May 10, 1955 O. DANYLUKE 2,708,075

PERIPHERAL FEED BREAKER

Filed May 29, 1952 4 Sheets-Sheet 1

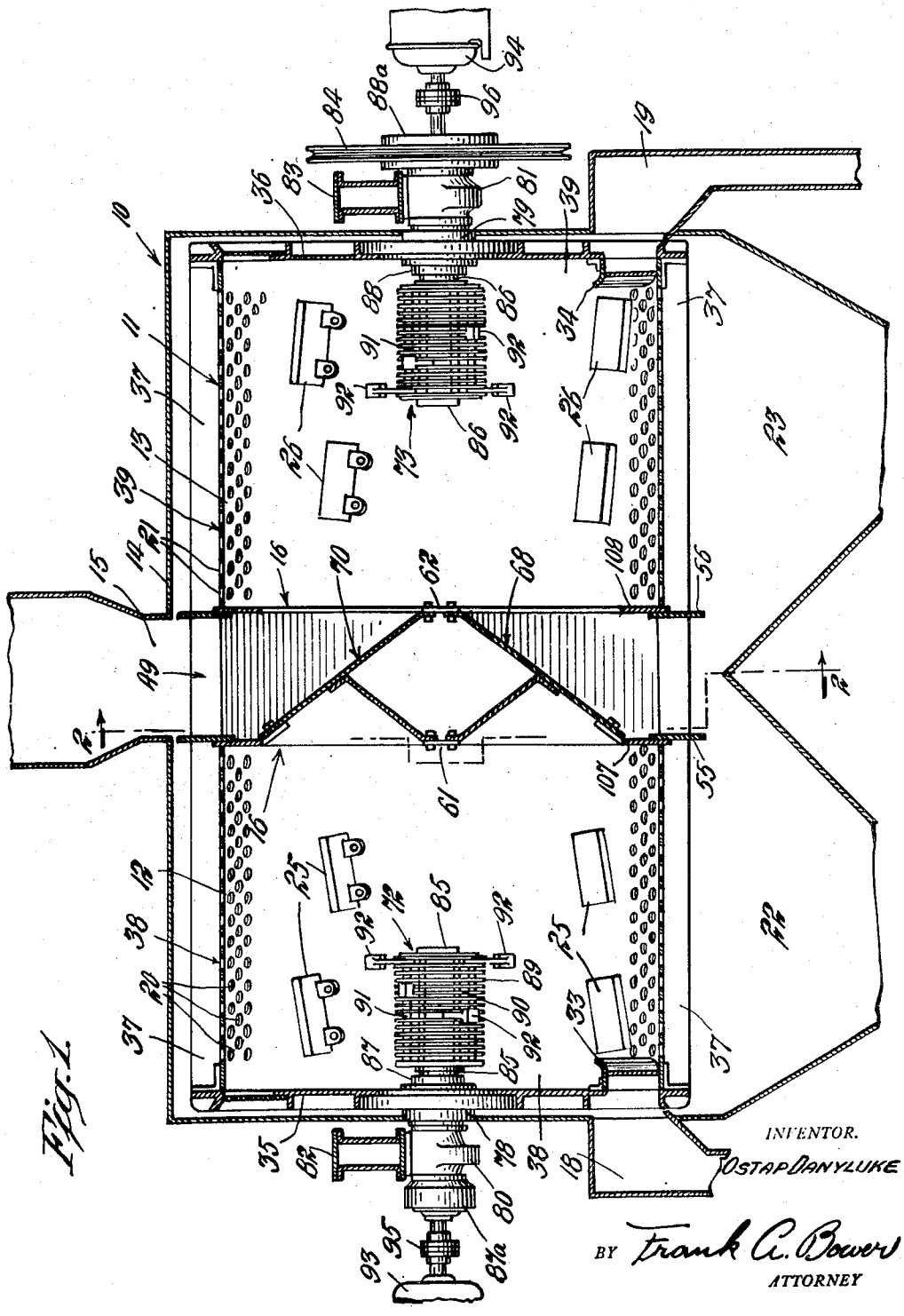


Fig. 1.

