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T. H. POESE

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ROTARY PIVOTED HAMMER

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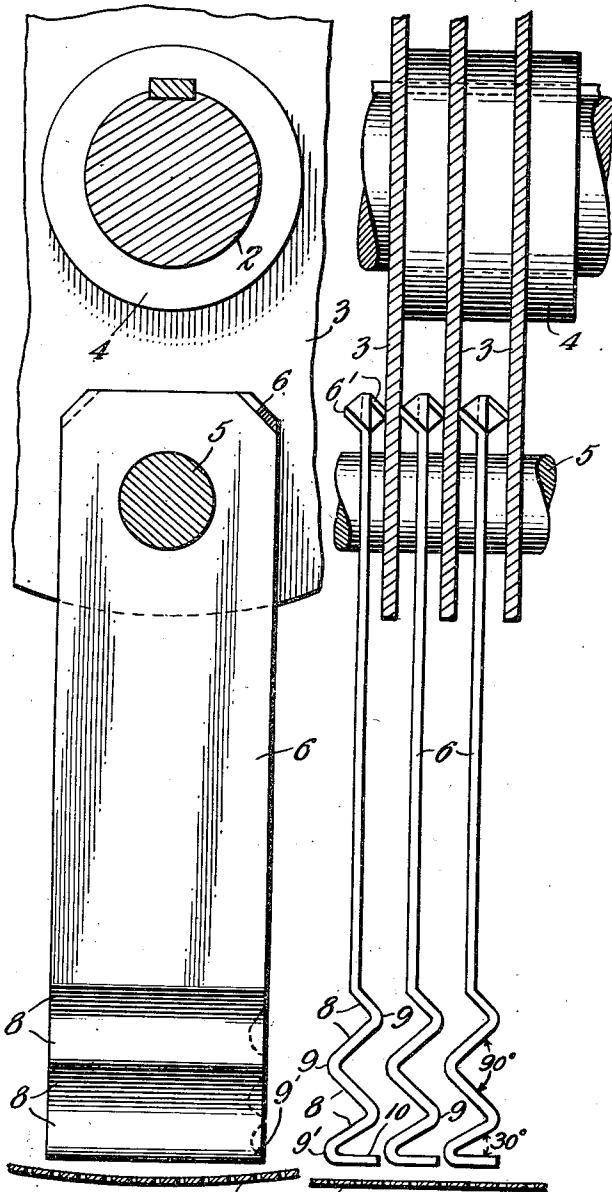


Fig. 2.

Fig. 3.

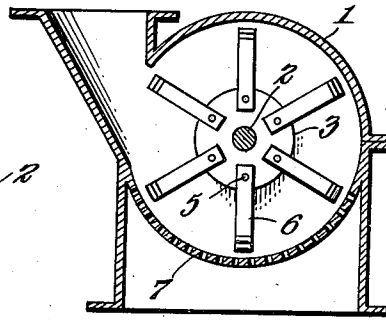


Fig. 1.

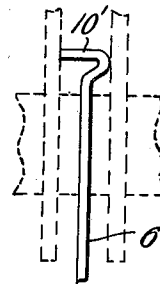


Fig. 3a.

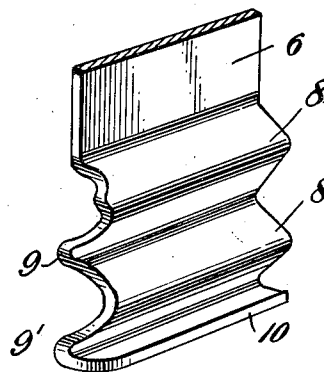


Fig. 4.

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ROTARY PIVOTED HAMMER

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6 Claims. (Cl. 83—11)

This invention relates to certain new and useful improvements in rotary pivoted hammers, the peculiarities of which will be hereinafter fully described and claimed.

More specifically, this invention relates to such hammers made of plate steel and having their outer ends formed in folds or corrugations extending backward from the front edge in the plane of rotation, so as to make the front operative edge thicker than the relatively thin shank portion.

The objects of my invention are to provide means first, for lessening the resistance of the shanks in passing through the material being reduced and thus to operate the machine on correspondingly less power; second, to increase production and efficiency of the machine; third, to reduce the loss of efficiency due to wear of the operating edge of the hammer; fourth, for causing such wear so to change the operating edge of the hammer so that it is substantially self-sharpening; fifth, for spacing the hammers on their pivot rods; and other features of construction hereinafter described and claimed.

In the accompanying drawing in which like reference numerals indicate corresponding parts.

Fig. 1 represents a vertical sectional elevation of a machine exemplifying my invention;

Fig. 2, an enlarged flat face view of one of my hammers and portions of adjacent parts on which it is mounted, the main shaft and pivot rod being in section in the plane of rotation;

Fig. 3, an edge view of said hammer and parts shown in Fig. 2, the disks being in section;

Fig. 3a, a detail of the inner end of my hammer; and

Fig. 4, a perspective view of the operative edge of said hammer indicating the change produced by wear.

