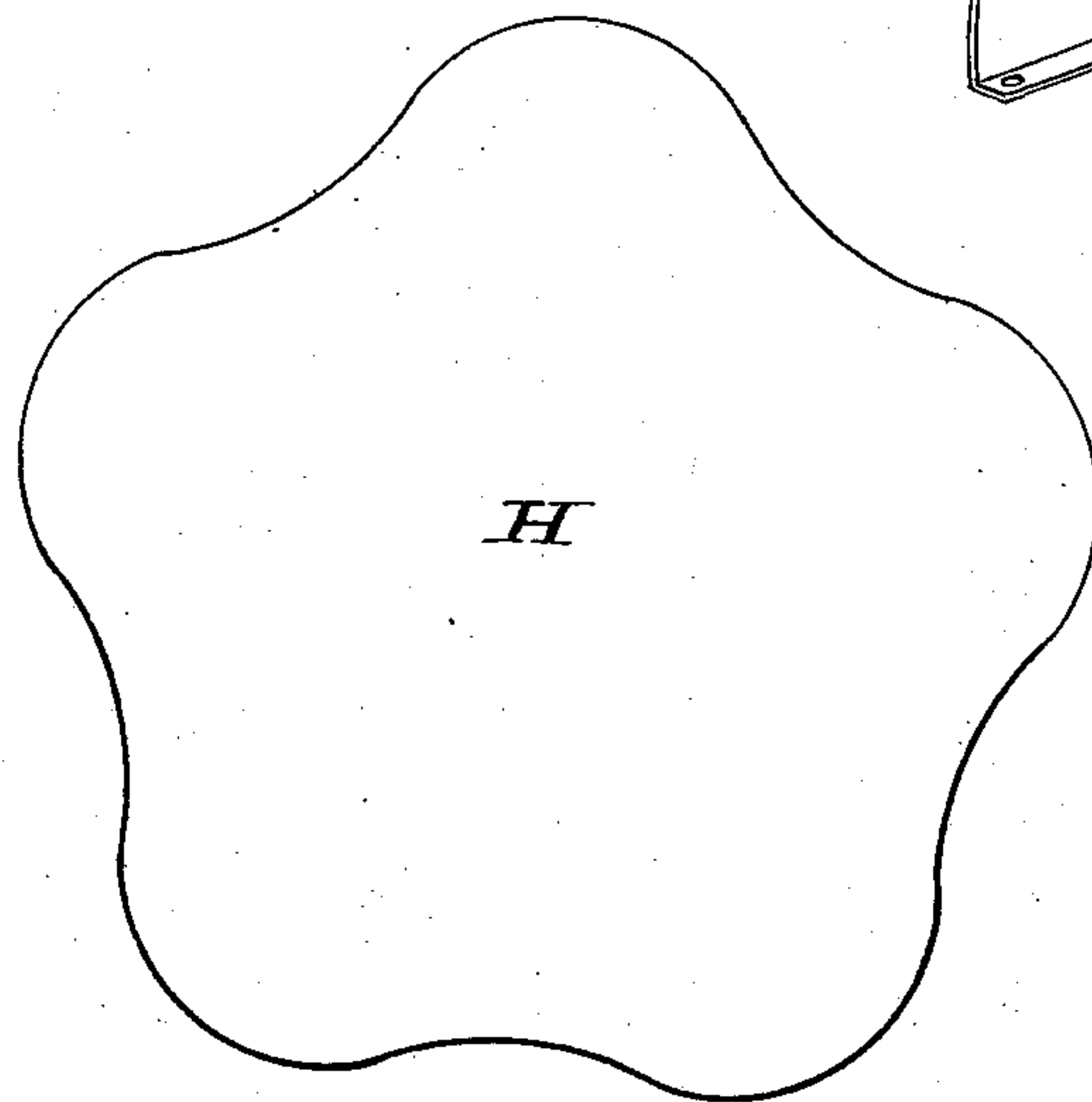
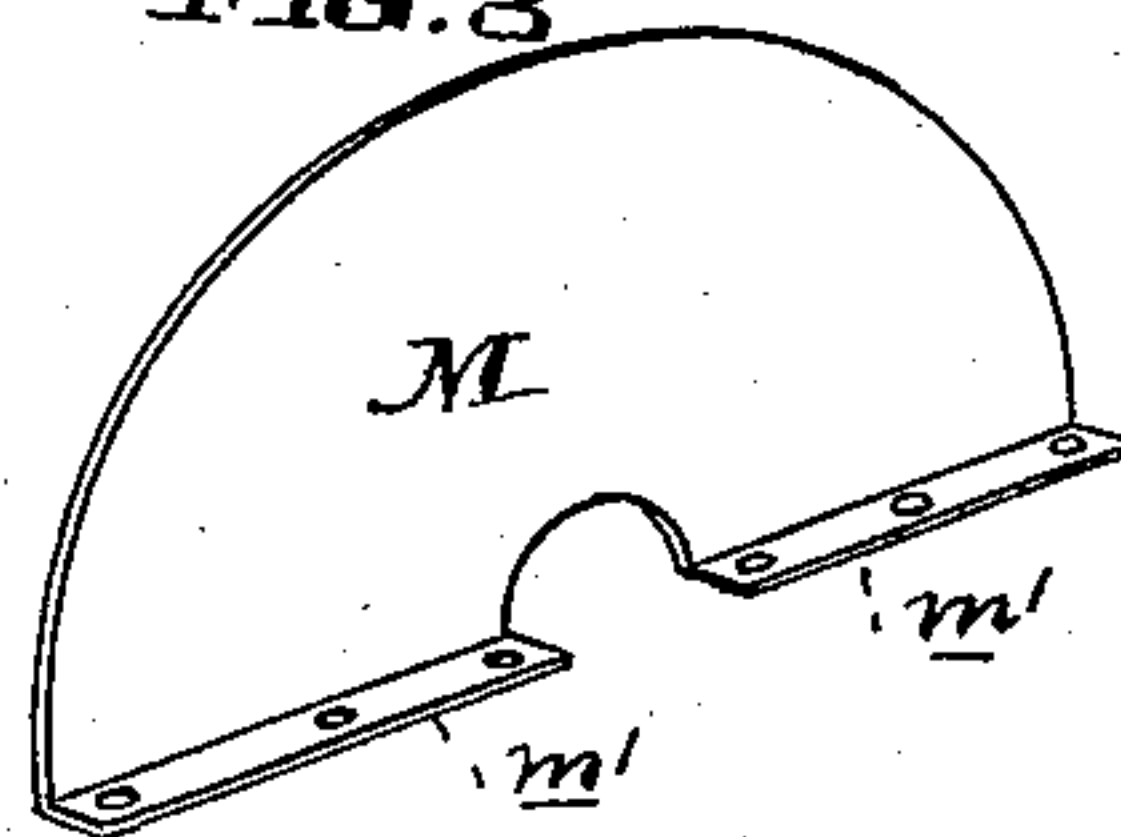