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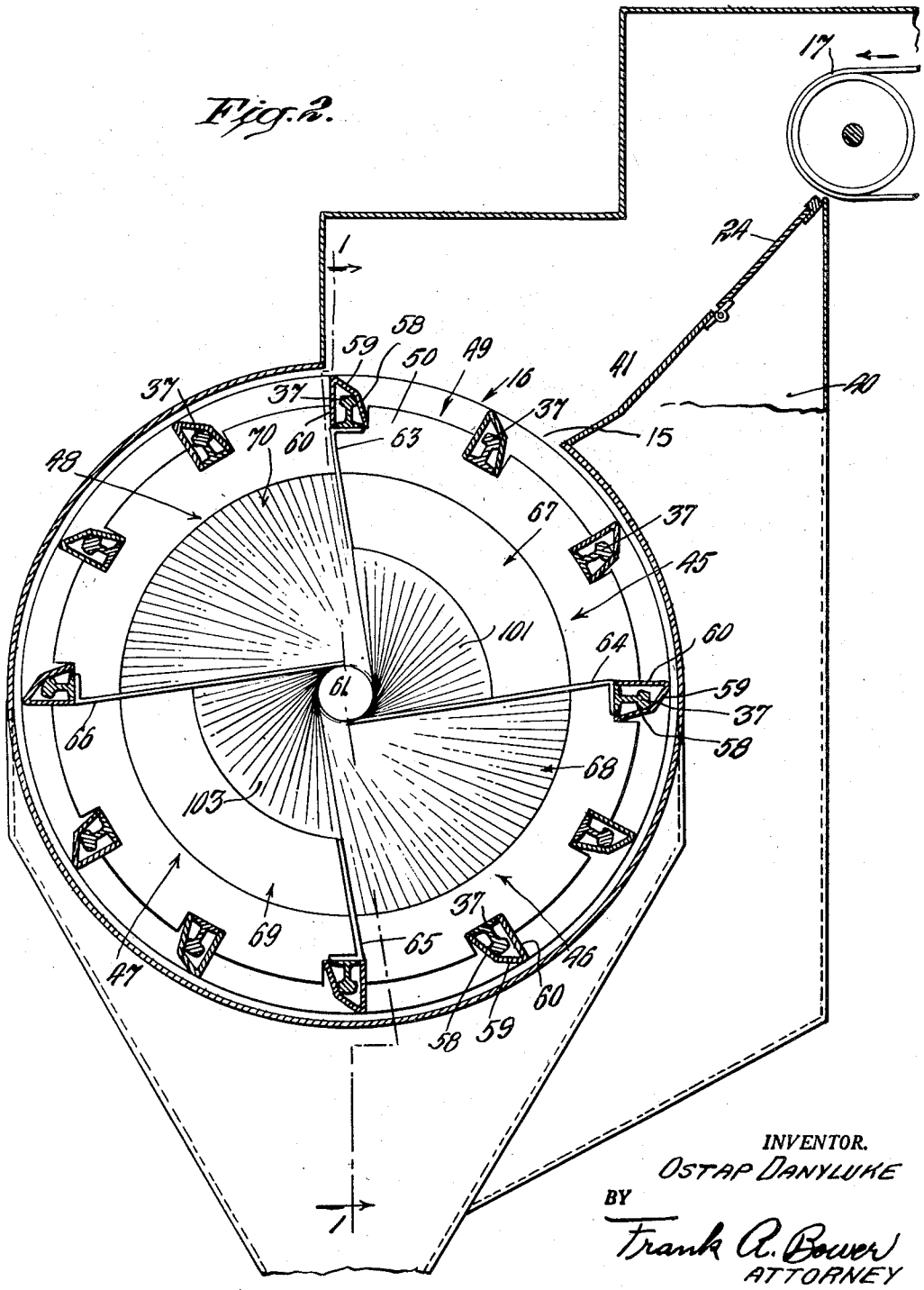
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PERIPHERAL FEED BREAKER

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Fig. 2.



