United States Patent [19]

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[54] **IMPACT BREAKER**

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[51] **Int. Cl.** **B02c 13/20,** B02c 25/00

[58] **Field of Search**.....241/32, 138, 154, 241/186 R, 187, 189 R, 239, 275, 287, 289, 290

[56] **References Cited**

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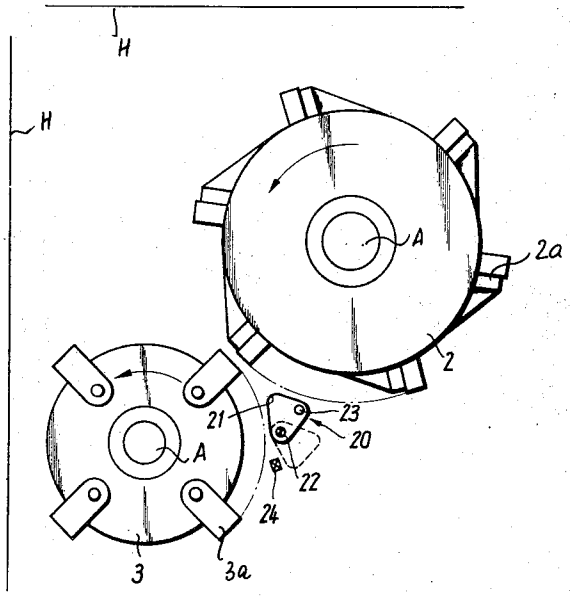
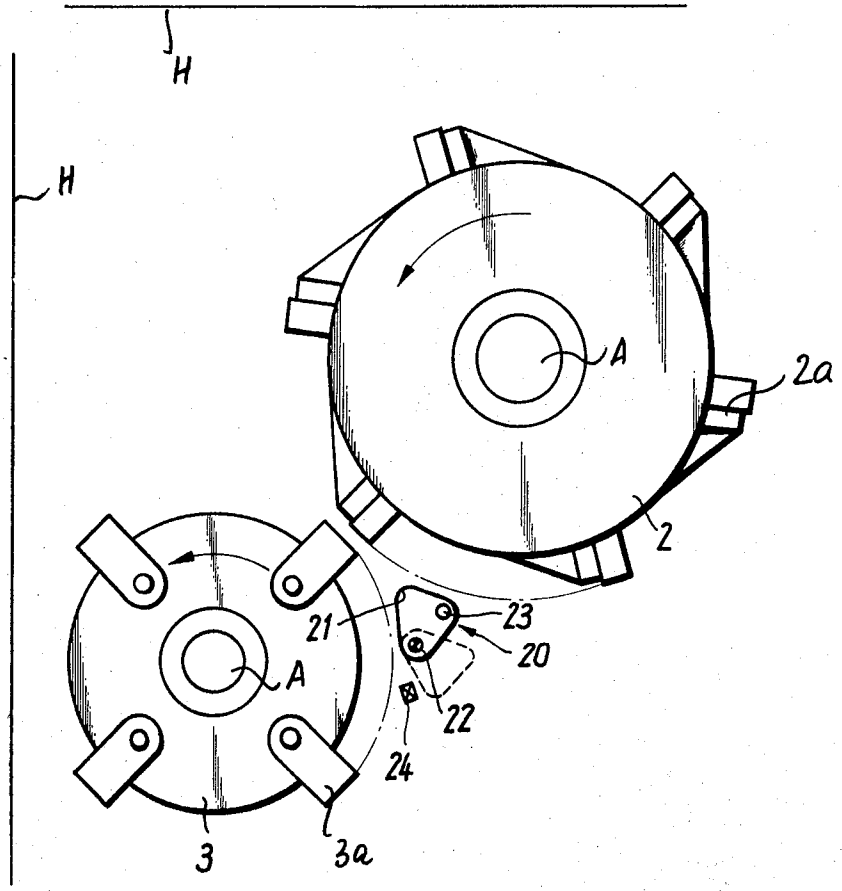
[57] **ABSTRACT**

A pair of impellers are mounted in a housing for rotation about substantially parallel horizontal axes on which one is located at a level below the other. The impellers have circumferences which define with one another a gap extending longitudinally of the axes of rotation and an anvil member of wedge-shaped cross-section is located at least in part in this gap at a side of an axial plane passing through these axes which is located downstream of this plane as seen with respect to the direction of rotation of the impellers. Material to be crushed which is carried along by the impellers into the gap thus impacts on the anvil member and becomes further crushed.