FIG. 3.



Witnesses,

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Inventor,
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By
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UNITED STATES PATENT OFFICE,

ENOS A. WALL, OF BULLION, IDAHO TERRITORY.

CRUSHING-ROLL.

SPECIFICATION forming part of Letters Patent No. 332,978, dated December 22, 1885.

Application filed November 12, 1885. Serial No. 182,640. (No model.)

To all whom it may concern:

Be it known that I, ENOS A. WALL, of Bullion, Alturas county, Idaho Territory, have invented an Improvement in Crushing-Rolls; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of crushing-rolls consisting of iron or steel shells upon rotating shafts, and forming a portion of a machine commonly known as "Cornish rolls."

My invention consists in certain details of construction and combination of parts, all of which I shall hereinafter fully claim and describe by reference to the accompanying drawings, in which—

Figure 1 is a plan of a machine embodying my improvements. Fig. 2 is a diagram or outline of the cross-section of one of the rolls. Fig. 3 is a perspective view of one-half of the shield M.

The principle usually applied in machines of this class heretofore in use for the crushing of ores of quartz and other hard substances is defective, chiefly in the construction of the outer or crushing surfaces of the cast-iron or steel shells. These shells are made round or fluted and of varying thicknesses, of from two and a half to six inches, the diameter being from one-third to two-fifths greater than the length. They are placed upon rotating shafts and are made to rotate in opposite directions, being adjustable as to space between the adjacent sides, according to the size to which the material is desired to be reduced.

In crushing hard substances—such as quartz and metal-bearing ores—it is found that the crushing-surfaces at once begin to wear in parallel grooves around the shell, thus forming a series of channels into which the ore or other material naturally drops and continues to wear the channels or grooves deeper and wider, and consequently renders the production of a uniform pulp impossible and the shells valueless, even before one-third thereof has been worn off. This can be corrected, to a certain extent, by corrugating or fluting the surfaces of the shells or rolls; but unless certain relative proportions between the corrugations or ribs and the diameter and circumference of the roll be provided for the wear is not properly equalized.