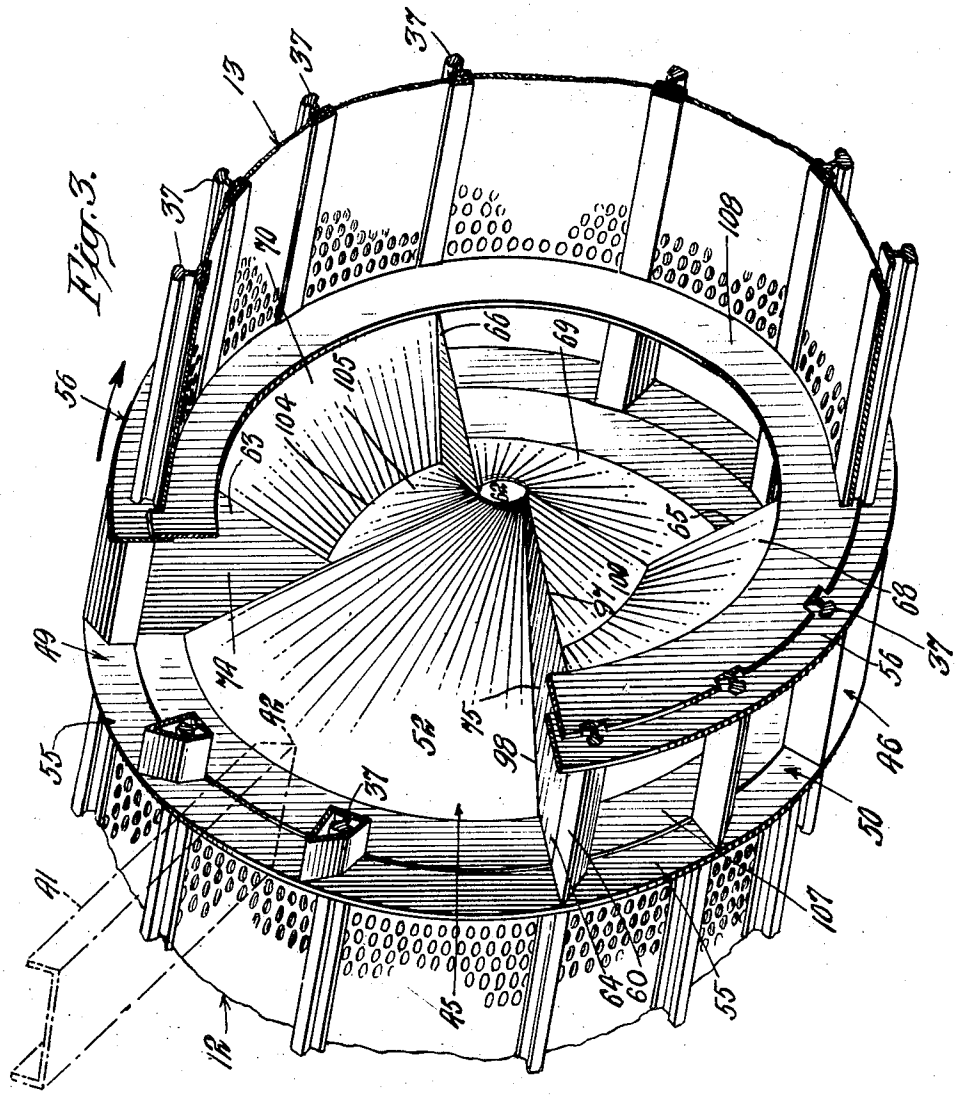
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PERIPHERAL FEED BREAKER

Filed May 29, 1952 4 Sheets-Sheet 3

Fig. 3.



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Fig. 4.

