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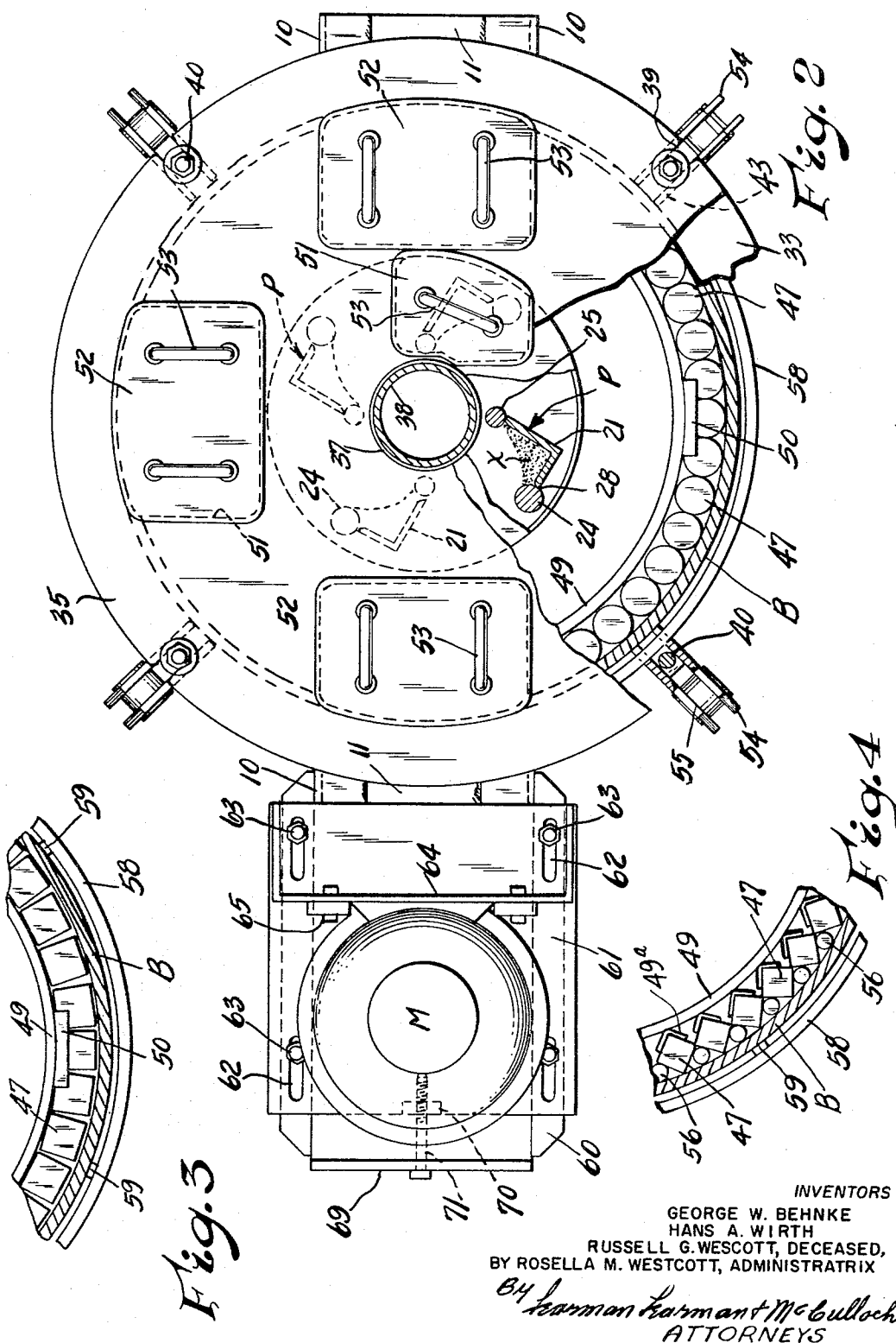
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3,334,823