6 Claims, 1 Drawing Figure





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IMPACT BREAKER

BACKGROUND OF THE INVENTION

The present invention relates generally to impact breakers, and more particularly to a multiple impact breaker for crushing or comminuting hard materials such as stones or the like.

From my prior U.S. Pat. No. 3,447,758, a multiple impact breaker is known in which a pair of impeller members rotate in the same direction about horizontal axes which are located at two different levels in a housing. Impact plates are arranged in the housing and cooperate with the impellers in such a manner that the material to be crushed and impelled by the impellers against the impact plates will rebound from the latter back to the respective impeller so that this material will at least in part be passed several times in the respective impact plate and impeller before being moved in circumferential direction of the impeller.

The impellers are rotary members which are provided with striking blades arranged uniformly spaced from each other about the peripheral surface of the respective impeller member or rotor, with the latter being of substantially cylindrical configuration.

Most of the material admitted into the housing rebounds back and forth between the plates and the respective impellers in the desired manner. A relatively small amount of the material, however, is carried along circumferentially of the impellers, especially of the upper one, by the blades provided on the periphery thereon and is taken out of the area of effectiveness of the lower impeller. This means that these quantities of material will not be subjected to crushing or comminuting by the interaction between the lower impeller and the impact plates in the housing.

Evidently, this is undesirable because the total quantity of material admitted into the housing should undergo equal crushing or comminution.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to provide an improved impact breaker which is not possessed of this disadvantage.

More particularly, it is an object of the present invention to provide an improved impact breaker of the type under discussion wherein none of the material to be crushed can escape comminution by the lower impeller subsequent to the comminuting action which it has undergone from the upper impeller, that is from the one which it will contact initially on admittance into the impact breaker housing.

A concommitant object of the invention is to provide such an improved impact breaker which is simple in its construction and highly reliable.

In pursuance of the above objects, and others which will become apparent hereafter, one feature of the invention resides in an impact breaker which, briefly stated, comprises a housing having a pair of impellers mounted therein for rotation about substantially parallel horizontal axes one of which is located at a level higher than the other. The impellers have circumferences which define with one another a gap extending longitudinally of these axes, and according to the invention anvil means is located at least in part in this gap so that material to be crushed which is carried along by the upper impeller into the gap, will impact the anvil means to become crushed thereby, and will in turn be impacted in the gap by the lower impeller.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a highly diagrammatic and very simplified view illustrating the embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before entering into a detailed discussion of the FIGURE, it is pointed out that for specific details of the construction and operation of an impact breaker of the type under discussion, reference may be had to my aforementioned U.S. Pat. No. 3,447,758. In view of this, I have illustrated herein only those features and details of the novel impact breaker which are necessary for an understanding of the present invention. All other features have been omitted and can be ascertained by reference to my aforementioned patent.

With this in mind it will be seen that in the FIGURE, I have diagrammatically indicated a housing H in which there are mounted two impellers or rotors identified with reference numerals **2** and **3**, respectively. The construction of the impellers or rotors **2** and **3** may be identically the same as disclosed in my aforementioned patent. The rotors rotate about horizontal or substantially horizontal axes A which extend in parallelism with one another.

The arrows associated with the rotors indicate that they both rotate in one and the same direction, and reference numerals **2***a* and **3***a* respectively indicate impact members or blades provided on the circumferences of the rotors **2** and **3**.

It will be seen that the circumferences of the rotors **2** and **3** define with one another a substantially wedge-shaped gap at the lower side of an axial plane passing through the two axes A. According to the present invention, there is located anvil means in this gap in form of at least one elongated anvil member **20** of substantially wedge-shaped cross-section which extends in parallelism with the axes A and has side faces which are substantially tangential to the peripheries of the rotors **2** and **3**.

