

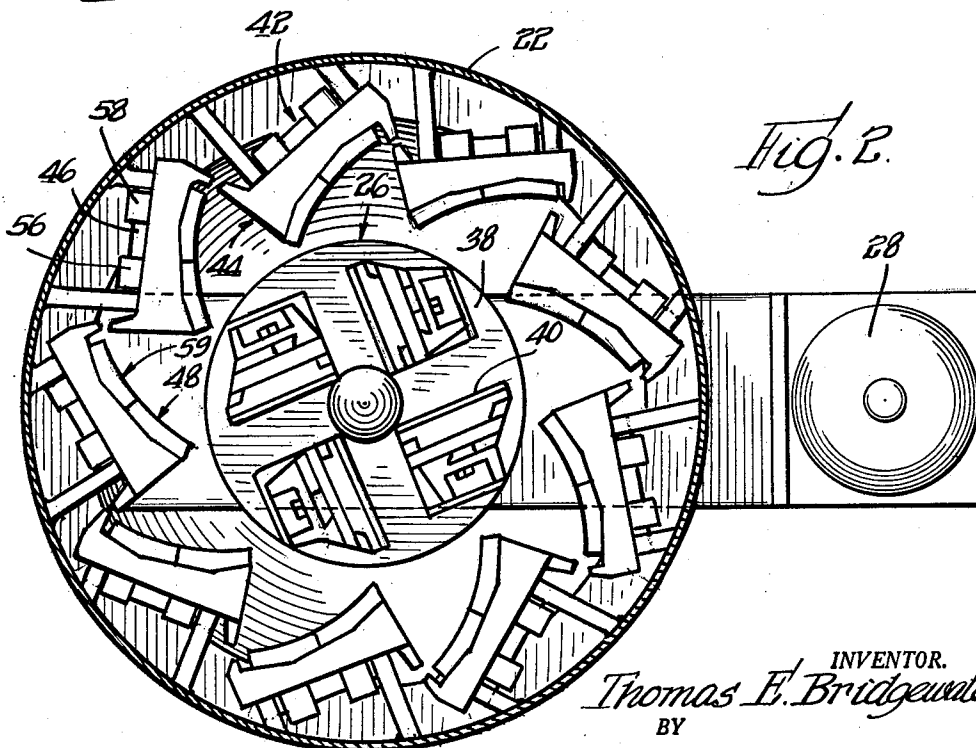
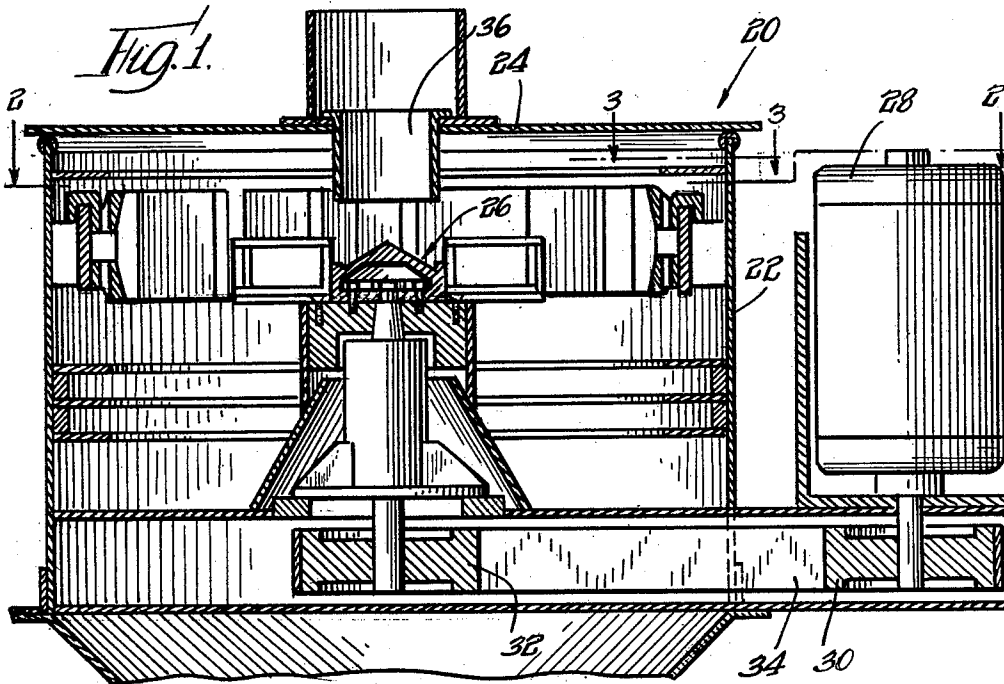
June 11, 1963