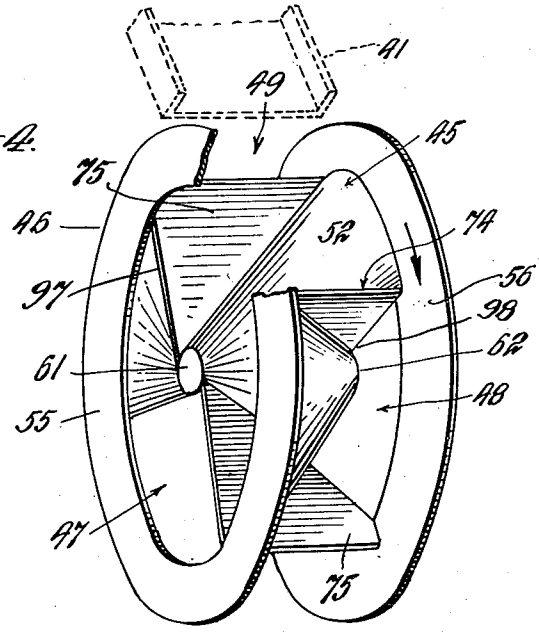
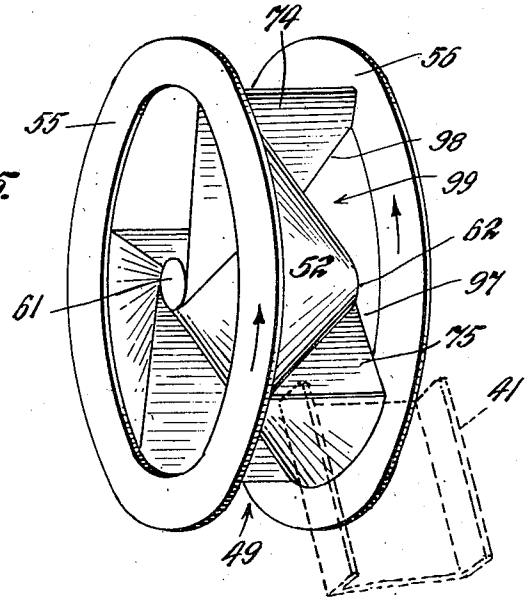


Fig. 5.



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United States Patent Office 2,708,075 Patented May 10, 1955

2,708,075

PERIPHERAL FEED BREAKER

Ostap Danyluke, Philadelphia, Pa., assignor, by mesne assignments, to Bath Iron Works Corporation, Bath, Maine, a corporation of Maine

Application May 29, 1952, Serial No. 290,804

16 Claims. (Cl. 241—138)

This invention relates to Bradford type breaker mills and more particularly to the drum structure and the feed for the drum structure. It is directed to the breakage of the material in the initial stages of breakage and the introduction of the material into the initial stages.

An object of the invention is to increase the amount of breakage of the material fed into a Bradford type breaker for a given drum length.

Another object of the invention is to increase the per unit length breakage of a Bradford breaker drum.

Another object of the invention is to provide a Bradford type breaker drum that produces more than one type of fines.

Another object of the invention is to provide a Bradford type breaker in which the material is proportionately split within the breaker and eliminating secondary exit chutes below the breaker.

Another object is to provide a Bradford type breaker that has a greater increase capacity and less structural weight.

Another object is to provide a Bradford type breaker that has rotating hammers at each end.

Another object of this invention is to provide a Bradford type breaker in which the crushed material is divided within the breaker.

A further object of this invention is the elimination of secondary splitting chutes beneath a Bradford type breaker.

A still further object of this invention is to provide a Bradford type breaker having a feed intermediate the ends and rotating hammers within the breaker at each end.

Other and further objects and advantages will appear from the following description taken in connection with the drawings in which:

Fig. 1 is a sectional side view of a mill of this invention with hammers at each end;

Fig. 2 is a sectional view of the mill taken along lines 2—2 of Fig. 1;

Fig. 3 is a perspective view of the feeding structure;

Fig. 4 is a schematic perspective side view of the feed structure without the drum; and

Fig. 5 is a schematic perspective top view of the feed structure without the drum.