Referring to the drawing the numeral 1 indicates the casing of a grinder in which is mounted a main shaft 2 of a rotor on which are mounted disks 3 spaced apart by collars 4. In these disks are a set of concentric openings in which are mounted rods 5 on which are pivoted the inner end of the shanks 6 of plate steel hammers which extend outward till their outer ends are in close proximity to a perforated screen 7 through which the material being ground is discharged when it is sufficiently reduced to pass through the perforations.

A portion of the outer end of this hammer is increased in the thickness of its operating edge over the thickness of the shank 6, by being formed in folds or corrugations, the inclined portions 8

of which form 90° angles or less with each other as shown in Fig. 3. The meeting edges forming ridges 9 of said folds are thus disposed alternately on opposite sides of the plane of the shank 6 so that the thickness of the operative edge is several times the thickness of the edge of the shank portion 6. In other words the transverse folds are so arranged that the adjacent ridges lie alternately on one side and then the other of the radial plane, parallel to the disks, of the length and width of the bar. In the drawing, such thickness of the operative edge is substantially five times the thickness of the shank. The outer end 10 of said hammer is folded approximately straight across the width of the hammer face so that it rotates in close proximity to the perforated screen and facilitates the discharge of the finely ground material through the perforations. As shown in Fig. 3, this corrugated outer end of the hammers forms a zigzag operative edge, and said hammers as mounted in the machine, are substantially parallel to each other in their shanks and zigzag operative edges.

The material entering the casing of the machine is subject to impact by the operative zigzag edges of the hammers until sufficiently reduced to pass through the screen. The partly reduced material that passes inside the hammer circle of the outer ends 10 of said hammers, offers little resistance to the rotation of the thin shanks which pass through said material without as much rotative impulse thereon as would be the case if the shanks were as thick at the operative edges as in the usual form of straight bar pivoted hammers. Thus the rotation of the rotor in grinding with this form of hammer, requires less power to operate it than when the usual form of hammers is used. Tests by ammeter of this form of hammer shown and described above, indicate that the power required is lessened by 10% as compared with the usual form of straight bar hammers in which the thick shanks act with a rotative action upon the material being reduced.

Also with my form of hammer, the material is not carried around with the hammers as much as in the usual form, and therefore the impact of the hammers upon the relatively slower movement of the material, causes a greater impact and increased efficiency of reduction. Tests have shown that the output of the ground material is increased 25% by the use of my form of hammer above described.

Thus not only the lesser power required, but the increased production obtained by the use of my form of hammer, are of advantage and

increases the usefulness of the machine operated with hammers above described.

The thickness of plate steel used for making my form of hammers varies according to the material on which they are employed. Thus for grinding soft material such as oats, barley, mill feed screenings, scrap leather, and such material, the preferred thickness of the plate varies from $\frac{1}{8}$ to $\frac{1}{4}$. Saw plate steel is preferred.

For grinding corn cobs, shelled corn, ear corn, and such material the preferred plate thickness is $\frac{1}{8}$ to $\frac{1}{4}$ inch.

The thinner plate steel is preferred for grinding fibrous roots such as darris that is pulverized to form bug dust. Other roots such as tomo from Brazil, Cuba root from Venezuela, and a flower from Japan and intermediate islands to Java which is like a wild diasy and hard to grind is made into Pyrethrum powder by hammers of my construction.

Various chemicals and drug products such as salts and crystals which require impact more than cutting action, are reduced by hammers having a plate thickness of $\frac{1}{8}$ to $\frac{1}{4}$ inch. For instance, tartaric crystals for making cream of tartar are reduced by plate hammers of preferred thickness of $\frac{1}{4}$ inch.

The speed of rotation varies with the diameter of the hammer circle. Thus rotors having a 40" hammer circle are preferably run at 1800 R. P. M.; a 28" hammer circle, 3600 R. P. M.; and an 8" hammer circle at 9,000 R. P. M. in machines used in laboratories.

In grinding and pulverizing Egyptian rock, and other igneous or trap rock material, in which heavy impact blows are required, the greater thickness of plate is preferred in my hammers.

These hammers with their zigzag corrugated operative edges, are preferably formed by dies and at relatively low cost. The operative zigzag edges may be tempered if so desired.

The wear on said zigzag edge is indicated by dotted lines in Fig. 2 as being greatest in the inclined folds 8 connecting the meeting edges 9 which latter appeared to resist the wear more than the inclined portions 8. The extreme fold 10 wears its outer corners rounding as indicated in Fig. 4 and forms one side of the extreme tooth 9'. Thus the resulting effect of wear upon the operating edge will form a series of teeth at the meeting points 9 which are caused by hollows or recesses produced by wear as indicated in the perspective view Fig. 4. The toothed edge thus formed is practically as efficient as the original zigzag edge, and the hammer is thus substantially self sharpening.

