April 8, 1941. J. A. TANKERSLEY 2,237,510

HAMMER-MILL HAMMER

Filed Aug. 2, 1939

Fig. 1.

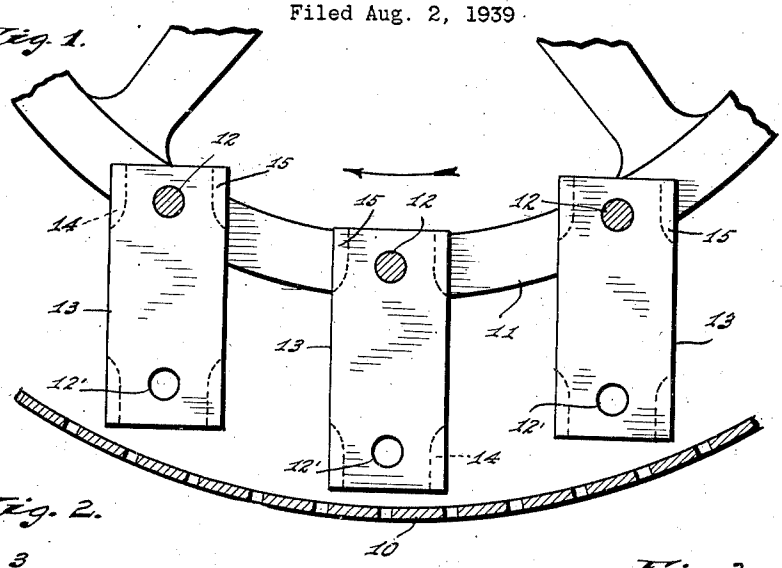


Fig. 2.

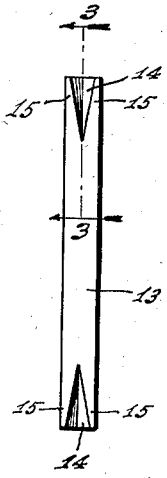


Fig. 3.

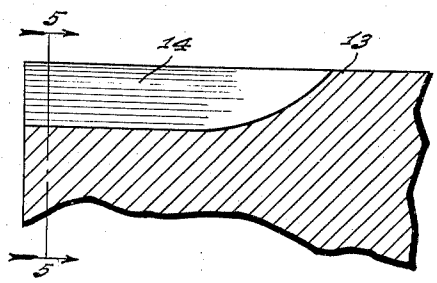


Fig. 4.

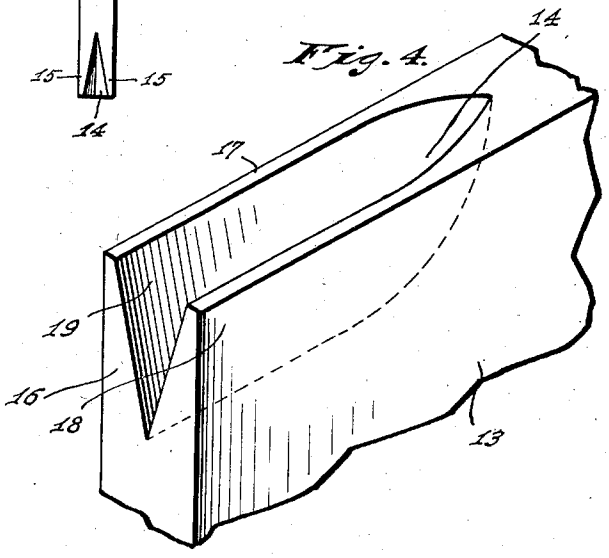
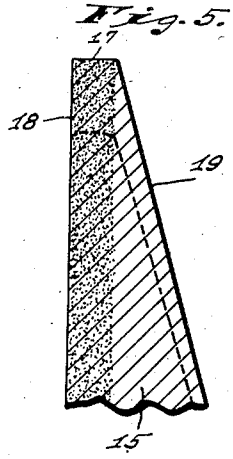


Fig. 5.



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HAMMER-MILL HAMMER

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Application August 2, 1939, Serial No. 288,037

6 Claims. (Cl. 83—11)

My invention relates to hammer mills and more particularly to the hammers employed therein. It is the object of my invention to produce a hammer which will possess a more efficient cutting action and have a longer effective life than prior hammers of which I am aware.

In carrying out my invention, I form a hammer of a plate of metal adapted at at least one end for pivotal attachment to the rotor of the hammer mill. At each of the outer corners of the hammer I provide a groove, desirably of a general V-shape in cross-section which opens in the end face of the hammer and extends inwardly of the hammer along the side face thereof. The material left at each side of each of these grooves constitutes a cutting tooth. To increase the effective life of the hammers they, or at least their cutting teeth, are desirably hardened; but I find that the effective life may be even further increased if one of the side faces of each tooth is left soft. As the cutting edge of a tooth so constituted wears away, the relatively soft side face also wears away, thus keeping the tooth thin and sharp.

