

United States Patent

[11] 3,540,667

[72] Inventor **Charles T. Parker**
Portland, Oregon
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[73] Assignee **Charles T. Parker Construction Co.**
Portland, Oregon
a corporation of Oregon

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Primary Examiner—Robert C. Riordon
Assistant Examiner—Donald G. Kelly
Attorney—Buckhorn, Blore, Klarquist and Sparkman

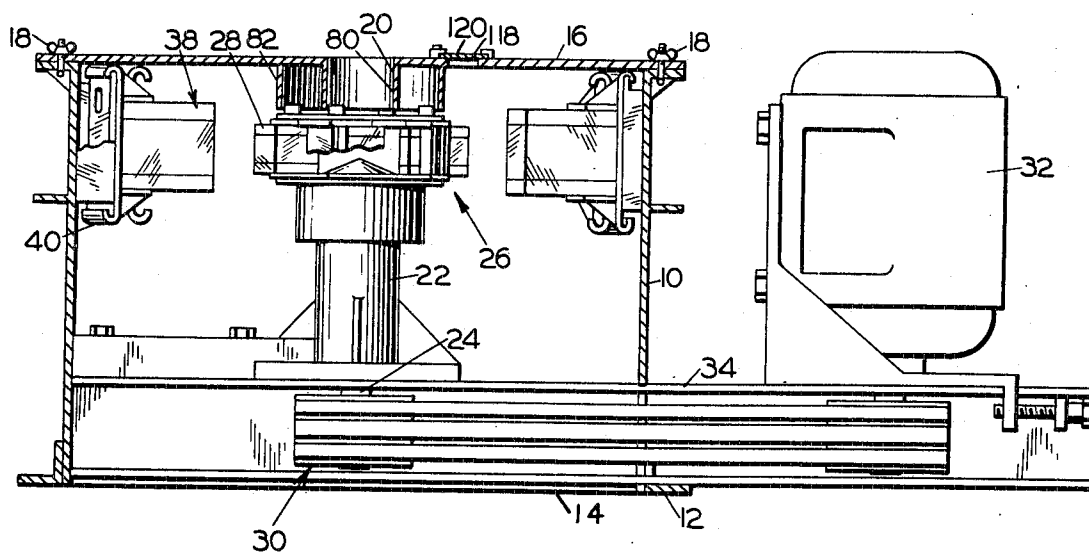
[54] IMPACT TYPE ROCK CRUSHER 21 Claims, 10 Drawing Figs.

[52] U.S. Cl. 241/275,
241/299
[51] Int. Cl. B02c 19/00
[50] Field of Search. 241/275,
299, 285, 291; 146/9, 253

[56] References Cited UNITED STATES PATENTS

3,000,579 9/1961 Bridgewater 241/275
3,058,679 10/1962 Adams 241/275

ABSTRACT: An impact rock crusher including an outer cylindrical shell which is closed by a cover having a central opening for the introduction of rock to be crushed. Impeller shoes are mounted on a rotary hub in the center of the shell, and the hub is mounted at the upper end of a vertical shaft which is driven through a belt drive by a motor mounted outside the shell. The impeller shoes fling rock fed into the center of the shell through the cover laterally against breaker plates lining the inside wall of the shell. The structure mounting the breaker plates is of a special construction which permits ready removal of the plates from the shell for replacement purposes by a simple lifting of a suspended portion of the breaker plate mounting from a fixed portion thereof, or reversal of the orientation of the plates for distribution of wear through reversal of the same portion of the mounting. The impeller shoes are mounted within the shell by a simple hook-type mounting. Both the breaker plates and the impeller shoes are designed to have especially long wearing qualities.



