

(No Model.)

A. M. HILL.
GRINDING MILL.

No. 395,140.

Patented Dec. 25, 1888.

Fig. 1.

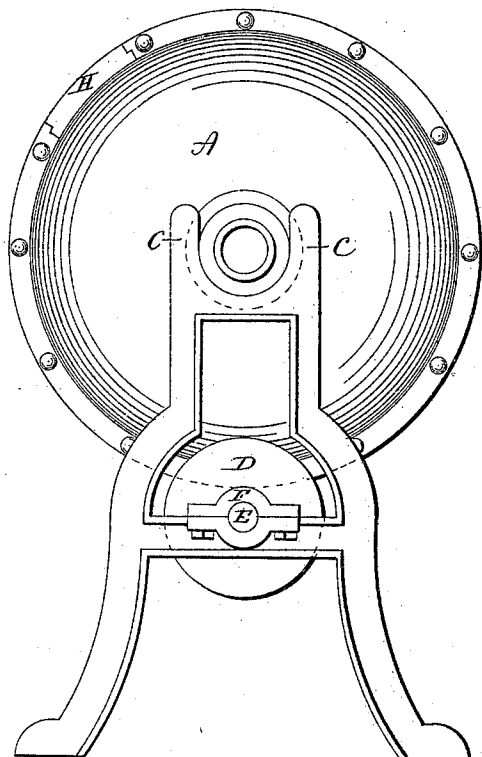


Fig. 2.

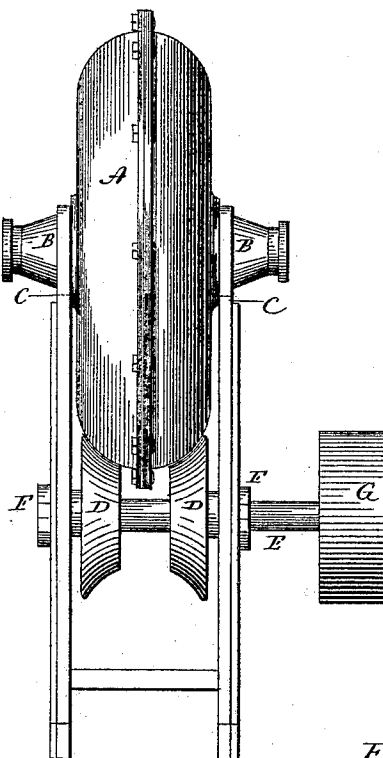


Fig. 4.

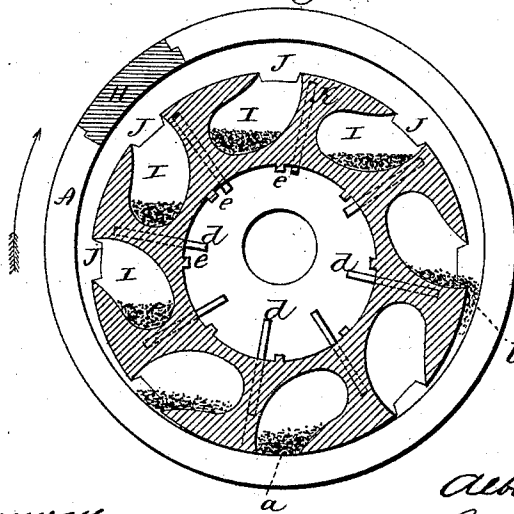


Fig. 5.

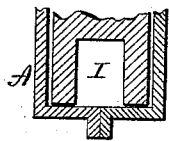
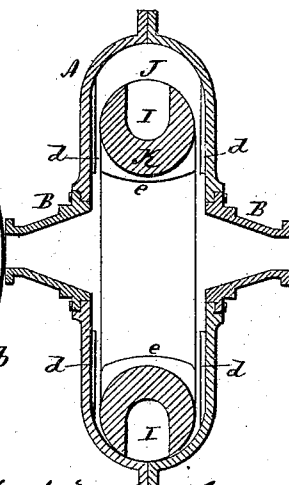


Fig. 3.



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GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 395,140, dated December 25, 1888.

Application filed July 2, 1888. Serial No. 278,822. (No model.)

To all whom it may concern:

Be it known that I, ALBERT M. HILL, of New Haven, in the county of New Haven and State of Connecticut, have invented a new
5 Improvement in Grinding-Mills; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be
10 a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, an end view of the mill complete; Fig. 2, a side view of the same; Fig. 3, a vertical section of the case and ring in the plane
15 of the axis of the mill; Fig. 4, a vertical central section of the case and ring at right angles to the axis; Fig. 5, a modification.

This invention relates to an improvement in that class of mills which consists of a case
20 arranged to revolve upon a horizontal axis, and within which heavy articles—such as iron spheres—are introduced, and which by the revolution of the case roll upon the material introduced into the case to crush it, the revolution of the case being designed to constantly
25 change the position of the material, while the rolling articles in the mill produce the crushing. This class of mills is largely employed in preparing mold-facings in foundry-work
30 and for many other purposes where a crushing of the material into powder or a very fine condition is desirable.

The invention consists in the construction of the mill, as hereinafter described, and particularly recited in the claims.

