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3,154,259

CRUSHER MECHANISM

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3 Sheets-Sheet 1

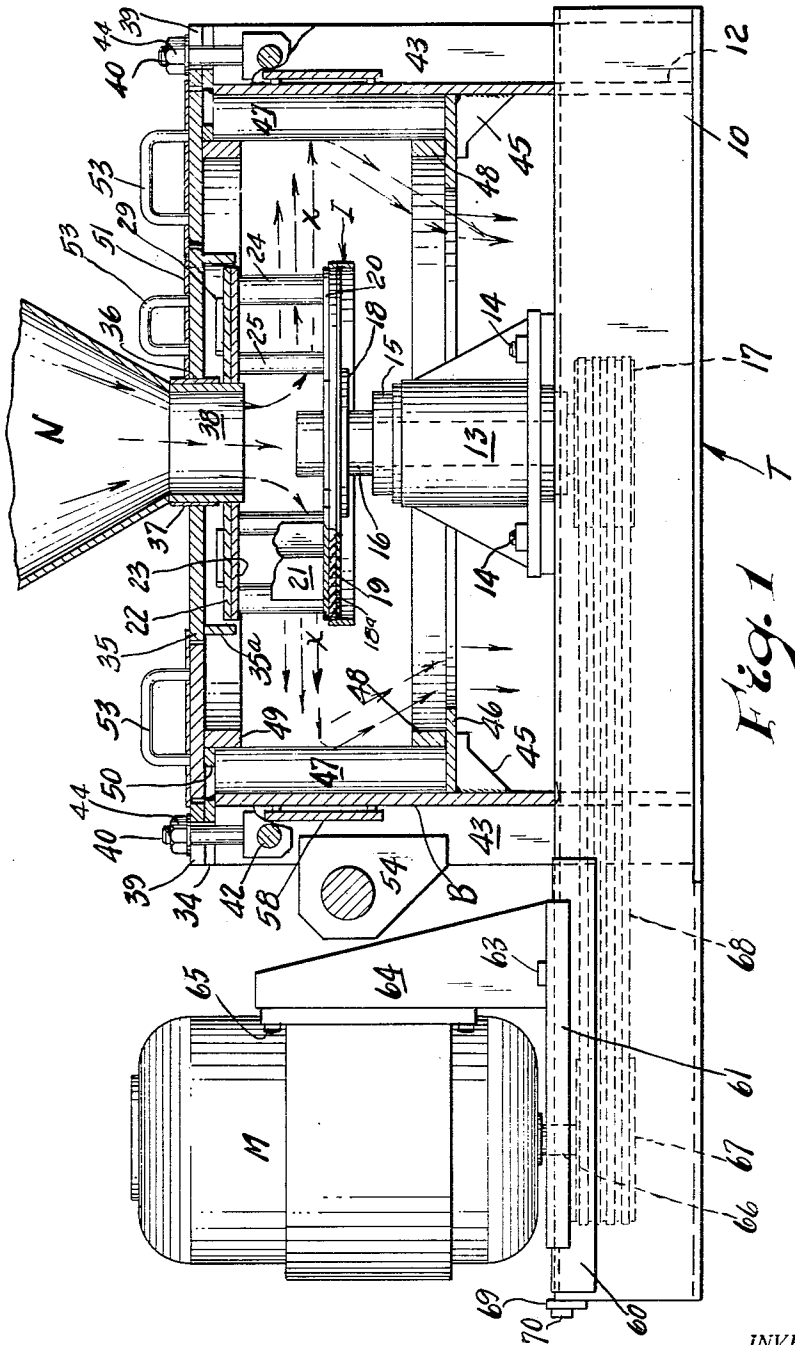


Fig. 1

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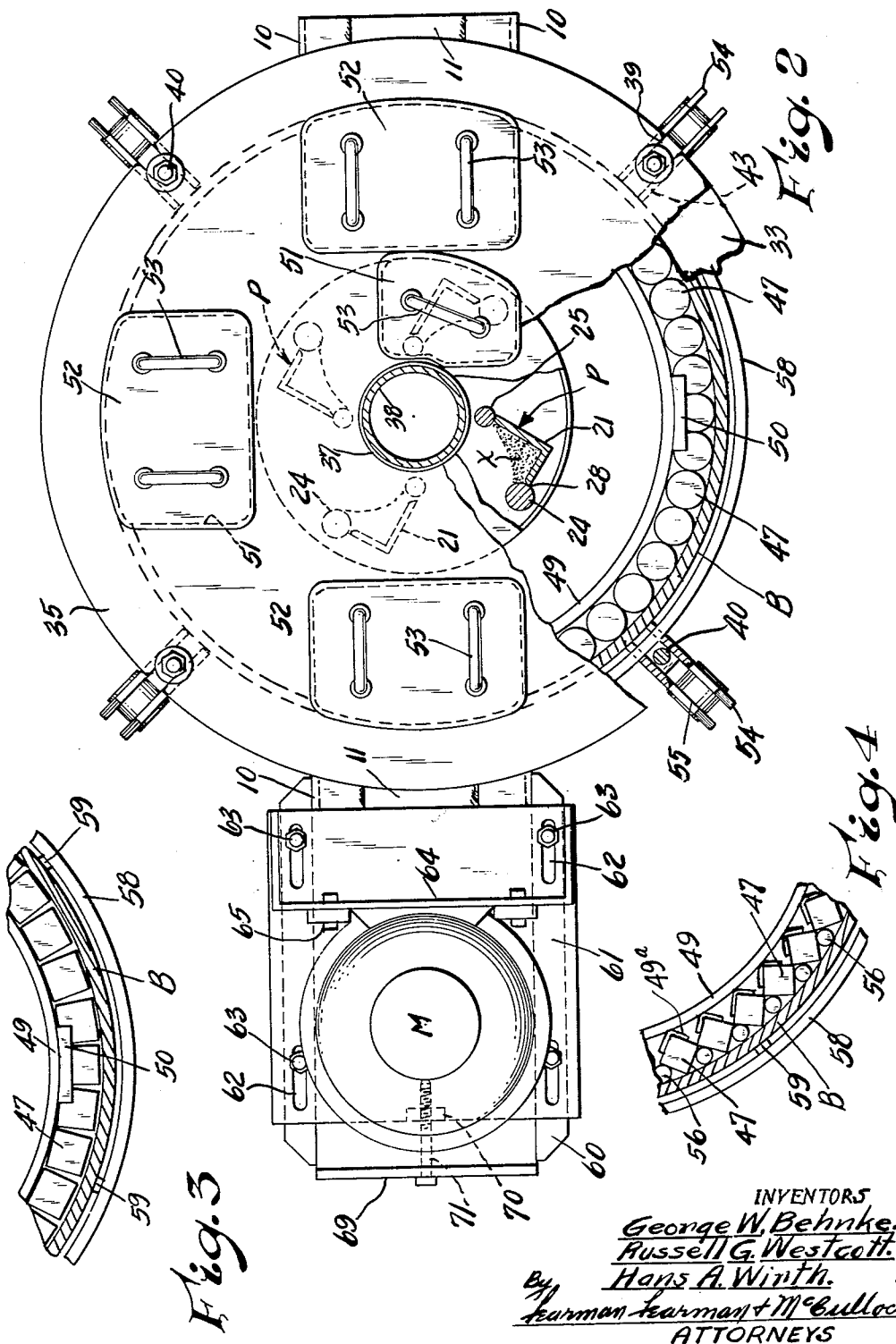