The accompanying drawing illustrates my invention: Fig. 1 is a fragmental transverse section through a hammer mill; Fig. 2 is an end elevation of one of the hammers; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is an isometric view on an enlarged scale, illustrating one corner of a hammer embodying my invention; and Fig. 5 is a fragmental section on the line 5—5 of Fig. 3.

The hammer mill shown in Fig. 1 includes a foraminous screen 10 and a rotor 11 rotatably mounted within such screen. The rotor includes an annular series of axially extending rods 12 upon which the hammers 13 are pivotally mounted.

Each hammer 13 is shown as consisting of a flat plate of metal having in each of its outer corners a generally V-shaped groove 14 which extends inwardly along the side face of the hammer from the outer end face thereof. Each of these grooves divides the outer corner of the hammer to form two teeth 15. If desired—and I have so indicated in the drawing—each of the hammers 13 may be reversible on the rotor 11, being provided with symmetrically arranged holes 12' either of which may receive the rod 12. If this is done, all four corners of each hammer 13 are grooved as indicated in Figs. 2, 3, and 4.

Each of the teeth 15 has four faces (see Fig. 4); one (16) defined by the end face of the hammer, one (17) defined by the side of the hammer, one (18) defined by a face of the hammer, and the fourth (19) defined by a side wall of the groove 14. In the preferred form of my invention at least one of the latter two faces, desirably the face 19, is made relatively soft so that as it wears away the tooth 15 will become thinner.

The differential hardness of the faces in the cutting tooth 15 may be obtained in various ways. For example, I may case-carburize the hammers 13 before the grooves 14 are provided therein, and then cut the grooves 14 exposing the uncarburized core of the hammer. In the preferred method, the hammers are not quenched at the conclusion of the carburizing process but instead are left soft, the grooves 14 cut as by milling, and the hammer then hardened. If the hammers are quenched at the conclusion of the carburizing process, thereby hardening them, the grooves 14 may be cut by grinding.

Alternatively, the grooves 14 may be provided before the hammer is carburized, and the side tooth-faces which are to remain soft protected against carburization, as by copper-plating. In general, I contemplate the use of any hardening process which will render one side face of each cutting tooth relatively soft.

In the absence of the grooves 14, each corner of the hammer would form, in effect, a single cutting tooth. By providing a groove 14 in each corner of the hammer, each corner of the hammer is made to possess two cutting teeth; and the cutting action is consequently rendered more effective.

Moreover, because of the relative softness of one side of each tooth, the sharpness of the teeth is preserved in spite of wear. This will be apparent from Fig. 5, which is an enlarged cross-section through one of the teeth 15, the hardened portion of the tooth being indicated by stippling. As the tooth-face 17 wears away under the influence of the cutting action, the relatively soft side face 19 also wears away, the shape of the tooth after considerable wear being indicated by the dotted lines. It will be evident that in spite of wear the tooth-face 17 will not increase in width and that as a result the tooth will remain sharp for extended periods of use.

I claim as my invention:

1. A hammer for use in hammer mills, comprising a generally rectangular metal plate adapted at one end for pivotal attachment to the hammer-mill rotor, said plate being provided at at least one of its outer corners with a groove open-

ing in the end face of the hammer and extending inwardly along the adjacent side face of the hammer, the walls of such groove being softer than the outer surfaces of the hammer adjacent such outer corner.

2. A hammer for use in hammer mills, comprising a generally rectangular metal plate adapted at one end for pivotal attachment to the hammer-mill rotor, said plate being provided at at least one of its outer corners with a groove opening in the end face of the hammer and extending inwardly along the adjacent side face of the hammer, to form two cutting teeth, at least one side face of each of said teeth being softer than the other faces thereof.

3. A hammer for use in hammer-mills, said hammer being adapted at one end for pivotal attachment to the hammer-mill rotor and provided at the other end with a cutting tooth having opposite side faces disposed generally perpendicular to the axis of pivotal attachment of the hammer to the rotor, at least one of the side faces of said tooth being softer than the remaining faces thereof.

4. The invention set forth in claim 1 with the addition that said hammer is of low-carbon steel, the outer faces of the hammer being carburized and the walls of said groove being uncarburized.

5. The invention set forth in claim 3 with the addition that said hammer and tooth are of low-carbon steel, the harder faces of said tooth being carburized and the softer face or faces uncarburized.

6. A hammer for use in hammer-mills, said hammer being adapted at one end for pivotal attachment to the hammer-mill rotor and provided at the other end with an integral cutting tooth having a relatively hard portion and a relatively soft portion, the hard portion being of approximately uniform thickness and extending generally perpendicularly to the axis of the hammer-mill rotor and the softer portion being contiguous to said harder portion, extending generally perpendicular to the axis of the hammer-mill rotor, and being of increasing thickness toward the base of the tooth.

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