In the best construction of the machine the case A is of circular shape, the periphery being of convex shape in longitudinal section—that is, section in the plane of the axis—and so
40 that the interior of the case presents a corresponding concave shape, as seen in Fig. 3. The case is constructed with trunnions B, projecting axially from each side, as seen in Fig. 2, and the case is supported in a frame be-
45 tween two uprights, C C. Its periphery rests upon a pair of pulleys, D D, on the driving-shaft E, supported in bearings F below the casing, and to which driving-shaft power is applied by means of a pulley, G, or otherwise,
50 so as to impart rotation to the said pulleys D D. These pulleys D D work in frictional or

other suitable contact with the case, and so that as the pulleys revolve under power applied thereto they impart a corresponding revolution to the case. The case is provided with
55 an opening having a cover, H, by which it may be conveniently opened for the introduction or removal of the material to be ground or the material when ground.

The case is made in two parts, divided centrally in the plane of the axis, the two parts being bolted together, so as to make the case complete. Within the case the grinding-ring K is arranged. This ring is of somewhat less
60 diameter than the internal diameter of the case, and also somewhat narrower than the width between the two sides of the case. The body of the ring itself is preferably circular in cross-section, and so that it may rest close upon
65 the bottom of the case, as seen in Figs. 3 and 4, and so that as the case revolves the ring will roll upon the inner surface of the case accordingly or upon the material between the inner
70 surface of the case and the ring—that is to say, the ring stands free in the case, and is made of heavy metal, as cast-iron, so as to
75 present a great weight for the crushing operation. In the ring several pockets, I, are formed, each having an opening, J, through the periphery. The pockets I turn from the
80 periphery in a circumferential direction within the ring, and so that each pocket as it comes to the bottom presents a cavity opening in the direction opposite to that in which the ring is
85 rolling. Consequently the pockets successively act as scoops to take up the material.

The material to be ground is placed within the case and may be introduced through hollow trunnions, such as seen in Fig. 3.

In operation the material tends toward the
90 bottom of the case, and so that the ring will roll upon it as the case revolves, the weight of the ring producing the crushing operation. The ring revolving, the material being ground naturally is taken up by the scoop-like pockets I, as seen in Fig. 4, a representing such
95 material as entering the first pocket, and as the ring revolves that material so taken up will fall back in the pocket, as seen at the top in Fig. 4, and be carried over to the opposite
100 side, where it will be dumped, as seen at b, Fig. 4, then fall down between the case and

ring in advance of the roller. Each successive pocket will take up its portion of the material being operated upon, and in like manner take it over and dump it in advance of the
 5 ring. Thus a constant change in the position of the material is produced, it being constantly re-presented in advance of the ring for a new crushing operation. The result of this transfer of the material is to greatly increase the
 10 capacity of the machine over that of the balls or over what the ring would do without such pockets.

As preliminary breakers for the material introduced into the mill, I construct the case
 15 with radial ribs *d* each side the body of the ring, and construct the ring with transverse ribs *e* upon its inside, which ribs extend longitudinally toward the respective sides of the case and so that material thrown into the
 20 case within the ring will be broken by the ribs of the ring working against the corresponding ribs of the case, and thereby reduced until they may pass down between the ring and case for further and final grinding.
 25 These ribs permit the introduction into the mill of material larger than would readily find its way beneath the ring, which larger or coarser material will be broken between the ribs until it is reduced so that it may pass be-
 30 low and be crushed between the periphery of the ring and case.

I have represented the surface of the case and the working-surface of the ring as presenting a semicircular shape in transverse
 35 section, and this I believe to produce the best result; but it will be understood that the working-faces of the case and ring may be varied, say to be substantially flat, as represented in Fig. 5, the pockets being formed in
 40 the surface of the ring, as also seen in that figure.

I am aware that mills consisting of a revolving circular case having a crusher arranged therein of less diameter than the case,
 45 but of a shape corresponding to the case and

so as to be guided thereby, and the said crusher constructed with pockets to transfer the material under the rotating action imparted to it by the revolving case, were known prior to my invention. I therefore do not
 50 claim such a mill, the essential feature of my invention being constructing the pockets in the form of recesses in the ring opening to the periphery, but extending from the said opening in a circumferential direction and so as
 55 to give them the scoop shape, as I have described.

I claim—

1. In a grinding-mill, the combination of a case arranged to revolve upon a horizontal
 60 axis and a ring within said case but without axial support, the surface of the said ring adapted to roll upon the inner surface of the revolving case under the revolution of the case, and the said ring constructed with pock-
 65 ets opening through its periphery, the said pockets turned from the said opening in a circumferential direction, and so as to form scoops to take up the material, substantially
 70 as described.

2. The combination of the case A, arranged to revolve upon a horizontal axis and provided with openings through the trunnions which form the axis of the revolving case, the
 75 ring H, arranged within the case, the said ring being of somewhat less diameter than the internal diameter of the case, the case constructed with ribs *d* upon its inside each side the ring, and the ring constructed with longi-
 80 tudinal ribs *e* extending to the plane of the respective sides of the ring and adapted to co-operate with the ribs *d* in the case, the said ring constructed with pockets I, opening through the periphery of the ring, substan-
 85 tially as and for the purpose described.

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Witnesses:

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