The drawing clearly shows that the anvil member **20** is so arranged that the rotor **2** will rotate past one side face and the edge **21** of the anvil member **20**, whereas the rotor **3** will rotate past the other side face and the same edge **21**. When material is admitted into the housing in the manner disclosed in my aforementioned U.S. patent, it will be contacted by the plates **2***a* of the rotor **2** and will rebound back and forth between the housing and the rotor to be partially crushed by this rebounding. Some of the material, however, will be swept along with the turning rotor by the blades **2***a* thereof, into the gap in which the anvil member **20** is mounted. Those portions of the material which are thusly swept along

are carried against the anvil member **20** in the gap and become crushed or deflected by the anvil member **20** within reach of the blades **3***a* of the lower rotor **3**. In any case, however, the material cannot escape additional comminution after it has undergone some comminution or crushing by the rotor **2**.

If particularly hard objects, for instance iron objects which occasionally may accidentally be admixed with the material to be crushed enter into the gap and are carried against the anvil member **20** but cannot be crushed thereby, they might become wedged between the anvil member **20** and the rotor **2** and thereby cause substantial damage to either or both of these elements. In order to avoid this, I currently prefer to mount the anvil member **20** not totally stationary, but for turning movement about an axis **22** which extends in parallelism with the axis A of the rotors **2** and **3**. Normally of course the anvil member **20** must be prevented from turning about the axis **22**, and for this purpose I provide bolts or similar members **23** which engage the anvil member **20** and a suitable stationary component for instance of the housing of a frame, and which normally prevent anvil member **20** from turning about the axis **22**. These bolts or similar elements **23** are, however, so constructed that when the force or pressure exerted upon the anvil member **20** in a sense attempting to turn it about the axis **22**, exceeds a preselected limit, the members **23** will yield and shear off, thus permitting the anvil member **20** to turn about the axis **22** and avoiding the possibility of damage to the anvil member **20** and/or rotor **2**. In order to avoid damage to the rotor **3** by the turning anvil member **20**, in other words to prevent the anvil member **20** from turning to such an extent that it could come into contact with the blades **3***a* of the rotor **3**, an abutment **24** is provided which then limits the turning movement about the axis **22**. In addition, the abutment **24** is also provided for the purpose of preventing the anvil member **20** from turning about the axis **22** to such an extent that it could block rotation of the rotor **3**.

It will be appreciated that various modifications of the illustrated exemplary embodiment are possible without in any sense departing from the spirit and intent of the present invention. Thus, the cross-sectional configuration of the anvil member **20** could for instance be different from what has been illustrated, just as it is possible to locate the anvil member **20** in a manner other than what has been illustrated.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in an impact breaker, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended

1. In an impact breaker, in combination, a housing; a pair of impellers mounted in said housing for rotation in a single direction about substantially parallel horizontal axes one of which is located at a level above the other and whose associated one impeller is the first to contact material admitted into the housing, said impellers having circumferences which define with one another a gap extending longitudinally of said axes; and at least one anvil member located in a lower part of said gap and having side faces one of which is located at a small distance from the circumference of said one impeller, and the other of which is located at a small distance from the other of said impellers, so that material to be crushed which is carried along by said one impeller into said gap in one direction, impacts said anvil member to become crushed thereby and is in turn impacted by said other impeller in direction opposite to said one direction.

2. In an impact breaker as defined in claim **1**, wherein said anvil member is of substantially wedge-shaped cross-section.

3. In an impact breaker as defined in claim **1**; further comprising mounting means mounting said anvil member for turning movement about an axis extending in parallelism with said horizontal axes.

4. In an impact breaker as defined in claim **3**; and further comprising retaining means for normally retaining said anvil member against any turning movement, but for yielding in a sense enabling turning movement to said predetermined extent in response to the exertion of predetermined pressure on said anvil means.

5. In an impact breaker as defined in claim **4**, said retaining means comprising at least one fixed retaining member engaging said anvil member and adapted to shear away when the latter is subjected to said predetermined pressure.

6. In an impact breaker as defined in claim **4**; and further comprising limiting means for limiting the turning movement of said anvil member from proceeding beyond a predetermined extent.

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