Referring to Fig. 1 a Bradford type breaker **10** is shown comprising a rotating breaker drum **11** with a left breaker drum section **12** and a right breaker drum section **13** rotatably mounted in a casing **14**. A feeding structure **16** rigidly fastened within the drum **11** and rotating with it alternately feeds material to the drum sections **12** and **13**. Material is delivered to the feeding structure **16** by the conveyor **17** (Fig. 2) dropping the material through an opening **15** in the casing **14**. The material falls into the drum **11** and is subjected to the breaking and sifting action of the rotating drum. The oversized material is lifted inside the drum on shelves **25** and **26** and repeatedly dropped to cause fracture and reduction of the oversize pieces to the desired sizes. As the material is tumbled it

is moved from the center of the breaker **10** towards its ends. The broken and undersized material passes through openings **20** and **21** in walls **38** and **39** of the drum sections **12** and **13** respectively and drops through exit chutes **22, 23** respectively at the bottom of the casing **14**. The oversized and unbreakable material passes out through the openings at each end of the drum **11** and drops through the refuse chutes **18** and **19** at the ends of the casing **14**.

In Fig. 2 a door **24** is hingedly mounted on the casing above the opening **15**. When the door **24** is lowered the incoming material drops into the feeding structure **16**. In the raised position the door **24** blocks the passage between the drum **11** and the conveyor **17** and diverts the material through a by-pass passage **40** into the exit chutes **22, 23**.

As shown in Fig. 1, the walls **38** and **39** of the drum sections **12** and **13** respectively are securely mounted to the inner surfaces of rail beams **37** which are evenly spaced around the periphery of the drum **11** and are secured at their ends to spiders **35** and **36** at the respective outer ends of the sections **12** and **13**. The spiders **35** and **36** have hubs **78** and **79** mounted in bearings **80** and **81** so as to rotatably support the drum **11** on lateral beams **82, 83** respectively which are adjacent and outside the ends of the casing **14**.

The openings **20** and **21** in the walls **38** and **39** are evenly distributed throughout the drum walls of both sections. These holes may be of any desired size depending upon the type of material fed to the drum and the desired resulting broken material. The material is tumbled by the lifting shelves **25** and **26** and moved axially until it is properly sized and falls through the openings in the walls. The discharge of the unbreakable material at the ends of the drum may be done by the conventional plows **33, 34** pushing the material through the openings in the spiders **35, 36** into the refuse chutes **18, 19** repectively.

The ends of the drum sections **12** and **13** have hammer rotors **72, 73** mounted on the radial spiders **35** and **36**, respectively. The spiders **35** and **36** each have a hub **78** and **79** respectively upon which the spiders **35** and **36** are carried, and in turn the section **12** and **13** and drum **11** including the feeding structure **16**. The left hub **78** is supported and turns in a bearing **80** while the right hub **79** is supported and turns in a bearing **81**. The bearings **80** and **81** are supported in a suitable manner such as a pair of laterally extending beams **82** and **83** shown in Fig. 1 supporting the bearings **80** and **81** respectively. Thus the drum **11** rides on the beams **82** and **83**. The right hub **79** is keyed, not shown, in a sprocket wheel **84** to which power may be applied.

The hubs **78** and **79** at each end of the drum **11** are axially hollow to receive shafts **85, 86** inserted through each of them into the respective drum sections **12** and **13**. These shafts **85, 86** support the hammer rotors **72, 73** in each end of the drum **11**. These two hammer rotors **72, 73** are symmetrically arranged in the drum **11**. The shafts **85, 86** are supported at the inner ends of the respective hubs **78** and **79** in bearings **87, 88**, and at the outer end of hubs in bearings **87***a* and **88***a*. Extending into the drum sections, **12** and **13** from the bearings **87, 88** the shafts **85, 86** carry a succession of spacing disks **89** and plain disks **90** alternatively. The plain disks **90** carry hammer suspension bars **91** from which are hung swinging hammers **92**. The shafts **85, 86** are driven by motors **93, 94** respectively through couplings **95, 96**. The hammer rotors **72, 73** are thus rotated within and independently of the drum sections **12** and **13**. With this central feed the bearings **80, 81** may be mounted on top of the beams **82, 83** instead of being suspended from below.

