Jan. 30, 1923. 1,443,757

H. M. PLAISTED
CRUSHER
FILED MAY 13, 1922.

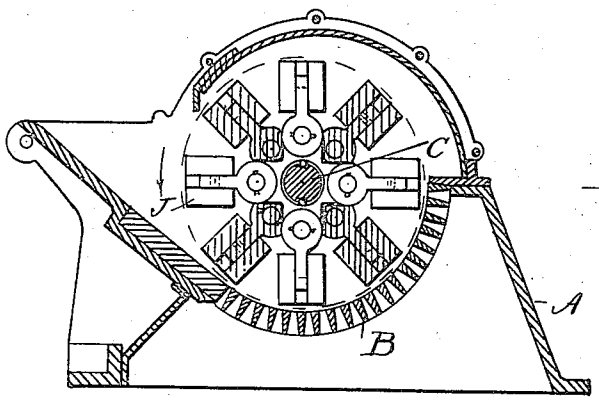



Fig. 1.

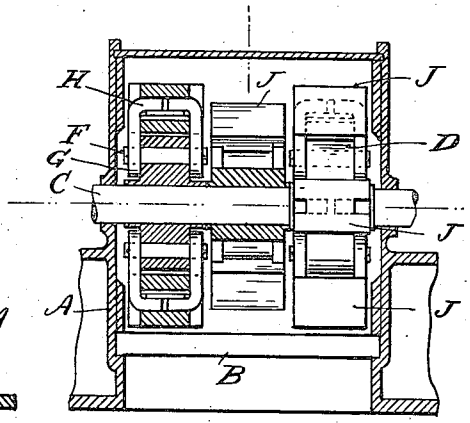



Fig. 2.

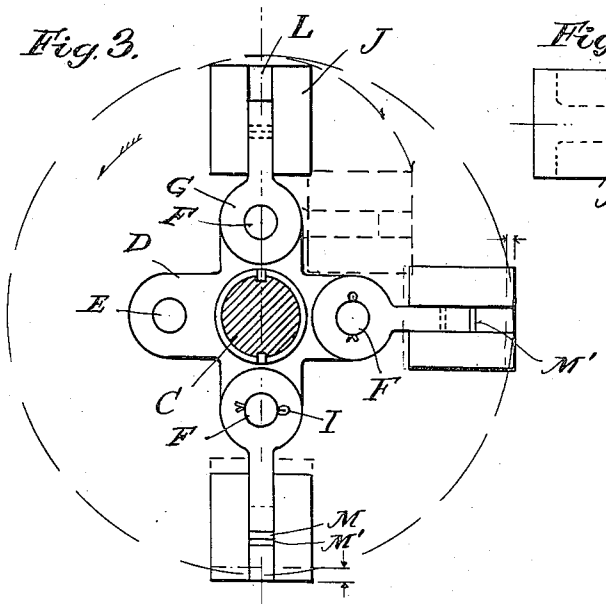



Fig. 3.




Fig. 4.

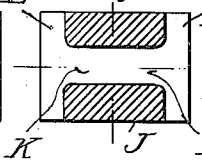



Fig. 5.

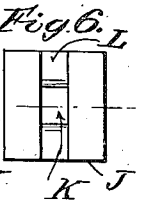



Fig. 6.

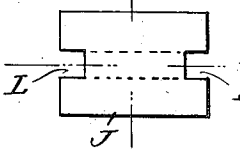



Fig. 7.

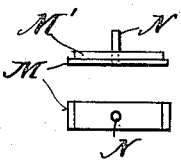



Fig. 8.

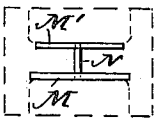



Fig. 9.

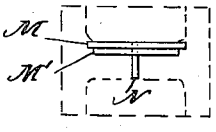



Fig. 10.