T. E. BRIDGEWATER
BREAKER PLATE STRUCTURE

3,093,329

Filed June 28, 1961

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

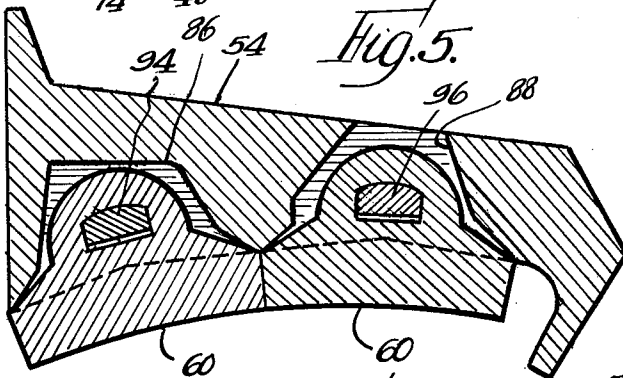
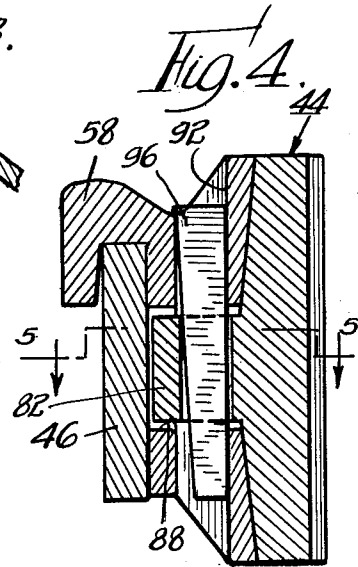
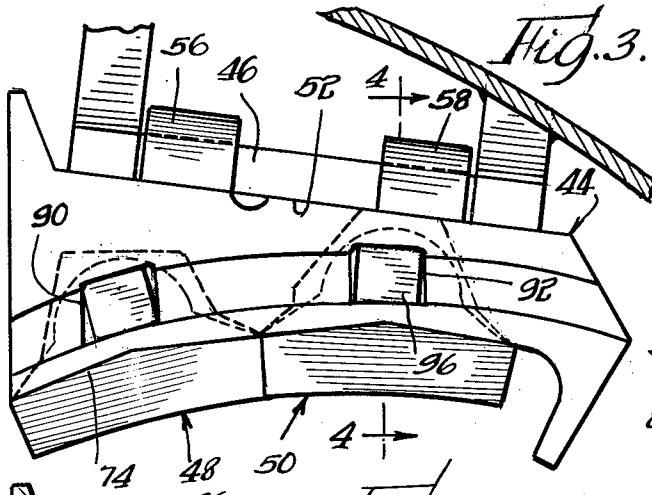
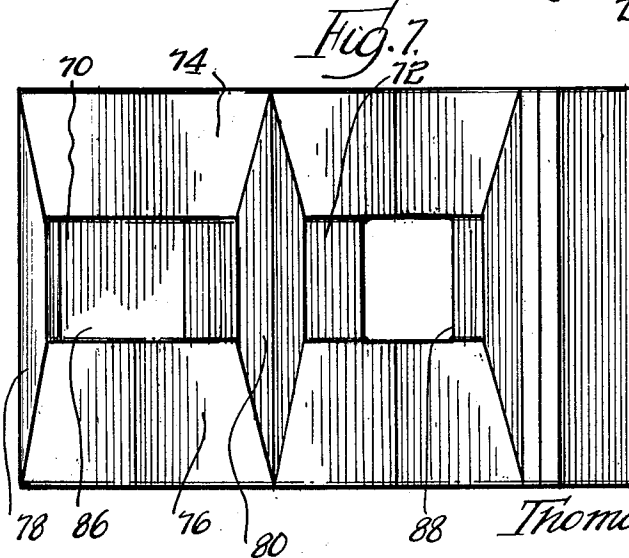
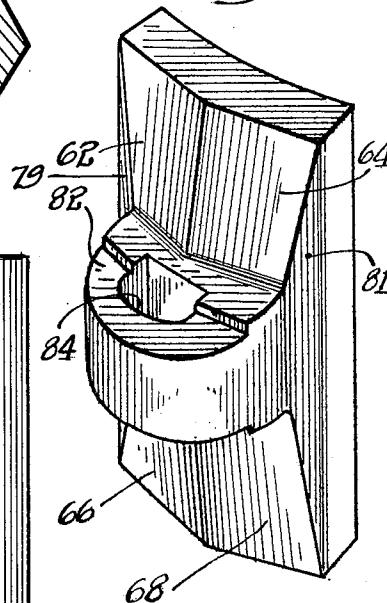


Fig. 6.