CRUSHER MECHANISM

Original Filed Dec. 26, 1961

3 Sheets-Sheet 2



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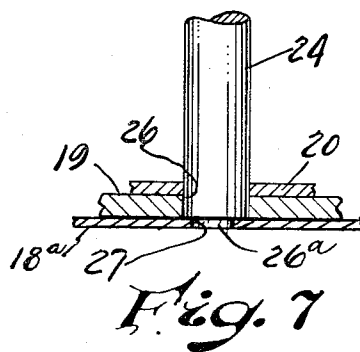
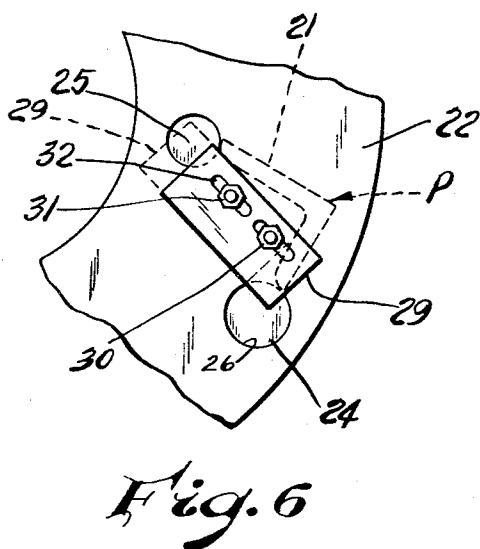
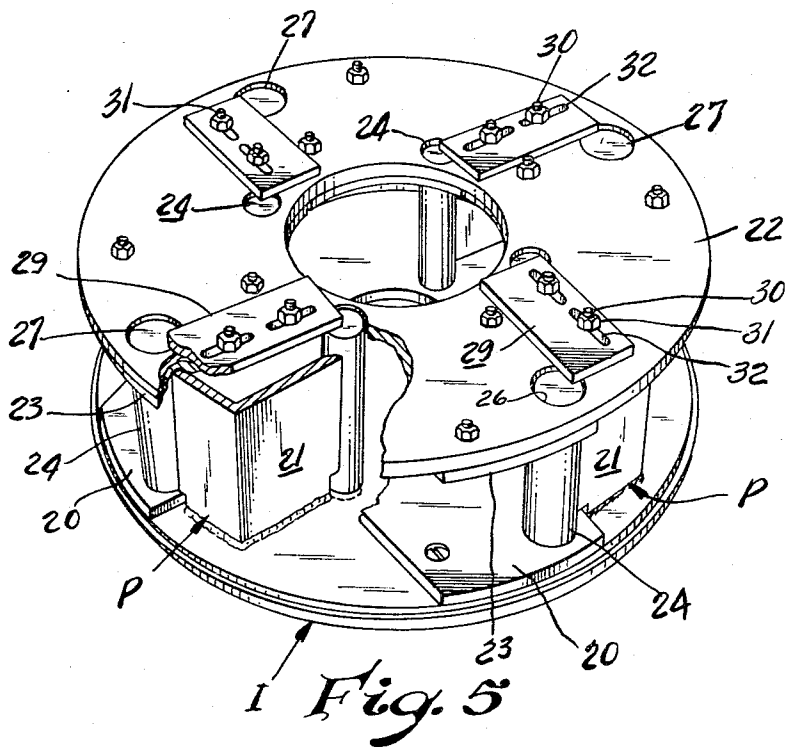
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CRUSHER MECHANISM

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Original application Dec. 26, 1961, Ser. No. 162,130, now Patent No. 3,154,259, dated Oct. 27, 1964. Divided and this application Oct. 21, 1964, Ser. No. 417,854
7 Claims. (Cl. 241-275)

This is a divisional application directed to subject matter disclosed in Ser. No. 162,130, filed Dec. 26, 1961, now Patent No. 3,154,259, issued Oct. 27, 1964, entitled, Crusher Mechanism, and relates to crushers of the impact type in which the material to be crushed is fed to a driven impeller mechanism within a bowl and then flung, by centrifugal force, against a sectional liner for crushing the material to required size.

One of the prime objects of the invention is to design a simple, sturdy and economical crusher mechanism which includes, a sectional bowl liner, the individual sections of which can be readily mounted, adjusted, and/or removed in a minimum length of time and with little effort and but few tools.

Another object of the invention is to provide a novel impact crushing apparatus of the above described type which is constructed so as to minimize any possibility of severe damage in the event of entry of oversize or foreign material into the apparatus being crushed which might pierce the bowl wall and strike and injure workmen or other persons working in close proximity to the crusher.

Still a further object is to provide a simple, practical and inexpensive means for releasably securing the bars of the bowl liner in position, which bars can be readily rotated for adjustment to provide fresh unworn surfaces or areas when the surfaces or areas in use become worn.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, it being understood that changes may be made in the form, size, proportion and minor details of construction, without departing from the spirit, or sacrificing any of the advantages of the invention.

In the drawings:

FIG. 1 is a vertical, part-sectional view of the crusher mechanism, the arrows indicating the path of travel of the material through the machine.

FIG. 2 is a top plan view of the crusher mechanism, parts being broken away to more clearly show the construction and arrangement of parts.

FIG. 3 is a fragmentary, plan view showing alternate bowl liner crusher bars.

FIG. 4 is a fragmentary view similar to FIG. 3 showing a slightly different arrangement of the bars.

FIG. 5 is an enlarged, perspective view of the impeller assembly, parts being broken away to more clearly show the construction.

FIG. 6 is a fragmentary plan view illustrating the wear pin securing means.

FIG. 7 is a sectional, side elevational view illustrating the mounting of the wear pins in the impeller.