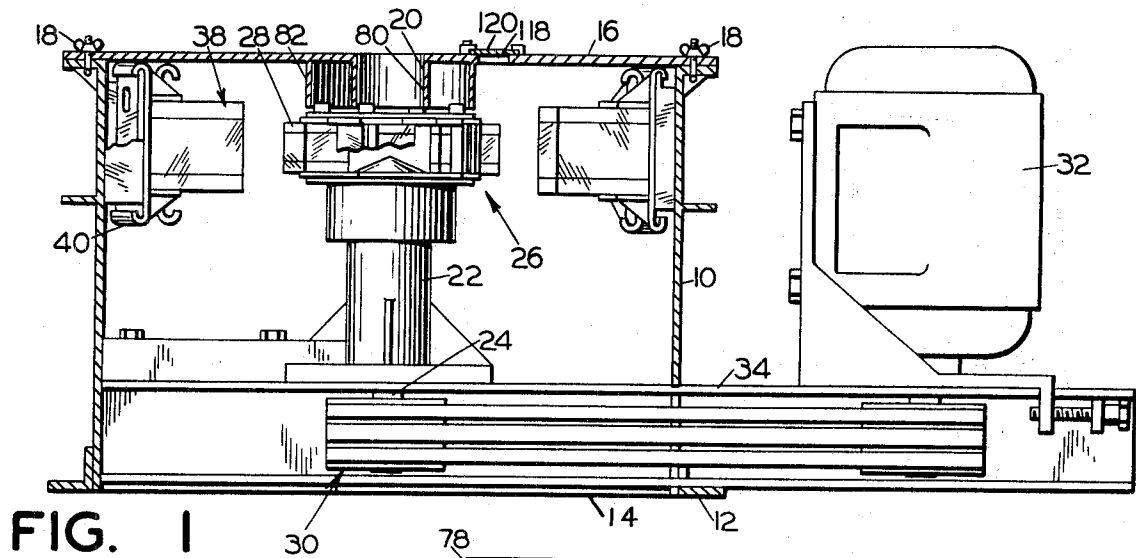


FIG. 1

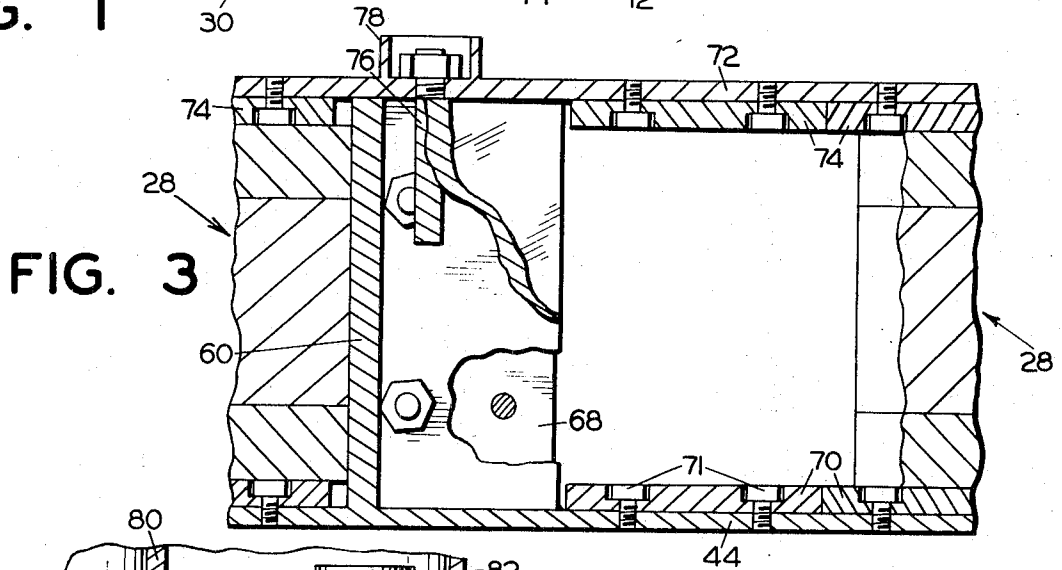


FIG. 3

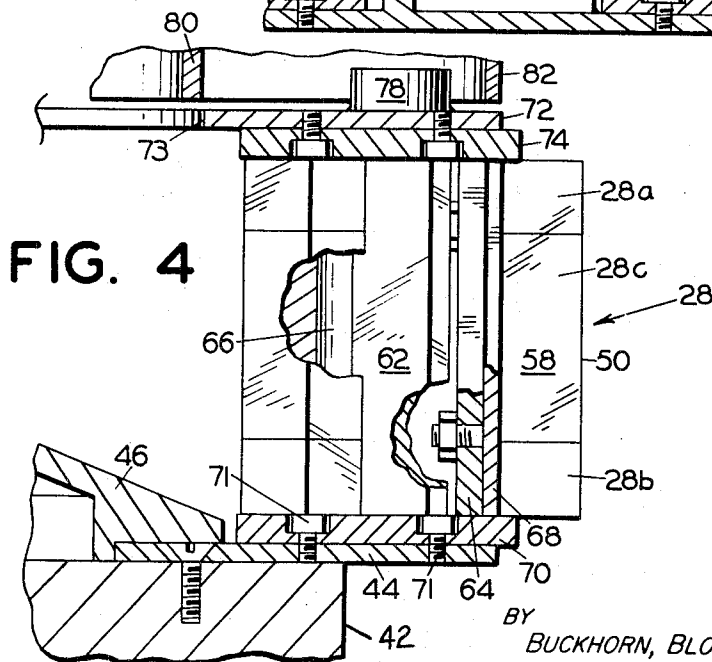


FIG. 4

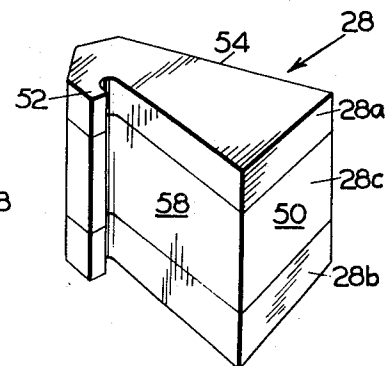
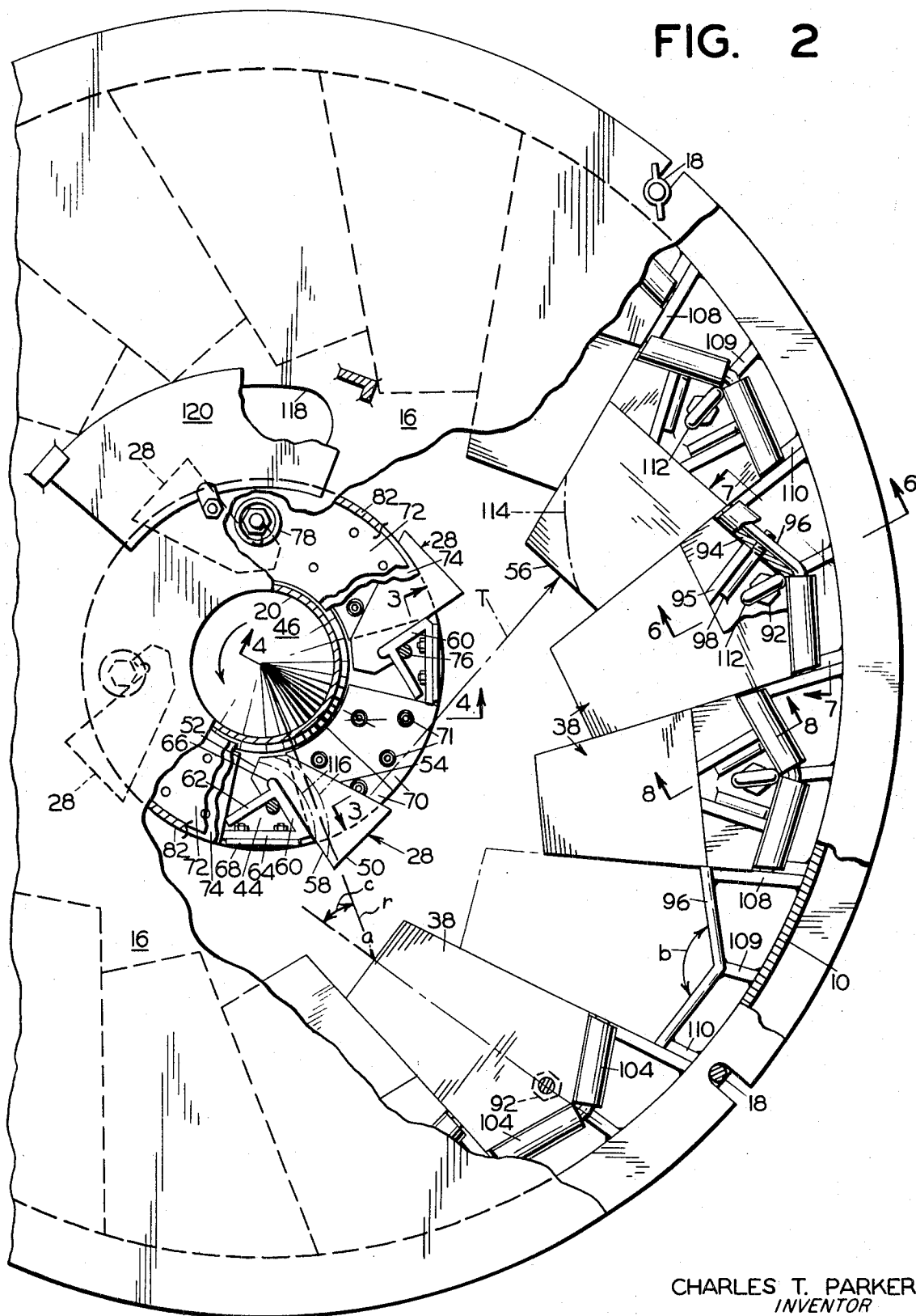


FIG. 5

CHARLES T. PARKER