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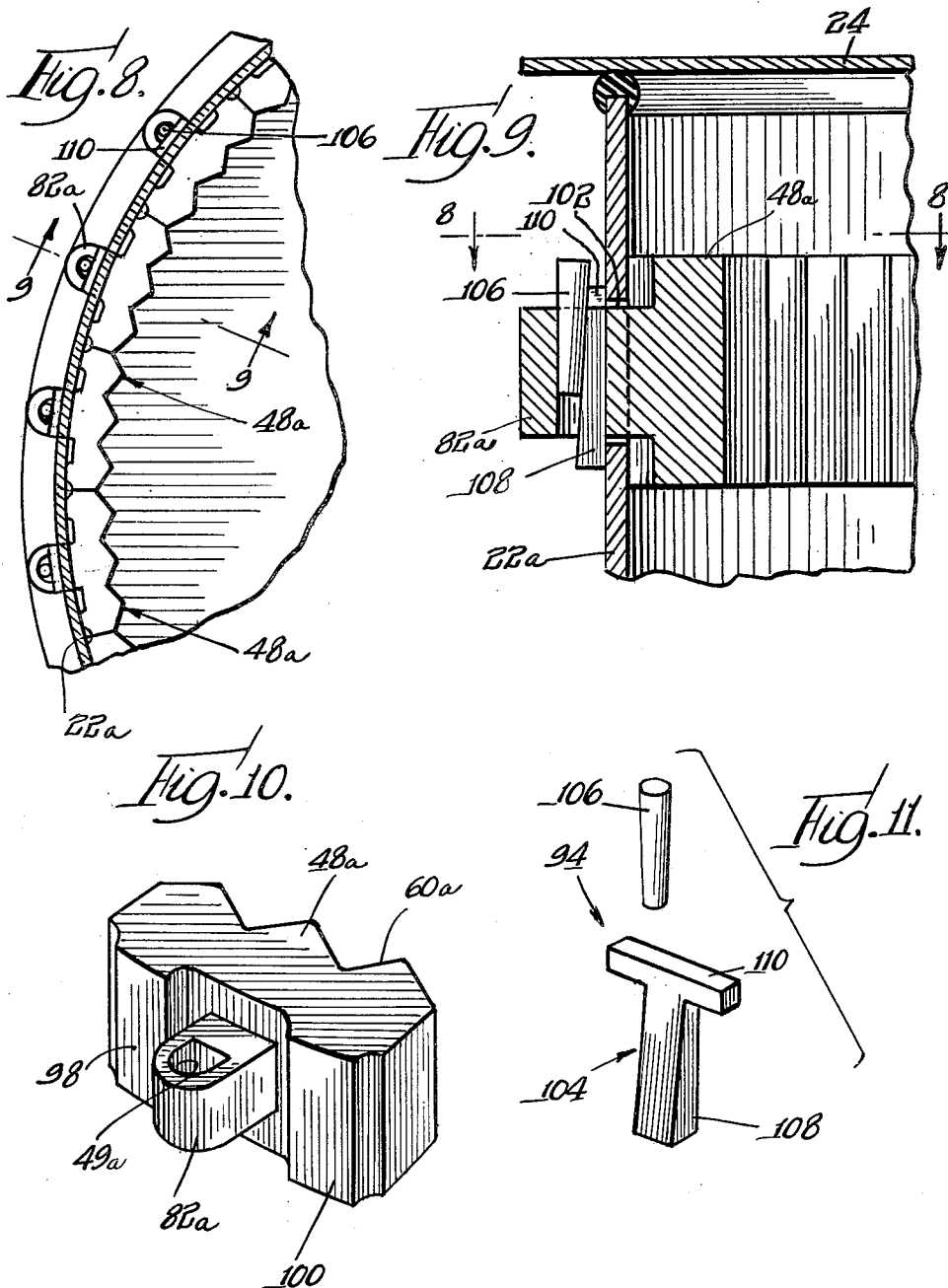
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Filed June 28, 1961

3 Sheets-Sheet 3



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BREAKER PLATE STRUCTURE

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Filed June 28, 1961, Ser. No. 120,219

10 Claims. (Cl. 241-275)

The present invention relates to a novel crushing apparatus, and more particularly to a novel impact type crushing apparatus in which material to be processed is projected laterally outwardly from a central impeller and impinged against breaker plate means surrounding the rotatable impeller.

