

Oct. 12, 1943.

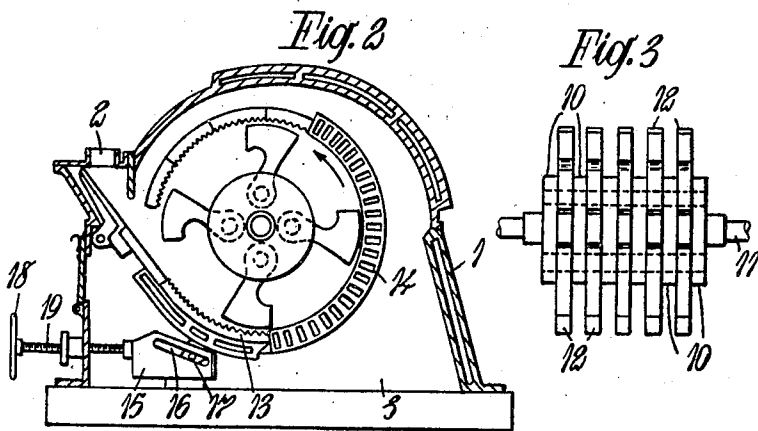
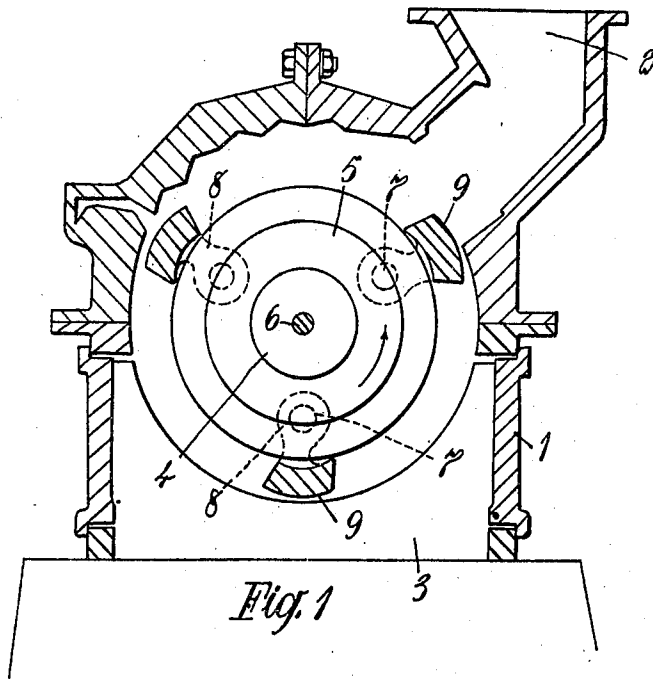
G. H. N. COLES