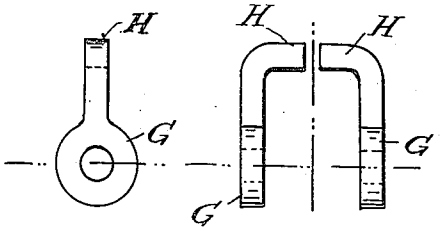



Fig. 12. Fig. 11.

Inventor

Harold M. Plaisted.

Patented Jan. 30, 1923. 1,443,757

# UNITED STATES PATENT OFFICE.

HAROLD M. PLAISTED, OF ST. LOUIS, MISSOURI, ASSIGNOR TO WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

## CRUSHER.

Application filed May 13, 1922. Serial No. 560,786.

*To all whom it may concern:*

Be it known that I, HAROLD M. PLAISTED, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Crushers, of which the following is a specification.

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

The main object of my invention is to provide a crusher with a rotary pivoted hammer that has a heavy head with a large amount of wearing surface, and which head is reversible so as to present four operative edges; secondly to adjust such a head outwardlly as it wears; thirdly, to protect the yoke from wear, so that the head only need be renewed; fourthly, to provide a hammer mount in the rotor that will allow the hammers to turn backward on their pivots and afford large clearance between the cage and the heads.

In the accompanying drawing on which like reference letters indicate corresponding parts, Fig. 1 represents a vertical sectional view inside the casing and across the shaft of a crusher exemplifying my invention; Fig. 2, a vertical sectional view of such a machine along the shaft, showing one set of hammers in edge view; Fig. 3, an enlarged detail end view of my rotor head on the shaft in section with hammers carried thereby in several outward adjustments; Fig. 4, a detail side view of my hammer head; Fig. 5, a central section of said head as taken on a radial plane through the pivot axis; Fig. 6, an end view of said head; Fig. 7, a plan view of said head; Fig. 8, a side and plan view of filler strips forming adjusting means for the head; Fig. 9, a side view of the said strips arranged for the first outward adjustment of the head; Fig. 10, a similar view showing the strips arranged for the second outward adjustment; Fig. 11, a side view of the divided yoke; and Fig. 12, an end view of the same.

The letter A designates a suitable casing for a crusher in which is mounted a cage B concentric with a shaft C on which are mounted a series of rotor heads provided with a plurality (preferably four) radiating arms D, in the outer ends of which are holes E for hammer rods F by which rotary pivoted hammers are carried on said rotor head. This head is rounded at each end of the said arms and the space between the arms forms a reentrant angle to receive the backward movement of the hammers under the resistance of the material as indicated by the dotted lines in Fig. 3.

The hammers mounted on said hammer rods preferably consist of parallel shanks having eyes G formed on their inner ends and having their outer ends bent laterally in the radial plane of the pivot axis and shanks so as to form lateral projections H that are alined with each other as shown in Fig. 11. These shanks are spaced apart by the width of the arms D of the rotor head and in the construction shown, each arm has a hammer rod F upon the ends of which the eyes G are mounted and secured thereon by cotter pins I or otherwise. As the projections H in operative position have their ends adjacent to each other, the shanks present the appearance of a divided yoke as shown in Fig. 11.

Connecting these shanks and forming a heavy head for the hammer, is a block J, preferably rectangular and oblong in the axial direction and having at each end a recess that preferably form a continuous lengthwise opening K in the central lengthwise axis of the block. The alined projections H of the divided yoke are engaged by the walls of this central opening or end recesses and the shanks are also engaged by the walls of end slots L that extend from top to bottom preferably as shown in Fig. 5 and Fig. 6, and lie in the same radial plane through the pivot axis. The shanks are preferably square and the projections H are square or angular, and the slots L are likewise square or angular, and the shanks engaged by the slots L are practically hidden therein and protected from wear by the material being crushed.