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

FIG. 2



CHARLES T. PARKER
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

FIG. 7

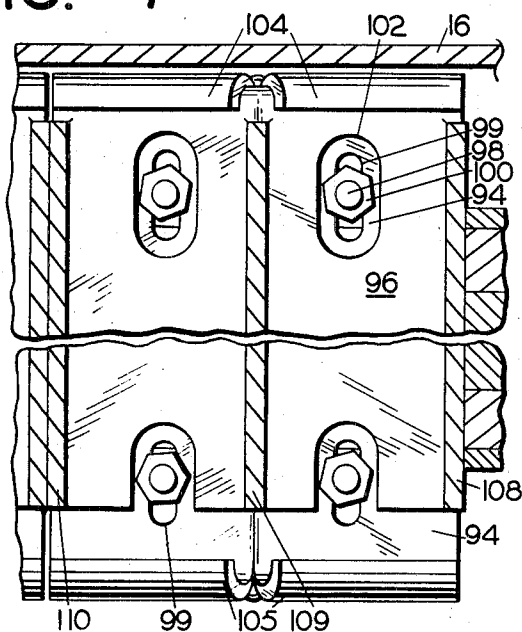


FIG. 6

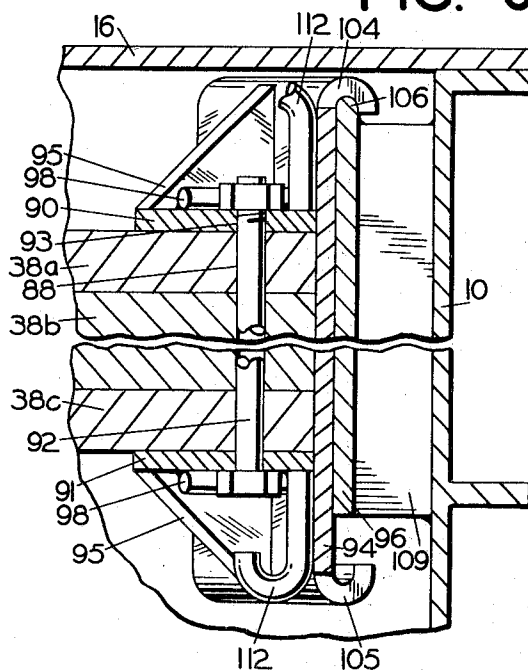
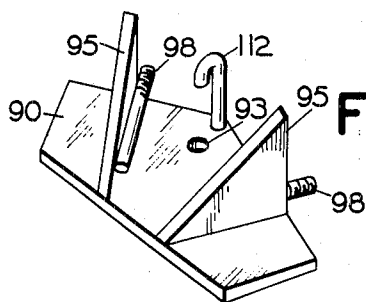