An important object of the present invention is to provide a novel breaker plate structure and means for mounting elements thereof whereby such elements may be easily and quickly and therefore economically installed and removed and replaced.

A further object of the present invention is to provide a novel breaker plate structure constructed so that elements thereof against which material to be processed is directly impinged are detachably mounted and at the same time firmly supported so as to minimize any possibility of breakage thereof.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawing wherein:

FIG. 1 is a partial vertical sectional view showing a crushing apparatus incorporating features of the present invention;

FIG. 2 is a sectional view taken generally along line 2-2 in FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken generally along line 3-3 in FIG. 1;

FIG. 4 is a partial sectional view taken generally along line 4-4 in FIG. 3;

FIG. 5 is a sectional view taken along line 5-5 in FIG. 4;

FIG. 6 is a perspective view showing an element of the breaker plate structure incorporating features of the present invention;

FIG. 7 is a front elevational view of another element of the breaker plate structure incorporating features of the present invention;

FIG. 8 is a fragmentary horizontal sectional view taken generally along line 8-8 in FIG. 9 and showing a modified form of the present invention;

FIG. 9 is an enlarged fragmentary sectional view taken generally along line 9-9 in FIG. 8;

FIG. 10 is a perspective view showing an element of the breaker plate structure of the assembly shown in FIGS. 8 and 9; and

FIG. 11 is an exploded perspective view showing additional elements of the assembly of FIGS. 8 and 9.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, a crushing apparatus 20 incorporating features of the present invention is shown in FIGS. 1 and 2. In general, the apparatus comprises an upstanding cylindrical housing 22 having a cover structure 24 removably disposed thereon. An impeller 26 is centrally disposed within the housing 22 and mounted for rotation about a vertical axis, which impeller is adapted to be driven by means of a suitable motor 28 or the like, and transmission means comprising pulleys 30 and 32 and an endless belt 34.

A central opening 36 is provided in the cover 24 over the impeller 26 through which material to be processed may be introduced. Such material falls on to the impeller 26 which includes a horizontally disposed plate 38 and a plurality of blade means 40 which are adapted to engage and accelerate the material and project the material lat-

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erally from the impeller at high speeds. Breaker plate means including a plurality of units 42 is disposed circumferentially around the impeller and within the housing 22, and the material is projected against the breaker plate means so as to be crushed upon impact therewith.

In accordance with features of the present invention, each of the breaker plate units 42 is constructed so as to facilitate assembly and disassembly and so as to promote a long useful life and minimize any possibility of injury thereto. In this embodiment each of the units 42 comprises a body member 44 adapted to be connected with a bracket 46, and a plurality of wear elements 48 and 50 adapted to be detachably connected with the body member 44.

In this embodiment, the bracket member 46 which is suitably rigidly supported with respect to the housing member 22 presents an horizontally elongated flat vertical surface 52 facing inwardly and against which a flat rearwardly facing surface 54 of the body member 44 is adapted to abut as shown best in FIGS. 3-5 so that the body member 44 is firmly supported. The body member 44 is provided with means so that it is quickly detachably connectable with respect to the bracket member 46, and more specifically, this means comprises a pair of hook elements 56 and 58 projecting rearwardly from an upper margin of the body member 54 and adapted to engage over the upper margin of the bracket member 46.

The breaker plate members 48 and 50 are substantially identical and respectively include substantially vertically disposed and horizontally curved impact surfaces 60 preferably arranged so as to be substantially perpendicular to trajectories of particles of the material being processed and projected from the impeller against the surfaces. The members 48 and 50 are preferably made from a metal alloy having high abrasion resistance characteristics and these members are formed so that they substantially cover the body member 44 so as to protect it from abrasion by the material being processed. On the other hand, the body member 44 is preferably formed from a material having high strength and impact resistance characteristics so as to withstand the shocks created when the material being processed is projected against the breaker plate members 48 and 50. Furthermore, the breaker plate members and the body member 44 are formed so that the breaker plate members are firmly supported so as to resist injury thereto as a result of impact loads.