The central opening K has a greater radial depth than that of the projections H, preferably, so that the extra space is filled by strips M M′ through the center of which pass a connecting pin N which is located in the space between the alined projections H and maintains the filler strips in their central position. In the first assembling of

the hammers these filler strips are located radially inward with regard to the alined projections as shown in Fig. 2. When the head is worn somewhat and it is desired to adjust the head outward, the strip M′ for instance, is located on the outer side of the central opening K as indicated in Fig. 9, and the central pin N keeps it from shifting lengthwise when the divided yoke is replaced. This gives a corresponding outward adjustment of the head as shown in Fig. 3 at the right. When the filler strips are both located at the outer side of the opening K as indicated in Fig. 10, a further adjustment of the head is given as indicated in Fig. 3, at the bottom.

Referring to Figs. 1 and 2, the rotor heads are mounted on the shaft C so that the arms of the middle head for instance are opposite the spaces between the arms of the adjacent heads as indicated by shade lines in Fig. 1. This causes the hammers to alternate when arranged in the rotor as shown, whereby an improved action is obtained upon the material entering the hopper and the material is drawn in more readily than when all of the hammers are arranged in lines parallel to the shaft and present a long operative edge instead of an alternating edge. This is the preferred arrangement, but they may be otherwise disposed if desired.

The shank eyes G are sessile, the balance of the shank in each case being hidden in the corresponding slot and recess of the head block, so that the outer circumference of the eye is substantially tangent to the inner face of the head block. The ends of the arms D are also rounded according to the eyes, so as to afford clearance for the block's inner face closely adjacent to the end of the arm. The sides of adjacent arms form a reentrant angle and allow the head block to turn into this space and hit the side of the block against the side of the arm, so that the operative edges are not injured. Dashed lines in Fig. 3, indicate the position of the upper hammer when thrown backward as just described so that the side of the head block impinges on the side of the arm.

The open end slot L, extending from the outer to the inner faces of the block, allows turning the block and inserting the shanks from either direction. This reversing of the head brings the inner edges to the outside, and turning the block end for end brings the rear edges to the front. Thus all four longitudinal edges can be successively used as the front outer operative edge of the hammer.

I claim:

1. A crusher comprising a rotary pivoted hammer consisting of a reversible oblong block head having a multiple of operative faces, and having therein a central longitudinal angular opening with an open slot at each end extending from top to bottom across the same and communicating with said central longitudinal opening, and a divided yoke adapted for pivotal mounting consisting of shanks adapted to fit in either top or bottom ends of said slots and having angular end projections fitting said lengthwise opening in the head, substantially as described.

2. A rotary pivoted hammer comprising a rectangular block head and shanks adapted for pivotal mounting,—said head having an open slot in each end extending from top to the bottom face thereof and the outer portion of said shank being enclosed in said slot and adapted to engage said head, substantially as described.

3. A crusher comprising rotary pivoted hammers each consisting of an oblong block head having a longitudinal opening, a divided yoke consisting of shanks adapted for pivotal mounting at one end and having alined projections forming the divided yoke at the other end disposed in said longitudinal opening of the head, and spacing strips mounted in said longitudinal opening and perforated midway and a connecting pin located in said midway perforations, substantially as described.

4. A crusher comprising a rotor head with radiating arms, rotary pivoted hammers mounted on said arms, and having heavy block heads and shank eyes,—the outer circumference of which eyes being substantially tangent to the inner face of said head and the eyes being spaced apart the length of the head,—the ends of said arms being located closely adjacent to the inner face of said head and rounded to give clearance of the head to recede into the reentrant angle space between adjacent arms, substantially as shown and described.

5. A crusher comprising rotary pivoted hammers, each consisting of a rectangular block and shanks having sessile eyes spaced apart the length of the block, a rotor shaft, a rotor head consisting of radiating arms matching the space between the shank eyes and rounded to give clearance for the inner face of the headblock mounted closely adjacent,—the sides of said arms forming a reentrant angle space adapted to receive the hammer block head and form a limit stop for the side of the hammer and avoid the operative edges.

In testimony whereof I have affixed my signature.

HAROLD M. PLAISTED.