FIG. 9

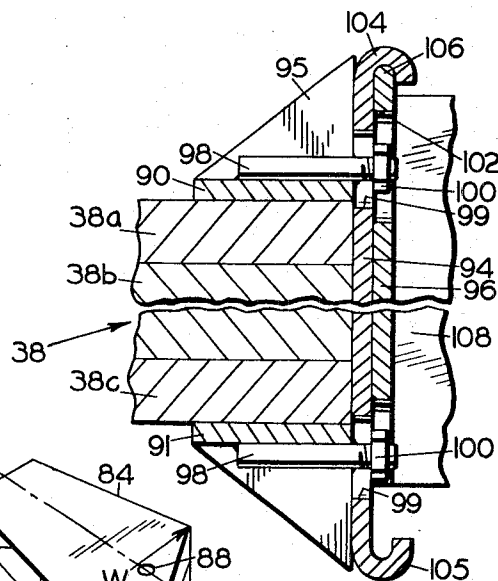


FIG. 8

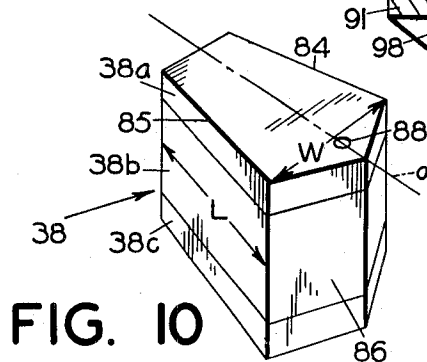


FIG. 10

CHARLES T. PARKER
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

IMPACT TYPE ROCK CRUSHER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to crushing apparatus and more particularly to a rotary impact-type crushing apparatus especially suited for crushing rock.

2. Description of the Prior Art

One of the problems with rotary impact crushing apparatus having a common prior-type plate and mounting is the rapid wearing out of breaker plates and consequent need for their frequent replacement. The problem is especially acute with the use of relatively hard or abrasive raw material which is common to certain sections of the country. In these sections, impact crushers have not been as widely used because of this problem. Rapid wearing out is caused both by the inherent inadequacy of the shape of such breaker plates and by their mountings, which features combine to provide such breaker plates with a low proportion of wearable metal as compared to the total amount of metal in the original plate. A fairly typical breaker plate and mounting therefor of the prior type is shown in Bridgewater U.S. Pat. No. 3,088,685, wherein the breaker plate has a rearward projection which is enlarged at its rear end so that a narrow neck of the projection can be slid into proper position within a vertical slot in a mounting plate fixed to the inner wall of the shell. Since the breaker plate is subject to severe punishment in use, fracturing of the rearward projection at its neck is a common occurrence which necessitates replacement of the plate.

Moreover, this type of breaker plate must often be discarded because of excessive wear with more than one-half of its original weight remaining, resulting in an appalling waste of metal.

Another problem with prior breaker plates of the aforementioned type is the difficulty encountered in replacing the same or reversing them to distribute the wear, and consequent excessive time required to accomplish either maintenance operation. Part of the problem is caused by rock dust which accumulates about and lodges in most internal parts, including the breaker plates and their mountings. With prior mountings as described, a large amount of time must be spent in digging through and clearing away the rock dust to dislodge the plates from their mounting. Then additional time must be spent in removing each worn plate from its mounting and in either reversing it or replacing it with another, as required.

Still other common problems with existing impact crushing apparatus are the rapid wearing out of impeller shoes and the difficulties in replacing the same because of their design and the manner in which they are mounted. Impeller shoes and impeller shoe mountings illustrative of the present state of the art are shown, for example in U.S. Pat. Nos. 3,149,793, 3,032,169, 3,000,579, 3,044,720 and 3,058,679.

SUMMARY OF THE INVENTION

In accordance with the invention, the problem of rapid wearing out of breaker plates is solved by an improved mounting for the breaker plate and an improved breaker plate configuration which enable both improved wear distribution and a greater proportion of the total metal of the breaker plate to be worn away before replacement is required. More specifically, the mounting itself is both vertically adjustable and reversible top to bottom for improved wear distribution, and a new mounting concept substantially eliminates premature plate breakage. Increased utilization of the total breaker plate metal is achieved by positioning a far greater proportion of the total mass of each plate forwardly of its mounting structure than rearwardly thereof than heretofore so that a far greater proportion of the total mass of the plates is subject to impact wear than heretofore.

Prior difficulties in changing and reversing breaker plates are reduced appreciably if not overcome completely by providing a reversible type mounting which eliminates the

need for reversing the plates in their mounting and by providing a hanger-type mounting which is simply suspended from the crusher shell. The mounting can be removed from and replaced in the apparatus by a simple vertical lifting and lowering movement, and can be reversed top to bottom on the shell in the same manner.

The problems of rapid wearing out of impeller shoes and difficulty in their replacement are at least partly solved by the provision of a laminated, or sectioned impeller shoe construction which enables replacement or rearrangement of individual sections for improved wear distribution. Such problems are also partly solved through the provision of a hanger hook-type impeller shoe and mounting which are quickly and readily separable from one another.