As shown in FIGS. 3-6, each of the breaker plate members 48 and 50 includes first relatively inclined rear surface sections 62 and 64 adjacent upper ends thereof and second relatively inclined rear surface sections 66 and 68 adjacent a lower end thereof. The surface sections 62 and 64 are disposed so as to have a generally V-shaped horizontal cross section, and in addition, the surface sections are inclined downwardly and rearwardly with respect to the vertical front face 60 as shown best in FIGS. 4 and 6. The surface sections 66 and 68 are similarly disposed so as to present a generally V-shaped horizontal cross section, but these surface sections are inclined upwardly and rearwardly with respect to the generally vertical front face 60.

The body member 44 is provided with a pair of seats 70 and 72 respectively for accommodating the breaker plate members 48 and 50. Each of these seats includes inclined and recessed upper and lower surface portions 74 and 76 having generally V-shaped cross sections for engaging and supporting the surfaces 62-64 and 66-68 of the breaker plate members 48 and 50, as shown in FIGS. 3, 4 and 5. Furthermore, each of these seats has suitably inclined opposite side portions 78 and 80 complementary to and engageable with marginal surfaces 79 and 81 respectively inclined relative to and intersecting

surfaces 62—66 and 64—68 of the breaker plate members so that the breaker plate members will be solidly and firmly supported by the body member 44.

In order detachably to secure the breaker plate members with respect to the body member 44, each of the breaker plate members is provided with a rearwardly projecting lug 82 disposed between its surface portions 62—64 and 66—68. Each of the lugs 82 has a vertical aperture 84 therethrough. Furthermore, the body member 44 is provided with recesses 86 and 88 respectively in the seats 70 and 72 for accommodating the lugs 82. Vertical apertures 90 and 92 are formed in the body member 44, which apertures traverse the recesses 88 and 86 and are adapted to be aligned with the openings 84 through the lugs 82 when the breaker plate members 44 and 50 are assembled with the body member 44. Wedge elements 94 and 96 are adapted to be inserted through the aligned openings in the body member 44 and the breaker plate members 48 and 50, which wedge elements are tapered in the manner shown best in FIG. 4 so that they are adapted to draw the breaker plate elements firmly against the seat surfaces of the body member 44. With this arrangement it will be appreciated that the breaker plate members may be easily detachably secured with respect to the body member merely by inserting the wedge elements into the aligned openings. Furthermore, since the openings in the body member 44 extend to the lower margin thereof as shown in FIG. 4, the wedge elements may be easily engaged by means of a suitable tool, not shown, from below so that they may be knocked upwardly from the openings for releasing the breaker plate members.

FIGS. 8 through 11 show a modified form of the present invention in which elements corresponding to those described above are identified by the same reference numeral with the suffix *a* added. While only a portion of the apparatus of this embodiment is shown, it is to be understood that the apparatus includes housing means, an impeller structure and drive means essentially identical to that of the above described embodiment.

In the modified form, the breaker plate members 48*a* are secured directly against the inner surface of the housing 22*a*. Each breaker plate member 48*a* is provided with a pair of rearwardly projecting pads 98 and 100 having rounded surfaces adapted to conform to the cylindrical inner surface of the housing member 22*a*. The apertured lug 82*a* projects rearwardly from the pads 98 and 100 for extending through an opening 102 in the housing member 22*a* as shown in FIGS. 8 and 9. In this embodiment, the wedge means 94*a* comprises a T-shaped element 104 and a pin 106. The T-shaped element has a stem portion 108 which is adapted loosely to fit within the aperture 84*a* through the lug 82*a* and also to project entirely through the lug. A hair cross portion 110 of the T-shaped wedge element 104 is adapted to overlie the lug 82*a* so as to limit downward movement of the T-shaped member. After the T-shaped member is assembled, the pin 106 is forced into the opening 84*a* as shown in FIG. 9. Either the pin 106 or the stem portion 108 or both are tapered so that the pin 106 cannot be driven entirely through the opening 84*a* and will serve to draw the breaker plate member firmly against the inner surface of the housing member 22*a*. It will be noted that when the parts are fully assembled as shown in FIG. 9, the stem 108 projects beneath the lug 82*a* so that it may be easily engaged by a suitable tool in the event it is desired to drive the wedge means upwardly for the purpose of releasing the breaker plate member.