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3 Sheets-Sheet 2



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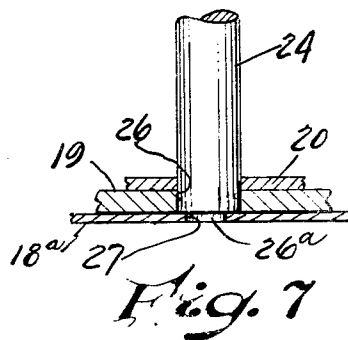
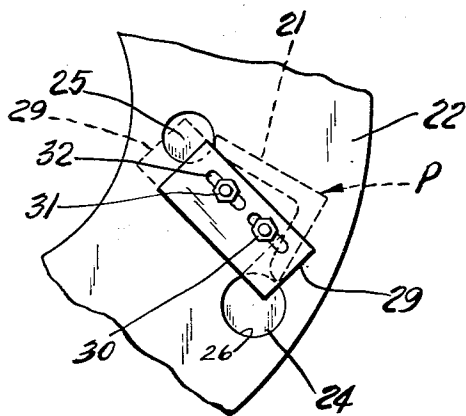
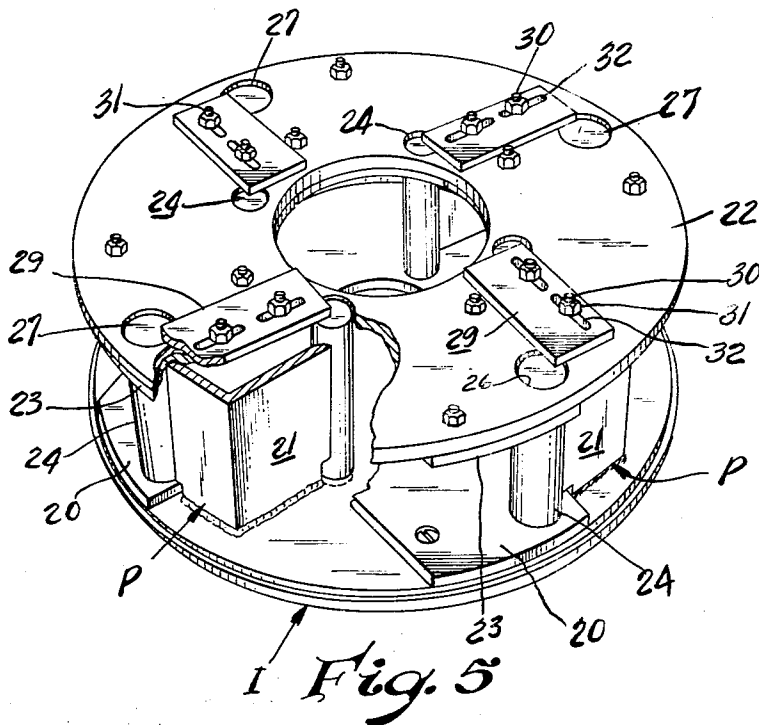
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CRUSHER MECHANISM