Crushers of the type herein referred to are subjected to severe wear and must be so designed that they require a minimum of maintenance and replacement, and the

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various parts must be readily removable and replaceable to limit "down time" and the expense incident thereto.

Referring now more particularly to the drawings in which we have shown the preferred embodiment of our invention, the crusher mechanism includes a tunnel-shaped base member T composed of horizontally disposed, spaced apart channel members 10-10, the upper edges of which are bridged by a plate 11 welded or otherwise secured thereto. A bowl B is mounted on said base, the side walls of the bowl being cut away as at 12 to accommodate the base member T which extends therethrough.

A bearing support 13 is mounted on the base T by means of bolts 14, and includes a bearing member 15 in which a vertically disposed shaft 16 is journaled, said shaft projecting into the base tunnel T, and a conventional drive sheave 17 being mounted thereon.

A horizontally disposed flange 18 is mounted on the upper end of the shaft 16 and carries a plate 18a which forms the bottom of the impeller assembly I, a plate 19 being mounted on plate 18a, and anti-friction plates 20 being mounted on the upper face of plate 19 as shown to minimize wear.

A plurality of bucket members P are mounted on the face of the plate 19 in circumferentially spaced apart relation, each bucket comprising a vertically disposed section 21, angular in cross section, the ends of which are welded or otherwise secured to the plate 19, and also to a plate 22 which forms the upper end of the impeller. An anti-friction wear plate 23 is secured on the lower face of the upper plate 22.

A plurality of wear pins 24 and 25 are interposed between and mounted in the lower and upper impeller plates 19 and 22 respectively, the lower end of each pin being seated in a bore 26 provided in plates 19 and 20 while a reduced portion 26a projects into an opening 27 provided in the plate 18a and the upper end of each pin extending into an opening 27a provided in the upper plates 22 and 23. These wear pins above referred to form a part of the buckets P, the pin 24 forming the front edge or lip of the bucket, and the pin 25 forming the rear edge, all as clearly shown in FIGS. 1, 2, and 5 of the drawings. The edges 28 of the angular member 21 are disposed in close proximity to the wear pins 24 and 25, but are not secured thereto, thus permitting the pins to be readily removed, adjusted end for end, and/or replaced when worn due to the volume of abrasive material contracting same.

Lock plates 29 are provided on the upper face of the plate 22 and are secured in position by means of bolts 30 having nuts 31 on the outer threaded end thereof, and these bolts are mounted in slotted openings 32, the corner section of each lock plate overlying the upper ends of wear pins 24 and 25. It will be obvious that loosening the nuts 31 and shifting the plate endwise, as shown in broken lines in FIG. 6, permits the wear pins to be readily removed, adjusted or replaced.

A horizontally disposed flange 33 is provided on the upper end of the bowl B, and a plurality of circumferentially spaced slots 34 are provided therein, a cover 35 being mounted on said flange to provide a closure for the open end of the bowl and being formed with a depending flange 35a surrounding the upper end of the impeller.

A centrally disposed opening 36 is provided in the cover 35, and a sleeve 37 is mounted therein, and the spout end 38 of a material hopper N is mounted in said sleeve for feeding material to said impeller.

Slotted openings 39 are provided in the outer edge of cover 35 in register with the slots 34 in the flange 33, and an eye bolt 40 is hingedly connected to a pin 42 which spans the vertical ribs 43 which are welded to the outer wall of the bowl, so that said bolt may be swung into and out of the registering slots 34 and 39, and the nuts 44 adjusted to release or lock the cover in position.

A plurality of spaced apart knee braces 45 are welded on the inner face of the bowl B as shown, and a bar support or breaker member mounting shelf 46 is provided thereon, the elongate breaker bars 47 which form the bowl liner, being mounted upright on the support 46, and a lower retaining ring 48 being mounted on the outer edge of the bar support to hold the bars in proper position.

A similar retaining ring 49 is provided at the upper end of the bars 47 and is formed with a plurality of spaced apart, laterally projecting wings 50 (FIG. 3) which bear on the upper ends of the bars to secure said bars in set position, and where the bars are positioned as shown in FIG. 4 of the drawing, triangular shaped sections 49a forming a plurality of sockets for the bars 47 are welded to the ring 49 to hold the bars in position.

A plurality of access openings 51 are provided in the upper wall and cover of the bowl, and plates 52 form a closure for said openings, said plates having handles 53 to facilitate handling, so that the liners, bars, wear pins, etc. can be readily adjusted, removed, and/or replaced.

Lift lugs 54 are welded to the ribs 43 on which the bolts 40 are mounted, and are formed with openings 55 to facilitate attachment of lifting chains or the like (not shown).

The nature of the material to be crushed determines the shape of the bars which make up the bowl liner, and in FIG. 1 these bars are cylindrical in shape and are readily accessible for adjustment upon removal of the plates 52.