While the preferred embodiments of the present invention have been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

The invention is claimed as follows:

1. In a crushing apparatus of the type described having a central upright rotatable impeller structure, cylindrical housing means surrounding said impeller structure and brackets secured within said housing means around said impeller structure and presenting upwardly facing support edge means and upstanding abutment surface means, a breaker plate structure disposed around said housing means and radially outwardly of the impeller structure and including a support member disposed against said surface means and including hook means engaging over said edge means, said support member having an opening therein, a breaker plate member abutting said support member and including a rearwardly extending lug projecting into said opening and having an aperture therein, and wedge means extending into said aperture and cooperating with said support member for releasably holding said breaker plate member against said support member.
2. A breaker plate structure, as defined in claim 1, wherein said support member includes means for providing a plurality of seats thereon, said support member having one of said openings in each of said seats, and said breaker plate structure including a plurality of said breaker plate members having portions conforming to and abutting against said seats.
3. A breaker plate structure, as defined in claim 2, wherein said breaker plate members include curved impact surfaces disposed for presenting increments thereof generally perpendicularly with respect to trajectories of pieces of material being processed projected from the impeller structure.
4. A breaker plate structure as defined in claim 1 wherein said support member has seat means thereon and said opening therein adjacent a midportion of said seat means, said breaker plate member being disposed against said seat means and including a first pair of seat means abutting surfaces disposed adjacent one end thereof and having a generally V-shaped horizontal cross section, said breaker plate member having a second pair of seat means abutting surfaces adjacent an opposite end thereof and having a generally V-shaped horizontal cross section, and said lug of the breaker plate member projecting from between said first and second mentioned pair of surface means.
5. A breaker plate structure, as defined in claim 4, wherein said first pair of surface means and said second pair of surface means are inclined rearwardly from the vertical from their respective ends toward the lug.
6. A breaker plate structure for installation in a crushing apparatus of the type including a central upright rotatable impeller structure and cylindrical housing means surrounding said impeller structure, said breaker plate structure comprising a breaker plate member abutting a portion of said housing means, said portion of the housing means having an opening therethrough, said breaker plate member including a rearwardly extending lug projecting through said opening and having an aperture therein, and wedge means extending into said aperture and co-operating with said housing means for releasably holding said breaker plate member against said portion of the housing means, said wedge means including a T-shaped wedge element having a stem insertable into said aperture in the lug, and a complementary pin element insertable into said aperture and cooperable with said stem for securing the breaker plate member.
7. A breaker plate member for use in crushing apparatus of the type described including impact surface means at one side thereof, a pair of support surface means at an opposite side thereof and adjacent opposite ends thereof for abutting against a complementary support structure, each of said support surface means having a generally V-shaped cross-section taken in a predetermined plane, and an integral attachment lug extending rearwardly from between said pair of support surface

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means, said lug having an aperture therethrough for accommodating wedge means which serve to secure and draw the breaker plate member against the support structure when the breaker plate member is fully assembled in the crushing apparatus, each of said pair of support surface means being inclined rearwardly with respect to said impact surface means and from its associated end of the member toward said attachment lug.

8. A breaker plate member, as defined in claim 7, wherein said impact surface means has an arcuate horizontal cross section.

9. In a breaker plate structure of the type described, an upstanding body member including integral hook means extending rearwardly from an upper margin of a rearwardly facing side thereof and detachably connectable to a support structure, means on said body member providing a seat on an upstanding side of said body member disposed forwardly of said rearwardly facing side for accommodating a breaker plate member to be assembled therewith, means in said body member providing an opening in and extending rearwardly from said seat for accommodating an apertured attachment lug of a breaker plate member to be assembled with said body member, and said body member including means provid-

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ing an aperture between said sides and traversing said opening means for accommodating a securing element such as a wedge when a breaker plate member is assembled with and secured with respect to said body member.

10. A breaker plate structure including a body member, as defined in claim 9, and a breaker plate member, said breaker plate member including a generally centrally located lug extending into said opening and having an aperture therethrough aligned with said aperture means of said body member, said lug terminating short of said rearwardly facing side, said seat means and said breaker plate member including complementary surfaces providing direct support for said breaker plate member entirely around the periphery thereof.

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