On the inner end of my hammer, I provide integral means for spacing the relatively thin shank between the disks 3 by producing a thickened inner end by a fold or single corrugation 10' (Fig. 3a) similar to those at the outer end; or by turning the corners 6' of the inner end in respectively opposite directions as indicated in Figs. 2 and 3 so that they fill the respective space between the adjacent disks and space the hammers uniform distance apart as indicated in Fig. 3. The oppositely folded corners of the inner end present beveled edges and avoid hanging up on the edge of the disk when the hammers are disposed in such a position that the said corners engage the periphery of the adjacent disk as when the rotor is at rest or about to stop or start.

It will be noted that the two inner corners of the bar when turned outward are disposed substantially at right angles to the plane of the

shank and their points formed by inclined edges, are adapted to bear on the respectively adjacent disks and thereby centrally dispose the shanks between said disks. When the rods are so near the periphery that these oppositely turned corners may engage the periphery of the disks except when the centrifugal force causes the shank to be radially disposed, the inclined edges of the triangular projections, if they should engage the periphery of adjacent disks, will make only a sliding engagement therewith and thus will not obstruct the hammer from taking its radial position under rotation. These projecting portions near the outer and inner ends make the operative thickness of the ends substantially the same.

Thus my plate bar hammer is bent outward laterally at and near both ends. Also when the transverse corrugations extend from the front to the rear edge as shown in the drawing, the hammer can be reversed upon its pivot rod so as to present the rear edge as a new front operative edge and thus extend the life of the hammer.

These alternately and oppositely inclined folds of the corrugations at the outward end of the bar, form meeting edges or ridges of the corrugations slightly rounded as shown in the drawing, of the operative edge, to facilitate forming the same by dies.

The portions 8 connecting the ridges of the corrugations may be straight as shown or otherwise formed.

I do not limit myself to the exact construction herein shown and described except by the appended claims.

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

1. A rotary pivoted hammer comprising a flat plate bar forming a shank adapted for pivotal mounting at its inner end and having at its outer end corrugations extending transversely backward from its front edge and laterally from the plane of the shank so arranged in transverse folds that adjacent ridges lie alternately on one side and then the other of the radial plane of the length and width of the bar, forming a zigzag operative front edge.

2. A rotary pivoted hammer comprising a flat plate bar forming a relatively thin shank compared to its width and having alternately inclined folds at its outer end forming ridges offset laterally and alternately from both flat faces of the shank, and connecting the front and rear edges of the bar transversely to the length of the hammer, and so arranged that adjacent ridges lie alternately on one side and then the other of the radial plane of the length and width of the bar, to increase the effective thickness of the operative edges over the thickness of said shank.

3. A rotary pivoted hammer consisting of a flat bar relatively thin compared to its width and forming a flat, thin shank, and having transverse folds forming corrugations at its outer end and thus increasing the effective thickness of its operative edge while maintaining the thinness of said bar throughout its length, said transverse folds being so arranged that adjacent ridges lie alternately one side and then the other of the radial plane of the length and width of the bar.

4. A rotary pivoted hammer of plate steel bent into transverse folds and ridges at and near its outer end, said transverse folds being so arranged that adjacent ridges lie alternately on one side

and then the other of the radial plane of the length and width of the hammer, and said ridges being offset from opposite faces of the hammer and adapted to form teeth in the operative edge
5 when the wear under usage makes concave recesses in the connecting folds.

5. A rotary pivoted hammer of plate steel characterized by having offset, laterally projecting portions near each end, said portions near the
10 outer end lying in transverse folds that are so arranged that adjacent ridges lie alternately on one side and then the other of the radial plane of the length and width of the hammer, and the portions at the inner end projecting sufficiently
15 to make the said ends substantially the same operative thickness.

6. A rotary grinding machine comprising spaced disks on a rotary shaft and having a set of pivot rods passing through said disks ad-

jacent their periphery, in combination with plate steel rectangular bar hammers pivoted on said rods and characterized by having their two inner corners turned outward substantially at right angles to the plane of the shank forming trian-
5 gular projections having edges inclined to the radial plane parallel to the disks, of the length and width of the shank and forming offset points having inclined edges meeting from opposite di-
10 rections adapted to bear on an adjacent disk to position in a definite operative plane the shank of the respective hammer, and the slanting edges of said projections being capable of sliding en-
15 gagement with the periphery of the adjacent disk to avoid hanging up any of said hammers on the said periphery when they assume other than ra-
dial position when starting or stopping the ro-
tor.

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