M. F. WILLIAMS.

HAMMER FOR ROTARY MILLS.

APPLICATION FILED JUNE 25, 1917.

1,266,894.

Patented May 21, 1918.

2 SHEETS—SHEET 1.

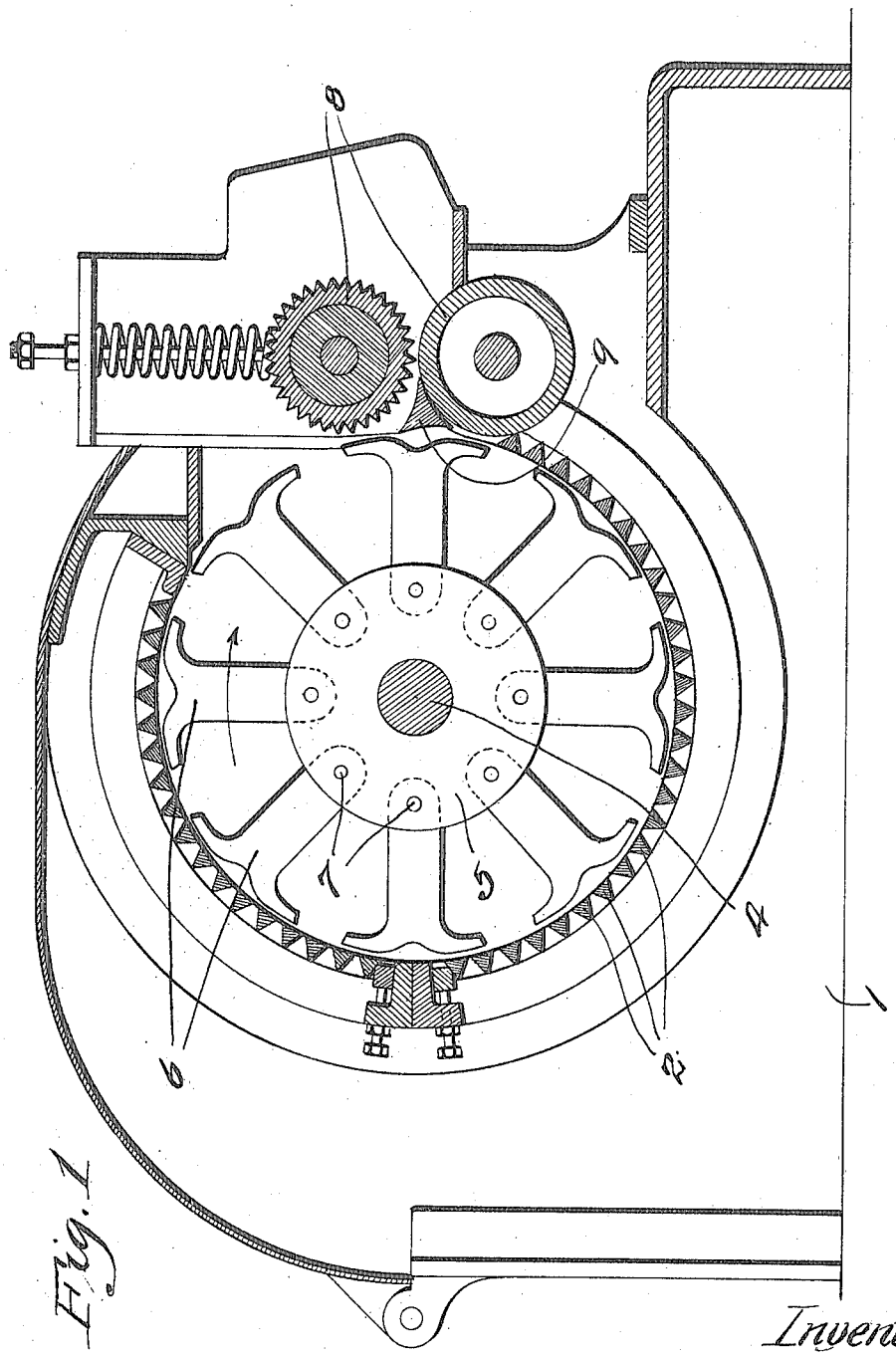


Fig. 1.