In FIG. 3 we have shown the liner bars 47 as substantially square in cross section so that as the material is flung outwardly, it strikes the substantially flat surface presented by said bars and thence drops through openings (not shown) on either side of the base tunnel, these bars being rotatably adjustable to present a new unused surface when desired.

In FIG. 4 of the drawings we show the bars 47 arranged to form a slightly different pattern to present a continuous serrated surface against which the material being processed is flung, and vertically disposed rods 56 providing sockets between them are disposed in the angularly shaped pockets 57 formed by the bars 47, so that said bars are backed and maintained in set position, these rods 56 bearing against the bars and the inner face of the bowl.

The bars and rods 47 and 56 are retained in upright position by upper and lower rings 48 and 49, respectively, and can be made up of extremely hard metal.

A safety band 58 embraces the bowl B, and spacers 59 serve to space said band from the bowl so that should any sharp metal object or other foreign material flung by the impeller pierce the bowl shell, the band 58 will form a baffle and protection for workmen and persons in the immediate vicinity of the apparatus.

Angles 60 are mounted on the upper face of the base T on the one end as shown, and a bracket plate 61 is adjustably mounted thereon, slotted openings 62 being provided in said plate and bolts 63 are accommodated therein, and are equipped with nuts as usual (not shown) to secure the plate in set position.

A vertically disposed section 64 is provided on the bracket 61, and a motor M is mounted thereon by means of bolts 65, the motor shaft 66 projecting through a slotted opening (not shown), provided in the plate 11, and a sheave 67 is mounted on the end of said shaft, a belt 68 drivingly connecting the sheaves 17 and 67 for driving the impeller assembly.

A plate 69 is provided on the one end of the base plate 11, and a lug 70 is provided on the end of the bracket plate 61 adjacent said lug and is provided with a threaded opening (not shown), and a threaded bolt 71 extends through the lug 70 to permit adjustment of said bracket plate on the base when the bolts 63 are loosened to permit tensioning of said belt.

From the foregoing description, it will be obvious that we have perfected a simple, rugged, and economical crusher apparatus for crushing material of all kinds to required size and consistency.

We claim:

1. A centrifugal crusher comprising; a bowl means; a plurality of angularly adjustable, vertically elongate members having a plurality of interchangeable vertically extending faces disposed around their perimeters and forming a liner for said bowl means; support shelf means including radially inner vertical wall means and radially outer vertical wall means providing socket means on the inner face of the bowl means within which ends of said elongate members are received and in which said members are mounted in substantially abutting side by side relation; impeller means mounted in said bowl means; means for feeding the material to be processed to said impeller means, and means for driving said impeller to fling the material outwardly against said liner members for crushing the material as the impeller is driven.

2. The combination defined in claim 1 in which the elongate liner members are square in cross section and are readily adjustable to selectively expose each face of each liner member to the impeller means.

3. The combination defined in claim 1 in which the elongate members are cylindrical in shape.

4. The combination defined in claim 1 in which the elongate liner members are readily adjustable to selectively expose an unworn area of each liner member; a continuous safety member encircling said bowl means and spaced a predetermined distance from the outer wall thereof; said bowl means being in horizontal alignment with the material as it is flung from the rotor, and means for securing said safety band in position.

5. An impact type crushing apparatus comprising, in combination: housing means including a top wall provided with a central inlet opening; an annular breaker member mounting means carried by the inner wall of said housing means and including a plurality of sockets; a plurality of breaker members including ends disposed in said sockets, each of said breaker members including a plurality of vertically extending breaker edges, each of said breaker members being selectively positionable at various keyed positions in its respective socket whereby different breaker edges can be directed radially inwardly.

6. An impact type crushing apparatus comprising, in combination: housing means including a top wall provided with a central inlet opening; an annular breaker member mounting means carried by the inner wall of said housing means and including a plurality of upper and lower sockets; a plurality of breaker members including ends disposed in said sockets, each of said breaker members including a plurality of vertically extending breaker edges, each of said breaker members being selectively positionable at various keyed positions in its respective socket whereby different breaker edges can be directed radially inwardly, the upper and lower ends of each of said breaker members being identical whereby each breaker member can be inverted in its respective upper and lower sockets.

7. An impact type crushing apparatus comprising, in combination: housing means including a top wall provided with a generally central inlet opening; an annular breaker member mounting means carried by the inner wall of said housing means and including socket means; impeller means within said housing means under said opening to receive material therefrom; a plurality of

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breaker members generally radially opposite said im-
peller means including ends received in said socket means,
each of said breaker members including a plurality of
vertically extending breaker faces, each of said breaker
members being selectively positionable at various angu-
larly adjusted positions relative to their axes in the socket
means whereby different breaker faces can be directed
inwardly toward said impeller means.

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