The foregoing improvements combine to carry out the primary objects of the invention, which are to provide an impact rock crusher (1) enabling longer continuous operation without maintenance, (2) requiring less maintenance time for replacement and readjustment of impeller shoes and breaker plates, and (3) enabling more complete use of impeller shoe and breaker plate metal, and therefore more economical operation than is possible with prior rotary impact crushers.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and advantages of the present invention will become more apparent from the following detailed description which proceeds with reference to the accompanying drawings, wherein:

FIG. 1 is an elevational view, mostly in section, incorporating features of the present invention;

FIG. 2 is a partial top plan view, partly in section, showing a portion of the interior of the apparatus of FIG. 1 on an enlarged scale;

FIG. 3 is a fragmentary vertical sectional view taken along the line 3-3 of FIG. 2 showing a portion of the impeller assembly on an enlarged scale;

FIG. 4 is a fragmentary view taken along the line 4-4 of FIG. 2, on approximately the same scale as FIG. 3, showing another portion of the impeller assembly;

FIG. 5 is perspective view of an impeller shoe as used in the apparatus;

FIG. 6 is a fragmentary vertical sectional view taken along the line 6-6 of FIG. 2 showing a portion of the breaker plate assembly and mounting therefor in accordance with the invention;

FIG. 7 is a partial vertical sectional view taken along the line 7-7 of FIG. 2, on approximately the same scale as FIG. 6, showing another portion of the impeller plate mounting;

FIG. 8 is a partial vertical sectional view taken along the line 8-8 of FIG. 2 on approximately the same scale as FIGS. 6 and 7 showing another portion of the breaker plate assembly and mounting therefor;

FIG. 9 is a perspective view of one of the two pressure plates of the mounting for a breaker plate assembly; and

FIG. 10 is a perspective view of one of the breaker plate assemblies used in the apparatus.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

General Assembly

With reference to the drawings, FIG. 1 discloses a rotary impact rock crusher having an upstanding cylindrical outer steel shell 10 having a flanged base 12 for mounting on an appropriate supporting structure and a generally open bottom 14. The top of the shell is normally closed when in use by a top cover 16 which is clamped in place by appropriate fasteners 18. The cover has a central opening 20 through which material to be crushed is fed into the interior of the shell.

Within the shell a vertical central column 22 serves as a bearing housing for supporting a rotatable central shaft 24 which mounts at its upper end an impeller assembly 26, in-

cluding several impeller shoes 28. Shaft 24 is driven by a pulley and belt arrangement 30 from a motor 32 mounted alongside the shell. A long narrow belt and pulley housing 34 extends from the motor through a lower end portion of the shell to separate the driving components of the apparatus from the rock crushing components.

A series of breaker plate assemblies 38 lines the inner wall of the shell at the same level as the impeller assembly to receive the impact of rocks thrown horizontally by the impeller shoes. The breaker plates are secured in mounting means 40, which are in turn secured to the inner wall of the shell.

In general, the crusher operates as follows. Rock fed through top opening 20 onto the rotating impeller unit is thrown laterally outwardly at high speed by the impeller shoes against the inner ends of the breaker plates, after which the resulting rock fragments fall through the bottom opening and usually onto a conveyor belt which carries the fragments either to a further processing station or to a suitable storage bin. Thus, it will be apparent that both the impeller shoes and breaker plates are subject to extreme wear by the abrasive action of the rock.

Impeller Assembly

Referring more particularly to FIGS. 2, 3 and 4, the impeller assembly includes a rotary hub 42 mounted on the upper end of shaft 24 and to which a disc 44 is fastened. A conical member 46 is mounted in the center of the top surface of the disc and hub. Cone 46 distributes rock to be crushed to a series of four impeller shoes 28 equally spaced about the outer portion of disc 44 outwardly of the cone. As viewed in plan in FIG. 2, each impeller shoe 28 is generally trapezoidal in shape and includes a relatively wide outer end 50 adjacent the periphery of the disc and a narrower hook-shaped end 52 adjacent cone 46. A leading edge, or face, portion 54 of each impeller shoe extends nonradially with respect to the axis of rotation of the impeller assembly at an angle such that rocks will be impelled by the shoes in trajectories T which are substantially normal to the inwardly directed, flat inner end faces 56 of breaker plates 38. A trailing edge face 58 of each impeller shoe abuts one face of an upright mounting plate 60 fixedly secured as by welding to disc 44 as shown, for example, in FIG. 3. Mounting plate 60 is supported in its upright position by inner and outer supporting plates 62, 64. An inner end portion 66 of mounting plate 60 projects inwardly of inner support plate 62 and serves as a hanger for receiving hooked end 52 of the associated impeller shoe. Outer support plate 64 also serves as a mounting base for the attachment of a side wear plate 68 which protects the impeller shoe mounting against rebounding rock fragments.

As shown most clearly in FIGS. 4 and 5, each impeller shoe 28 is made up of several, in this case three, vertically aligned horizontal sections, including a top section 28a, a bottom section 28b and a middle section 28c. The advantage of such an arrangement or any other arrangement of horizontally sectioned impeller shoes is that the individual sections can be rearranged to distribute wear or replaced when worn out without at the same time replacing other sections still having some remaining life.

Except for the areas which underlie the impeller mounting and support plates, the upper surface of disc 44 is covered with a series of wear plate segments 70, each of which is secured to the disc by three countersunk Allen head screws 71. These wear plates protect the upper surface of the disc from wear and are replaced when worn out to obviate the need for replacing the disc itself. With the impeller shoes mounted on disc 44, the top of the impeller assembly is covered by a plate 72 having a central opening 73 aligned vertically with the opening 20 of shell cover 16. The undersurface of cover 72 is protected by a series of replaceable upper wear plate segments 74 similar to lower segments 70. Impeller cover 72 is fastened to the impeller disc by a series of bolts 76,

the upper ends of which are recessed within sockets formed by rings 78 for protection against wear.