Inventor

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By G. F. Conrad. Atty

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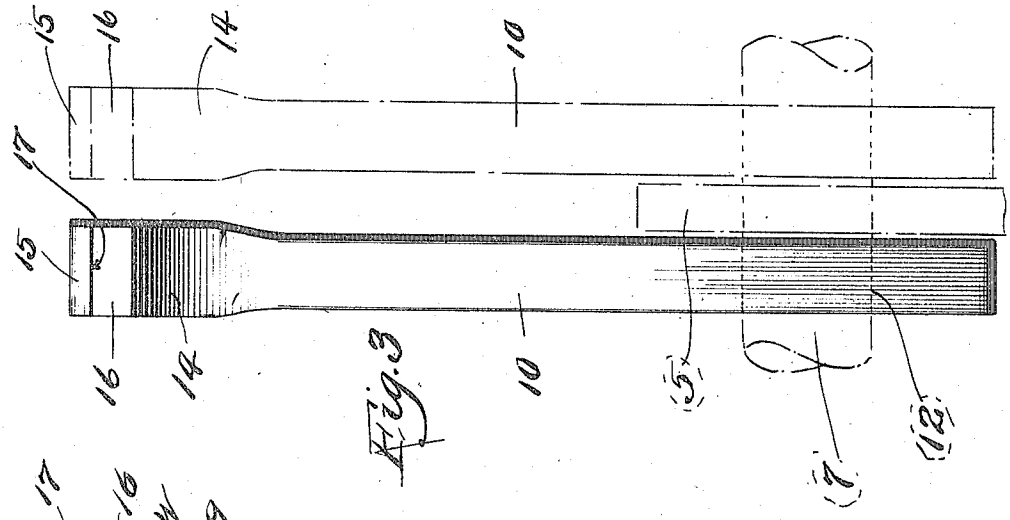