It is the object of my invention to provide rolls with surfaces adapted for the most effective crushing, and which will wear equally throughout their entire surfaces, leaving their corrugations or ribs proportionally the same size as at the beginning, and also to provide a guard or shield which takes the place of the ordinary hopper of such devices.

A is the bed-frame, B the driving-shaft, C its pulley, and D the pinion on its end. E E are shafts on the bed-frame, one of which carries the gear F, meshing with the pinion D. On its other end is a gear, G, meshing with a gear, G', on the other shaft, whereby said shafts rotate in opposite directions. Upon these shafts E E are the crushing-rolls H, which consist of shells of iron, steel, or other metal compound, secured in suitable manner. The surfaces of these shells, instead of being smooth, as is sometimes the case, or instead of being corrugated or fluted, without reference to the maintenance of certain proportions, are in my machine formed with corrugated or fluted intermeshing surfaces, the ribs or elevations of which and the corresponding grooves or depressions are arranged in a spiral or inclined course or direction, as shown, those on one roll being oppositely inclined to those on the other, said ribs or corrugations bearing certain proportions in their depth and thickness at their bases to the diameter and circumference of the rolls, as I shall now describe.

I am aware that spirally grooved or fluted rolls are not broadly new, the same being found in the Parrott patent, No. 28,499, dated May 29, 1860.

In my improved rolls the depth of each rib or corrugation should be about one-tenth of the diameter of the roll or shell. The thickness at the base of the rib or corrugation should be about one-sixth of the circumference of the shell, taken on a line or curve passing through points in the rib distant from its end about one-third of its depth, and the depth of the rib should be about one-sixth of its thickness at the base. This matter of proportions I deem of great value, for the following reasons: I have found from experience that when these proportions are adopted and the rolls subjected to an even wear of surface their ribs or corrugations will at all times maintain the

same relative proportions to each other and to the remainder of the shell or roll. As the surfaces wear away the corrugations will maintain their usefulness until the axis of the roll is reached. This result could not be achieved if the ribs or corrugations were of greater or less depth or thickness; or, in other words, if the depth and thickness bore a different relation to the circumference and diameter of the roll. If these proportions are not carefully provided for, but, on the contrary, the corrugations made at hap-hazard, the rolls after being subjected to wear to the extent of, say, one-third to one-fourth the depth of the rib, nothing remains to indicate the original shape of its surface; and, besides, its utility as a crusher ceases, even before the wear has proceeded to the extent above indicated. Therefore, without providing for the proportions I have named, there can be no proper application of the principle.

On the ends of one of the roller-shafts are the shields or guard-plates M. These are fixed rigidly to the shaft and rotate with it. They are separated from the ends of the roll by means of pieces *m*, and they are of larger diameter than the roll, whereby they span the space between the two rolls and overlap slightly the ends of the opposing roll.

I am aware that these shields or guard-plates are not broadly new; but in order to provide for the ready application of these shields or guard-plates I make them in halves, fitting them over the shaft, and having their meeting edges turned at an angle and bolted together, as shown at *m'*. The effect of these shields is to prevent the material being crushed from falling over the ends of the rolls—a result which is very liable to happen with the spirally-arranged corrugations, as described. As these shields rotate with the rollers, all wear is obviated, and by projecting only a short distance

above the rolls the feed may be dropped upon them close to the surface, thus avoiding the scattering of the ore after it has left the feed trough or table, and insuring an equal distribution of the material.

The intervention of the pieces *m* provides sufficient space for the shields to overlap the opposing roll.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the two oppositely-rotating crushing-rolls H, having corrugated or fluted intermeshing surfaces, the ribs and grooves of which are arranged on the rolls oppositely and in a spiral or inclined course or direction, said ribs or corrugations being in depth about one-tenth of the diameter of the rolls, and about one-sixth of the thickness of their own bases, and in thickness at their bases about one-sixth of the circumference of the rolls, taken on a line or curve passing through the ribs at points about one-third of their length from their ends, substantially as herein described.

2. In combination with the oppositely rotating crushing-rolls H, having the spirally-arranged corrugated or fluted and intermeshing surfaces, the rotating shields or guard-plates M at the ends of one of the rolls, and overlapping slightly the ends of the other, said shields or guard-plates consisting of halves fitted on the roll-shaft and having angled flanges at their meeting edges secured by bolts, substantially as herein described.

In witness whereof I have hereunto set my hand.

ENOS A. WALL.

Witnesses:

E. A. GUNSEN,
G. L. HAVENS, Jr.