Top cover 16 has an inner collar 80 which defines a vertical passage coaxial with opening 20 for guiding rocks fed into the crusher onto cone 46. Inner collar 80 extends downwardly inside the shell and terminates just above impeller plate 72 as shown in FIGS. 1 and 4. The top cover also includes an outer collar 82 which is concentric with the inner collar and which extends downwardly therefrom inside the shell in approximate vertical alignment with the outer periphery of impeller plate 72. Outer collar 82 protects inner collar 80 and the upper surface of impeller plate 72 from damage and wear from rebounding rock fragments while the crusher is in operation.

Breaker Plate Assembly and Mounting

Now referring especially to FIGS. 2 and 10, each breaker plate assembly 38 is made up of several, in this instance three, vertically stacked breaker plates or sections, including a top section 38a, a middle section 38b and bottom section 38c. This sectioned construction permits rearrangement and separate replacement of the different sections for maximum utilization of the metal of the plate assembly. Each breaker plate, as viewed in plan, has a considerably greater length L than maximum width W in its original condition. The opposite side surfaces 84, 85 of each plate taper inwardly from the point of maximum width W at an angular outer end face 86 toward the previously mentioned inner end face 56. Each section of the breaker plate has a bolt hole 88 extending therethrough from its flat top surface to its flat bottom surface for mounting the plates in a vertically stacked manner explained hereinafter.

The mounting means 40 for mounting the breaker plates is detailed in FIGS. 2 and 6 through 9. The mounting means for each breaker plate includes connector plate means comprising a pair of identical pressure plates including a top pressure plate 90 and a bottom pressure plate 91, and a hanger or mounting plate 94 suspended from a support bracket having support plate 96 providing a support means for the mounting plate. The three breaker plate sections 38a, 38b and 38c are mounted in compression between the pair of pressure plates by a single bolt-type threaded fastener means 92 which extends through holes 88 in the plate sections and aligned holes 93 in the pair of pressure plates. Thus the pressure plates and bolt serve as connector means for removably connecting the breaker plates to the mounting means under compression. Each pressure plate in turn is secured to the mounting or hanger plate 94 in a position normal to the face of the hanger plate by a pair of bolts 98 welded to the pressure plate. The bolts extend through vertically elongated slots 99 in the hanger plate and mate with nuts 100 within enlarged openings 102 in support plate 96. A pair of upright gussets 95 on each pressure plate abut against the inner face of hanger plate 94 to maintain the pressure plates substantially normal to such inner face when fastened to the hanger plate. Slots 99 permit a certain amount of vertical adjustability of the pressure plates and thus the breaker plate therebetween, relative to the hanger plate so that middle plate section 38b can be aligned horizontally in the path of the majority of rocks impelled outwardly by the impeller shoes.

Hanger plate 94 curls rearwardly at its upper and lower ends to form hook 104, 105, defining hanger-type upper and lower suspension means, the upper one of which hooks over an upward extension 106 of the backing plate so that the hanger plate 94 and connected pressure plates and breaker plate are suspended therefrom. Support plate 96 is rigidly fixed to the inner wall 107 of shell 10 by three strut plates 108, 109 and 110, as shown most clearly in FIG. 2.

Referring to FIG. 2, one of the breaker plates and its supporting pressure plates and hanger plate have been removed to reveal the top of a backing plate 96, which is angular in horizontal section so as to define an interior angle b which is less than 180° and somewhat greater than 90° as measured

between the inwardly facing surfaces thereof. Referring to an adjacent complete breaker plate and its mounting, hanger plate 94 in horizontal section defines an angle similar to angle *b* so that the hanger plate nests within the angle of the backing plate. Similarly, outer end face 86 of each breaker plate, as shown in FIG. 10, is angular, and more specifically defines a pair of outer end surfaces 86 intersecting at an angle which complements the interior angle of the associated hanger plate so that each breaker plate nests within the angle of the corresponding hanger plate and is thereby maintained in a predetermined fixed orientation with respect to the impeller shoes through the use of the single mounting bolt 92. This orientation is dependent on the orientation of the fixed backing plates 96 and is such that the flat inner end faces 56 of the breaker plates will be maintained in planes substantially normal to the various trajectories *T* of rocks impelled outwardly by the impeller shoes. Thus the longitudinal axis *a* of each plate extends nonradially and forms a constant angle *c* with a radial line *r* at the inner face of each plate. As seen in FIG. 2, each breaker plate 38 is mounted in a side-by-side abutting relationship with respect to circumferentially adjacent breaker plates so that, in effect, the entire inside wall of shell 10 is lined continuously with breaker plates at the level of the impeller shoes.

Referring to one breaker plate and its mounting having the top pressure plate removed in the lower portion of FIG. 2, it will be noted that both the breaker plates and the hanger plate are symmetrical with respect to the longitudinal axis *a* of the breaker plate. With reference to FIGS. 6 and 8, the upper and lower portions of each hanger plate 94 are also symmetrical with respect to a transverse axis thereof.

When hanger plate 94 is suspended by its upper hooked suspension portion 104 from support plate 96, its lower hooked suspension portion 105 extends well below the lower end of the backing plate. This permits ready removal of the hanger plate and connected breaker and pressure plates from the backing plate by a simple lifting movement of the hanger plate while pushing its lower hooked portion 105 inwardly slightly toward the center of the shell to avoid the lower edge of the backing plate. Removal of each hanger plate from its associated backing plate is facilitated by a hook-type lifting means 112 which forms part of the upper pressure plate 90. Lower pressure plate 91 has a similar hook. The lower hooked suspension portion 105 of the hanger plate and lifting hook 112 on the lower pressure plate 91 permit reversal of the hanger plate top to bottom on the backing plate so that the breaker plate sections between each pair of pressure plates can be reversed top to bottom and side to side without removing them from between the pressure plates and without removing the pressure plates from the hanger plate.