Fig. 3

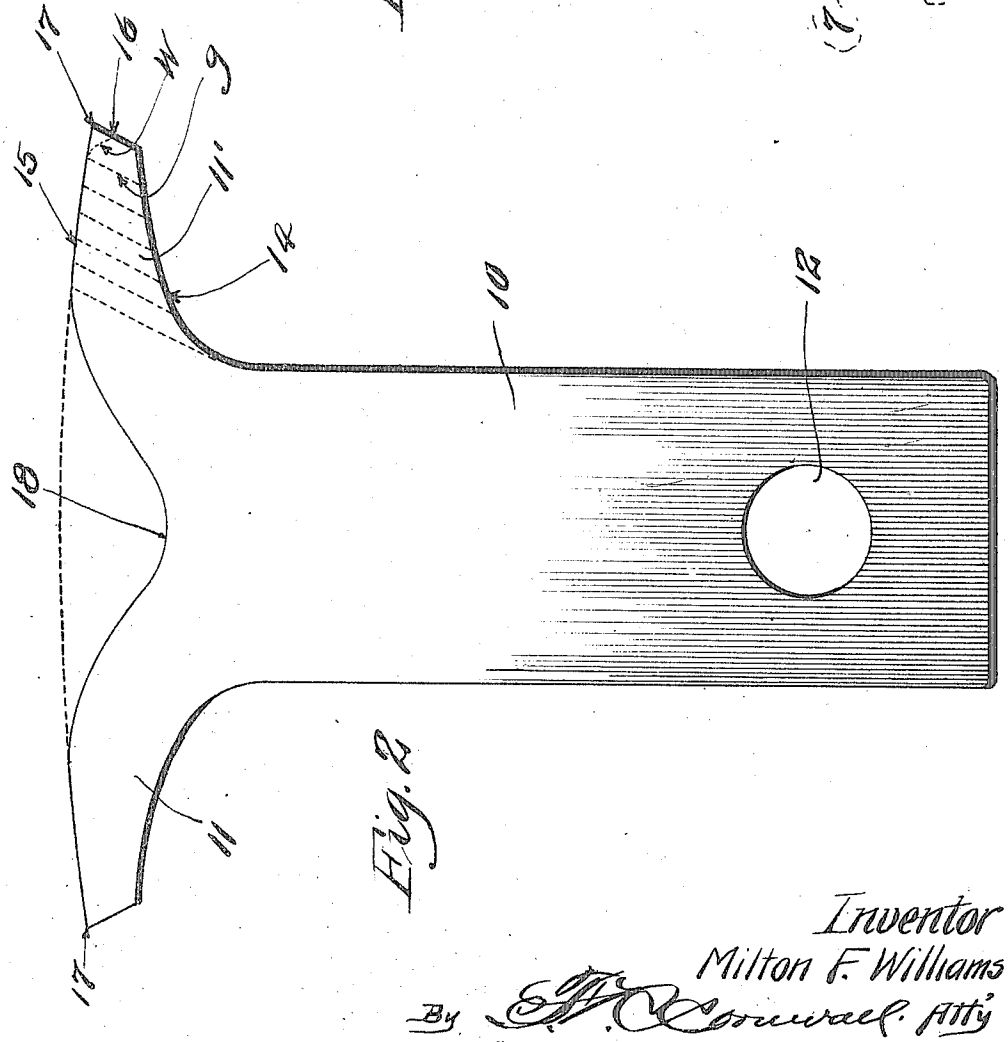


Fig. 2

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UNITED STATES PATENT OFFICE.

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HAMMER FOR ROTARY MILLS.

1,266,894. Specification of Letters Patent. Patented May 21, 1918.

Application filed June 25, 1917. Serial No. 176,758.

To all whom it may concern:

Be it known that I, MILTON F. WILLIAMS, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Hammers for Rotary Mills, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates generally to rotary mills of a type in common use for the crushing, shredding, grinding, or comminuting of a great variety of materials. In a more specific aspect, the invention relates to certain improvements in the hammers or beaters for use in such mills.

The objects of the invention comprehend the provision of an improved form of beater or hammer which is so designed as to give a maximum longevity or serviceability with a uniform and consistent efficiency throughout its life. By the provision of such an instrument, this invention accomplishes a decided increase in the economy and efficiency of operating machines of the class specified.

Other objects of the invention will be obvious or pointed out hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 represents a longitudinal sectional elevation of a rotary mill or grinder equipped with my improved hammers or beaters;

Fig. 2 represents a side elevation of my improved hammer or beater;

Fig. 3 represents a front elevation thereof.

Making reference to these illustrations by means of the numerals applied, let it be understood that 1 represents generally a frame or casing which forms a support and inclosure for the working parts of a rotary mill. This mill includes a cage or screen 2 disposed concentrically with an operating shaft 4, upon which shaft are mounted disks or hammer mounts 5 in which the hammers 6 are pivotally mounted on pivot bolts 7. In the illustration, the hammers are shown in the positions which they occupy theoretically when the machine is in operation, they being held out radially of the shaft 4 by the centrifugal force resulting from their momentum and inertia accruing upon the rotation of the shaft 4. The cage 2 forms a cylinder in which the rotary members just described are adapted to operate, and in the form of machine illustrated, the material to be reduced is fed into the cylinder by the operation of feeding rollers 8 which are rotated to move the material into the cylinder across a breaking or cutting plate 9. As the material is thus fed into the cylinder while the shaft 4 is rotating to drive the hammers in the direction indicated by the arrow, the hammers will be brought successively upon the material, and by virtue of the coaction of the breaker plate 9 will shred, cut, break or reduce it to small pieces. Such of these pieces as are not sufficiently small to pass through the interstices of the cage 2 will be subjected to the further action of the beaters or hammers in coaction with the portions of the cage 2, until such pieces are further comminuted to the requisite size or fineness. This is the well known operation of mills of this type, and it is the utility of my invention to contribute to the effectiveness and the economy of this operation.

It will be seen by reference to Figs. 2 and 3 that the hammer or beater which comprises my invention is formed of a flat bar of metal which is shaped to provide a shank portion 10 which terminates at one end in a pair of oppositely extending working points which are designated respectively 11 and 11′. Adjacent its other extremity the shank portion 10 is provided with an aperture 12 which is adapted to accommodate the pivot bolt upon which the hammer is to be swung. The arrangement of this mounting means is such that the hammer is adapted to swing edgewise with either one or the other of the working points 11 or 11′ in advance. Each of the working points has an inner margin 14 and an outer margin 15 extending to a front margin 16. The outer margin 15 is of somewhat greater extent than the inner margin 14, so that at the junction of the outer margin and the front margin is formed a cutting edge 17 which is the most advanced portion of the instrument. The outer margins 15 of both working points are formed substantially on the arc of the inner surface of the cage 2, with which the hammers are designed to coöperate. The inner margins 14 converge with the outer margins 15 from the shank portion

10. In the forging of the hammer, metal may be displaced from the inner margins of the point members, and from the portion 18 intermediate the point members, so as to form these point members somewhat thicker than the shank portion, as is apparent in Fig. 3.