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3 Sheets-Sheet 3



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1

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CRUSHER MECHANISM

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1 Claim. (Cl. 241-275)

This invention 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 including a bowl and a driven impeller having a plurality of circumferentially spaced apart buckets mounted thereon and to which the material to be processed is fed and then shifted by centrifugal force into the path of travel of the buckets, so that the material trapped by the buckets is flung outwardly against the bowl liner and reduced to predetermined size or particles.

Another object of the invention is to provide a crusher mechanism including a sectional bowl liner, the individual sections of which can be quickly and easily adjusted, mounted and/or replaced with a minimum of effort and in a minimum length of time.

Another object of the invention is to provide a crusher mechanism including a bowl and sectional liner, with an auxiliary band encircling said bowl and spaced from the outer wall thereof to form a safety band so that any material flung by the impeller, and piercing the bowl wall will strike said auxiliary band and prevent injury to 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.

To the accomplishment of the foregoing and related ends, said invention consists in the combination and arrangement hereinafter more fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims, 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, etc.

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

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 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

2

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, and 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, this shaft projecting into the base tunnel T, and a drive sheave 17 is 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 is mounted on plate 18a, and anti-friction plates 20 are 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; and 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 upper and lower impeller plates 19 and 22 respectively, the lower end of the pins being seated in a bore 26 provided in plates 19 and 20 while the turned end 26a projects into an opening 27 provided in the plate 18a, the upper end of the 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 inner edge, all as clearly shown in FIGS. 1, 2 and 5 of the drawings, the edges 28 of the angular member 21 being 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.

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. These bolts are mounted in slotted openings 32, and the corner section of each lock plate overlies the upper ends of wear pins 24 and 25, and 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 is formed with a depending flange 35a surrounding the upper end of the impeller.

A centrally disposed opening 36 is provided in said cover 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 X 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

3

on the inner face of the bowl B as shown, and a bar support 46 is provided thereon, the bars 47, which form the bowl liner, being mounted upright on the support 46, and a lower retaining ring 48 is 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 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 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 an opening 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. 3 of the drawing 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.

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 are disposed in the angularly shaped pocket 57 formed by the bars 47, so that said bars are backed and maintained in set position, these rods 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 serves to space said band from the bowl so that should any sharp metal object flung by the impeller pierce the bowl shell, the band 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

4

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 for crushing material of all kinds to required size and consistency.

What we claim is:

A centrifugal crusher comprising: a bowl, a plurality of vertically disposed, individually removable, elongated members forming a liner for said bowl; a supporting shelf on the inner face of the bowl on which said liner members are mounted in abutting side-by-side relation; a lower retaining ring mounted on said shelf and securing the lower ends of the liner members in assembled relation; an upper ring; laterally projecting wings on said upper ring and engagable with the upper ends of the liner members for securing the upper ends of the liner members in assembled relation; a centrally disposed impeller mounted in said bowl; circumferentially spaced apart buckets mounted thereon; means for feeding the material to be processed to said impeller and buckets, and means for driving said impeller to fling the material outwardly said liner members for crushing the material as the impeller is driven.

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