The reversal feature of the hanger plates facilitates distribution of wear along the entire vertical length of each breaker plate as well as on both sides of the longitudinal axis *a* of each breaker plate without the necessity of reshuffling the sections of each breaker plate or reversing such sections within their mounting. The simplified mounting of the hanger plates and their symmetry also enables reversal of such plate and its associated breaker plates on the backing plate in a very short length of time with a minimum of effort. Replacement of plate sections is also simplified because it can be done after the hanger plate has been lifted from the shell.

With the present arrangement the lifting hook of an overhead crane can be hooked directly to lifting hook 112 of the top pressure plate to lift the entire hanger plate assembly, including the connected breaker plate sections and pressure plates, from the shell whereafter the lifting hook of the crane can be hooked to lifting hook 112 of the lower pressure plate and then used to lower the assembly back into the shell with the lower hooked suspension portion 105 of the hanger plate hooked on upper extension 106 of the fixed support or backing plate 96 to reverse the entire assembly top to bottom within the shell.

The foregoing described reversal of the breaker plates from side to side is desirable because of the normal wear pattern which results from the use of wear plates of the disclosed configuration. Specifically, with the breaker plates and impeller shoes arranged as in FIG. 2, the exposed inner corner of each breaker plate at inner end face 56 tends to wear away before the protected opposite inner corner in a pattern indicated by dashed line 114. Thus the crusher is operated with greater effectiveness and the breaker plates have a much longer useful life if they are periodically reversed to expose to wear their originally unexposed inner corners. In this manner, the entire portion of each breaker plate section that protrudes inwardly from the innermost edge of its associated pressure plates can be worn away before it is necessary to replace such section. In this respect approximately two-thirds of the overall length *L* of each illustrated breaker plate extends inwardly beyond the innermost edge of its pressure plates. This feature permits the wearing away of approximately two-thirds of the original weight of each breaker plate section before replacement is necessary. This should be compared to a commonly used prior type of breaker plate which requires replacement with the loss through wear of considerably less than one-half of its original weight. For example, with such prior art breaker plates originally weighing 65 pounds, it was not uncommon to discard such plates as worn out when still weighing 40 to 47 pounds. With the illustrated breaker plates having the same original weight, it is expected that all but from 5 to 20 pounds of the original weight will be lost before the plate need be discarded, depending on the relative lengths of the breaker plates and corresponding pressure plates.

The impeller shoes are also subject to rapid wear and gradually wear back from their leading corners in a pattern generally indicated by the dashed lines 116 and 116' of FIG. 2. With such a wear pattern and the illustrated shoe configuration, all but a very small sliver of the original impeller shoe can be worn away before replacement of the shoe is necessary. Thus by far the greatest percentage of the original weight of each breaker shoe section can be worn away and only a very minor percentage of the original weight need be discarded. In comparison, commonly used prior impeller shoes were similar in design and mounting to the previously described prior breaker plates and had the same disadvantages with respect to the small percentage of their original weight used up before the shoes had to be discarded.

As an example of the wearability of the illustrated impeller plates as compared with the above-mentioned prior impeller plates, the prior plates had to be replaced after an average use of approximately 3 eight-hour shifts, whereas the illustrated plates having approximately the same initial weight were used an average of 12 such shifts before replacement. These results were achieved under actual operating conditions in a crusher rotating at speeds up to 1200 r.p.m.

The initial distance between the outermost corner of the impeller shoes and the innermost corner of the breaker plates will preferably vary anywhere from about 4 inches to 12 inches in a typical installation, depending upon the original diameter of the shell. Of course this distance will progressively increase as the breaker plates and impeller shoes wear back from their original positions as shown in FIG. 2.

Shell cover 16 is provided with an inspection opening 118 having a removable cover 120 and through which the condition of the impeller shoes and breaker plates can be observed without the necessity of removing the shell cover.

Having illustrated and described a preferred embodiment of the invention, it should be apparent to those having skill in the art that the same permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the following claims.

I claim:

1. In an impact rock crusher having an upright cylindrical shell and a central rotary impeller means within said shell for impelling rocks outwardly toward an inner wall of said shell, breaker means for breaking said rocks into fragments, comprising:

a series of disposable breaker plates;

breaker plate mounting means for removably mounting said breaker plates on the inner wall of said shell in line with the trajectory of rocks impelled outwardly by said impeller means;

support bracket means fixed to said wall and defining a top edge;

said mounting means including connector plate means for removably connecting a breaker plate to said mounting means under compression; and

said mounting means including hanger-type suspension means for hanging said mounting means from said top edge of said wall support bracket means on the inner wall of said shell in a manner permitting removal of said mounting means and breaker plate as a unit from said inner wall by application of a simple lifting force to said mounting means.

2. Apparatus according to claim 1 wherein said mounting means includes a first hanger-type suspension portion on an upper portion of said mounting means and a second hanger-type suspension portion on a lower portion of said mounting means in a manner so that said mounting means and breaker plate can be reversed top to bottom as a unit in hanging relationship on said wall bracket means.

3. Apparatus according to claim 1 characterized by said mounting means including a mounting plate, said mounting plate being adapted for mounting in an upright position on the inner wall of said shell by said suspension means, and said connector plate means comprise a pair of upper and lower pressure plates extending inwardly from and normal to said mounting plate, means for securing said pressure plates to an inwardly directed inner face of said mounting plate including means for adjusting said pressure plates vertically relative to said mounting plate and means for securing under compression a breaker plate between said pair of pressure plates.