It has been described above how in the ordinary operation of a machine of this type, the beaters coöperate with the breaker plate and with the cage. The continuous operation of beaters in a machine of this kind results in a wearing down of their working edges due to the abrasion and attrition of the material upon which they operate. In Fig. 2, I have indicated by a dotted line marked "*w*" the form to which the working point may be worn down in time. A hammer so worn, of course, has greatly reduced efficiency, as it is not so effective to sever the material on the breaker plate or to comminute it on the cage. The construction of my improved form, however, affords means for immediately removing this condition and restoring the mill to its maximum efficiency. This is accomplished by simply reversing the hammers on the disks or mounts 5 so that the working point which formerly was at the rear of the hammer is now at the front thereof, and presents an effective working edge. It will be understood that the two working points 11 and 11′, being practically identical in form and size, effectively balance the hammer so as to make it hold the true radius when in operation, and the reversal of the hammers in the manner specified, keeps the wear equalized on the two point members. When the second point member has been worn down, the hammers may be removed from the mill, and the front margins of the point members ground back to the form illustrated by the dotted line marked "*g*". Thus, it will be seen that entirely new working edges and faces are provided on both of the point members, and the point members are left at substantially uniform size and shape, so as to maintain the balance of the hammer. Attention was directed above to the fact that the outer margins 15 of the working points are disposed substantially on the arc of the cage. Consequently, the new working edges formed by the dressing down of the working points will be on the same radius relative to the shaft, or the same arc, as were the original edges. In this fashion the proper spacial relationship of the working edges with the breaker plate and cage is maintained, and the efficiency of the mill is kept at its highest point. Upon the continuous operation of the mill and wear of the hammers, this manipulation or reversal of the hammers and grinding down of the working points is repeated, the working points being gradually dressed back in the form illustrated by the successive dotted lines in Fig. 2. It will be observed that in all of these forms the working edge is maintained substantially on the same arc.

It will be observed that by virtue of this construction, the hammers have a very long life without any decrease in their effectiveness, and that the proper balance of the hammer is maintained throughout its life so that it will operate upon the proper radius as well as upon the proper arc. The forming of the point members in the manner above described not only increases their density and contributes to their durability, but also increases their effective extent, as will be obvious upon inspection of Fig. 3 wherein the relative disposal of adjacent hammers is shown, and from which it will be observed that the effective working edges overhang the greater portion of the space intermediate the hammers occasioned by the interposition of the mounts 5.

I am aware that the device is susceptible of certain modifications and changes which I have not described herein or specifically referred to. Accordingly, it is my intention that the appended claims be construed to comprehend such variations.

What I claim is:

1. In a rotary mill, a hammer comprising a flat shank portion equipped adjacent one extremity for pivotal mounting, and carrying at its other extremity similar oppositely extending working points projecting a substantial distance in advance of the margins of the shank and terminating in outer margins disposed substantially upon the arc of the mill's cage, and said working points having inner margins and front margins extending from said inner margins to the outer margins and forming working edges at their lines of junction with the outer margins on the effective radius of the hammer.

2. In a rotary mill, a hammer formed of a flat bar which is bilaterally symmetrical and equipped for suspension on its longitudinal axis adjacent one extremity, the other extremity of the bar being formed into oppositely projecting working points having their outer margins extending beyond the front and rear margins of the shank and disposed substantially on the arc of the mill's concave, said working points being formed also with inner margins and front margins extending from the same to the outer margins and terminating at their outermost extremities in working edges extending in the direction of the bar's thickness.

3. In a rotary mill, a hammer formed of a flat bar equipped adjacent one extremity on its longitudinal axis for suspension on an operating shaft, and formed at its other extremity into similar oppositely directed working points extending outwardly a substantial distance in advance of the front and

rear margins of the bar, the outer margins of which working points form the terminal edge of the hammer, and throughout the portions thereof which extend beyond the front and rear margins of the shank portion are disposed substantially in a common arc described on a radius from the axis of the operating shaft, both the outer and inner margins of the working points terminating at front margins which form working edges at their junctions with the outer margins.

In testimony whereof I hereunto affix my signature this 20th day of June, 1917.

MILTON F. WILLIAMS.

Witnesses:
ELLIOTT S. HAUSER,
H. M. PLAISTED.