2,331,597

DISINTEGRATOR HAMMER

Filed Sept. 3, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

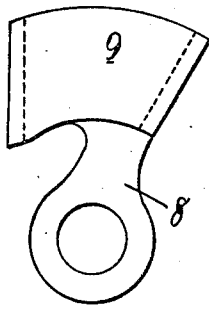


Fig. 4

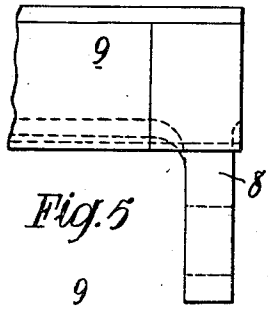


Fig. 5

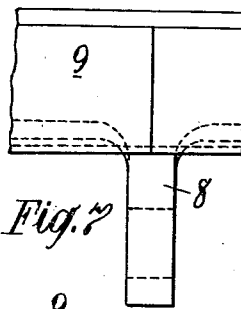


Fig. 7

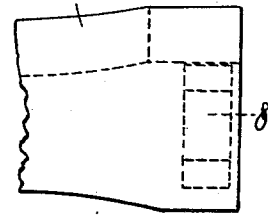


Fig. 6

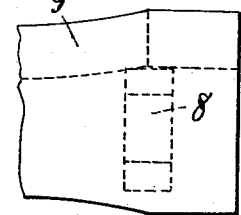


Fig. 8

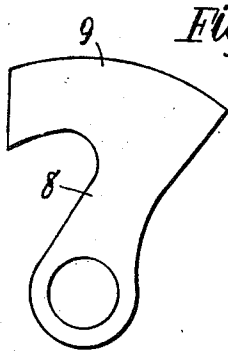


Fig. 9

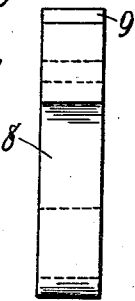


Fig. 10

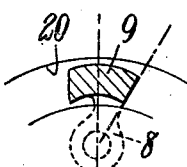


Fig. 11

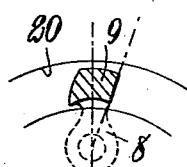


Fig. 12

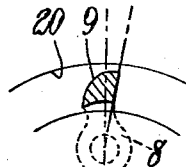


Fig. 13

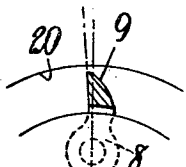


Fig. 14

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# UNITED STATES PATENT OFFICE

2,331,597

## DISINTEGRATOR HAMMER

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Application September 3, 1940, Serial No. 355,251  
In Great Britain September 25, 1939

### 1 Claim. (Cl. 83—11)

This invention relates to hammer mills, rotary granulators, pulverisers and generally apparatus employed as disintegrators, masticators and otherwise in cutting or dividing materials and furnished with swinging hammer or other form of swinging cutting or dividing elements.

The outstanding disadvantage of machines of the type in question is that there is a great difference in the size of the product obtained from the machine when it has new hammers or like elements and when the hammers or like elements have become worn and are nearing the end of their life.

As the hammers or like elements wear down, so the product becomes coarser and coarser, and the reason for this is mainly due to the increasing gap between the hammers and the breaking blocks.

In general, the form of the swing hammers is symmetrical and the centre of gravity of the hammer is on the same radial line as the axis about which the hammers pivot.

The shape of the hammers produced by different makers varies slightly in that, for instance, some have a curvature over the length of the face but all of them have the disadvantage that, as they wear, the width of the crushing gap increases, as the result of the wear taking place to an increasing degree adjacent to the leading edge of the hammer.

One object of the present invention is to increase the effective life of the hammers and in particular to secure that during an increased period of their life the gap between the hammers and the breaking blocks remains substantially constant.

According to the invention, the hammer or like element is so shaped that the head thereof, which extends from the lug or arm by which it is pivotally connected to the rotor, comprises an overhung portion directed away from one side or edge of the lug only, the face of which portion remote from the lug or arm will constitute the working face of the element.

Thus, a section of the element taken through the lug or arm will be generally of L form and the angle between the median line of the arm and the radial line extending through the axis of rotation of the arm and the axis of rotation of the rotor will progressively decrease as the result of the wear of the head of the hammer or like element.

The elements may comprise a head portion secured to a single lug or arm when they are designed for use with machines of the kind in which

a plurality of such elements are arranged side by side in association with the rotor, or they may be of the character of the so-called hammer bars, in which case the head of the hammer is in the form of a bar of a relatively considerable length extending from one side to the opposite side of the rotor, in which case the bars will comprise a lug or arm arranged adjacent to each end of the bar.

The thickness of the portion of the head extending from the lug or arm may increase from a position which is most remote from the lug or arm, and may be regarded as the forward side of the element in a direction to the rear side of the element.

In all cases the head of the element will always be unsymmetrically disposed with respect to the lug or arm by which it is connected with the rotor.

The formation of the hammer element so that the central line of the lug or arm and the axis about which movement of the hammer element is permitted with respect to the rotor forms, in consequence of wear, a progressively decreasing angle with a line joining the axis in question and the axis of rotation of the rotor has, as its result, the retention of the extreme or outer edges of the working face to be at a substantially constant distance from the breaker plate for a much greater fraction of the total life of the hammer than is possible with the more usual construction in which the forward and rearward faces of the hammer bars are initially equi-distant from the central line of the hammer element and the point about which pivotal motion between it and the rotor is permitted.

Preferably, in the case of a hammer bar, the lugs are so arranged that they are positioned within the side plates of the rotor.