4. Apparatus according to claim 1 wherein said bracket means includes a generally vertically disposed support plate means fixed to said inner wall, said mounting means comprising generally vertically disposed mounting plate means having a greater length than said support plate means, said hanger-type suspension means including an upper hook portion normally extending over an upper edge portion of said support plate means from an upper end portion of said mounting plate means, said hanger-type suspension means including a lower hooklike portion extending from a lower end portion of said mounting plate means and adapted to extend over said upper edge portion of said support plate means when said mounting plate means is reversed top to bottom to reverse said breaker plates on said inner wall.

5. Apparatus according to claim 4 wherein said connector plate means includes a pair of vertically spaced-apart pressure plates extending generally horizontally from an inwardly directed face of said mounting plate means toward said impeller means, means for adjusting said pair of pressure plates vertically on said mounting plate means, and fastener means for removably securing a breaker plate under compression between said pair of pressure plates.

6. Apparatus according to claim 3 wherein each of said pair of pressure plates includes a hook-type lifting means for facilitating reversal of said mounting means as a unit, including said mounting plate and said pair of pressure plates, on the inner wall of said shell.

7. Apparatus according to claim 3 wherein said mounting plate is angular as viewed in horizontal sections therethrough so that the inner face of said mounting plate defines an angle of less than 180°, said pressure plates having radially outwardly directed end edges defining complementary angles to that of said mounting plate so that said edges nest in abutment with the inner face of said mounting plate.

8. Apparatus according to claim 3 wherein said means for adjusting said pressure plates vertically includes a vertically elongated slot through said mounting plate and threaded fastening means extending horizontally rearwardly from said pressure plate for insertion through said slot.

9. Apparatus according to claim 8 wherein said support bracket means is spaced from the inner wall of said shell, said suspension means including a hook means on said mounting plate for suspending said mounting plate from said support bracket, said support bracket having an opening therethrough normally in alignment with said slot through said mounting plate for receiving the outer terminus of said threaded fastening means.

10. Apparatus according to claim 7, said breaker plate having an inner end facing inwardly of said shell and an outer end, said outer end being angular so as to complement the angulation of the inner face of said mounting plate, said breaker plate when mounted with its outer end in abutment against the inner face of said mounting plate extending inwardly of said shell beyond the innermost edges of said pressure plates.

11. Apparatus according to claim 10 wherein the length of said breaker plate when new as measured from the outer end to the inner end thereof is greater than the width thereof, and wherein said breaker plate is symmetrical with respect to the longitudinal centerline of said plate, said breaker plate having a bolt hole therethrough adjacent the outer end thereof in vertical alignment with a corresponding bolt hole through each of said pair of pressure plates, the inner end of said breaker plate defining when new a single flat surface.

12. Apparatus according to claim 11 wherein each breaker plate as assembled between a pair of said pressure plates is composed of a plurality of separate vertically aligned horizontally disposed plate sections:

13. Apparatus according to claim 12 wherein each breaker plate is composed of at least three of said plate sections including a top and bottom section and a central section, said central section being of greater thickness than each of said top and bottom sections.

14. Apparatus according to claim 3 wherein each pressure plate includes a gusset portion extending generally normal to the general horizontal plane of said pressure plate for maintaining said pressure plate normal to the abutting inner face of said mounting plate in all positions of vertical adjustment of said pressure plate.

15. Apparatus according to claim 3 wherein said mounting plate, including the suspension means thereof, is symmetrical with respect to both a horizontal and a vertical centerline thereof so that when reversed top to bottom the reversed mounting plate has the same orientation with respect to the remainder of said apparatus as said mounting plate had in its initial position.

16. Apparatus according to claim 11 wherein said breaker plates are arranged in a plurality of breaker plate assemblies each comprising at least two breaker plates, said assemblies being arranged in circumferential side-by-side abutting relationship about the inner wall of said shell, each assembly having an inwardly directed flat inner end face directed generally nonradially with respect to the center of the shell, the longitudinal axes of said breaker plate assemblies extending at a constant angle relative to an imaginary radial line extending from the center of said shell and intersecting each said longitudinal axis at the inner face of each breaker plate assembly.

17. Apparatus according to claim 2 wherein said plate mounting means includes a first lifting means extending upwardly from an upper portion of said mounting means and a second lifting means extending downwardly from a lower portion of said mounting means for facilitating removal of said mounting means from said inner wall when said mounting means is in either its upright or its reverse orientation on said wall.

18. Apparatus according to claim 1 wherein said connector plate means includes upper and lower pressure plates and fastener means for confining at least one of said breaker plates in compression therebetween.

19. Apparatus according to claim 18 including means for adjusting said upper and lower pressure plates vertically with respect to said breaker means for adjusting the vertical level of said breaker plate with respect to said inner wall.

20. In an impact rock crusher having an upright cylindrical shell and a central rotary impeller means within said shell for impelling rocks outwardly toward an inner wall of said shell, a mounting arrangement for mounting breaker plates along an inner wall of said shell comprising:

support bracket means fixed to said inner wall;

breaker plate mounting means;

said mounting means including means for removably connecting a breaker plate to said mounting means under compression; and

said mounting means including hanger-type suspension

means for hanging said mounting means from said support bracket means in a manner permitting removal of said mounting means from said support by application of a lifting force to said mounting means.

21. A mounting arrangement according to claim 20 wherein said hanger-type suspension means includes an upper suspension portion and a lower suspension portion positioned for reversing said mounting means top to bottom on said support means.

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