This arrangement, which in itself is known, assists in giving a long life to the hammer bar as in use the hammer bars are found to wear at a rate which increases towards their extremities, with the result that the thickness of the metal in the vicinity of the point of connection of the lugs with the main portion of the hammer bar normally becomes decreased excessively thus necessitating the replacement of the hammer bars and the positioning of the lugs more remote from the ends of the hammer bars prolongs the time during which they may be used before the degree of weakening due to wear reaches the point of connection of the lugs with the main portion of the hammer bar.

The invention will be described further in de-

tail and by way of example with reference to the accompanying drawings, in which—

Figure 1 is a view in section of a swing hammer pulveriser comprising hammer bars extending from one side to the opposite side of the rotor;

Figure 2 is a similar view of a construction in which the rotor is provided with a plurality of hammer elements spaced apart in the direction of the width of the rotor;

Figure 3 being a view in elevation of the rotor with which such hammer or beater elements are associated.

Figure 4 is a view in end elevation;

Figure 5 a fragmentary view in front elevation;

Figure 6 a corresponding plan view of one construction of hammer bar for use in a machine of the general character indicated in Figure 1;

Figures 7 and 8 being fragmentary views in front elevation and in plan of an alternative construction.

Figures 9 and 10 are respectively views in side and front elevation of a hammer element designed for use in a machine of the character illustrated in Figures 2 and 3;

Figures 11, 12, 13 and 14 illustrate the position assumed by hammer bars or hammer elements in accordance with the invention, as the result of wear, while

In the case of the constructions illustrated in Figures 1 and 2, within a casing 1 furnished with a feed opening 2 and a discharge opening 3 at its lower portion there is arranged a rotor 4 which, in the case of the construction shown in Figure 1, comprises two end members 5 spaced apart along a shaft 6. By pivot pins 7, to these end plates there are secured hammer elements comprising lugs or arms 8 and a head or bar 9 which may be generally of the form illustrated in Figures 4 to 8.

In the case of the construction illustrated in Figure 2, a plurality of plates 10 are arranged at intervals on the shaft 11 in forming the rotor, and between the adjacent plates there are secured hammers 12 which may be of the general form indicated in Figures 9 and 10.

In the construction illustrated in Figure 2, there is provided a grid 13 and a breaker plate 14 the position of which is adapted to be adjusted to bring it closer to or move it away from the hammers, such adjustment being effected by the member 15 which is furnished with an inclined slot 16 engaging a pin 17, a handwheel 18 and spindle 19 being furnished for adjusting the position of the member 15.

The construction and arrangement of these elements, however, form no part of the invention.

As will be seen more particularly from Figures 4 to 9, the head 9 of the hammer element extends from a lug or arm 7 by which it is pivotally connected with the rotor and comprises an overhung portion directed away from one side or edge of the lug or arm only, the face of which portion remote from the lug or arm constituting normally the working face of the element.

The position of the arm in question initially is indicated in Figure 11, while in Figures 12 and 13 the effect of progressive wear on the working face of the hammer is shown.

As will be seen, the effect of wear is to cause the angle between the median line of the arm and a radial line extending through the axis of rotation of the lug or arm and the axis of rotation of the rotor progressively to decrease.

In Figure 14 the hammer bar is shown in the reversed position, the bar, for instance, worn to the extent indicated in Figure 3, being detached from the machine and rotated to bring what was the rear or right-hand face of the bar shown in Figure 3 into the left-hand or forward position so that the hammer may be used for a further period.

It will be noted from these figures that the result of wear on the face of the hammer bar does not result in an increase of the gap between the extremity of the bar and the adjacent surface 20 of the casing in which it operates.

I claim:

A hammer for disintegrators or pulverisers of the type in which the hammers are pivotally connected with a rotor in such manner that they are capable of free or unrestrained rotation about their pivotal connection and, as the result of wear upon their working faces, they become displaced under the action of centrifugal force about their pivotal connections to an increasing degree from the position they initially occupy when new, comprising a head, an arm portion extending therefrom by which the hammer may be pivotally connected to the rotor, the rear or face of the arm and rear face of the head being both flat and substantially in the plane in which the axis of pivotal motion of the hammer relative to the rotor lies, the other face of the head extending beyond the corresponding face or side of the arm portion to provide an overhung portion and exposing a flat working face which, throughout its width, is initially in a plane intersecting the first-mentioned plane at a point more remote from the outer or upper face of the hammer than is its axis of rotation, the said outer or upper face of the hammer being in the form of an arc struck from such axis.

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