The feed structure **16** is axially positioned between the

drum sections 12 and 13 and is rigidly fastened to the rail beams 37. In the embodiment shown the feed structure is divided into four separate chutes 45, 46, 47, 48 of the same size. The chutes are arranged to alternately feed the drum sections 12 and 13. Each drum subtends substantially a quarter of the periphery of the drum. Feed chutes 45 and 47 feed the right section 13 and feed chutes 46 and 48 feed the left section 12. The material from the feed passage 41 enters the feed structure 16 through the openings 50 between the rails 37 into the feed chute. The material then hits the inclined surface 52 of the chute and the leading partition surface 74 and the trailing partition surface 75. The material is diverted at an angle into the drum section. In this particular embodiment the equal feeding of material to both sides is desired so the feed chutes 45 to 48 are of substantially the same structure as 45 and 47 except that chutes 46 and 48 are turned to feed in the opposite direction. In Fig. 2 the feed chutes 46 and 48 are shown with the inclined surface facing outwardly and feed chutes 45 and 47 are viewed from the rear.

In Fig. 3 the feed structure is perspectively viewed from the drum section 13 end and from the feeding side of the feed structure. The feed chute 45 is positioned to receive the material and deliver to the drum section 13. The position of the material feed 41 is indicated in outline so that the view of the feed structure is not obscured. The edge 42 is positioned to feed the material below the top of the feed structure and preferably at the midpoint of the quadrant. The tilt of the feed passage is set so that the material enters the feed structure at a forty to fifty degree angle from the horizontal. The feed 41 is also set at an angle between forty and fifty degrees.

The feed structure comprises two radial flanges 55, 56 spaced axially to provide a peripheral opening 49 between the drum walls 38, 39 into the interior of drum 11. The rail beams 37 longitudinally traverse the opening 49 between the flanges to form rectangular openings 50 leading to the feed chutes 45, 46, 47, 48. These chutes are separated by triangularly shaped partition plates 63, 64, 65, 66 extending radially from the hubs 61, 62. Chute members 67, 68, 69, 70 extend at an angle across the space between the drum sections and divert the incoming material into the respective drum sections. These members preferably have a generally conical pie shape and extend from the radial flanges to one of the opposite hubs. Members 67 and 69 extend from the radial flange 55 to the hub 62 and members 68, 70 extend from the radial flange 56 to the hub 61. The members 67, 69 are circumferentially at ninety degrees to the members 68, 70 and feed in the opposite direction. The hubs 61, 62 are axially spaced from one another along the central axis of the drum 11 substantially the same distance as the spacing of the flanges. Preferably the hubs should be in the plane of the respective flanges.

In each chute the chute member forms the deflecting surface 52 and the partition plates form the leading deflecting surface 74 and the trailing deflecting surface 75. The surface 52 extends circumferentially from one partition surface to the next to form a solid deflecting chute to direct substantially all of the incoming material into a drum section.

The partition plates 63, 64, 65, 66 are triangular in shape with the trailing partition plate forming a continuous wall from the hub of the chute to the rail beams 37. This forms a continuous surface 75 across the triangular shaped space between the pie shaped chute member forming the surface 52 and the feed end of the drum section. This is clearly indicated in Fig. 4. Considering chute 45 (Fig. 3) the partition plate 64 between chutes 45, 46 extends from the plate 60 to the hub 62, with the edge 97 extending from the flange 56 to the hub 62.

The leading partition surface 74 does not extend to the hub of the chute surface 52. The edge 98, also indicated on partition plate 64, extends to the other hub 61 as best

illustrated in Fig. 5. This leaves a triangular opening 99 (Fig. 5) between the end of the drum section, the partition plate and the chute member.

The chute members 67, 68, 69, 70 are supported in the rear by a backing member or plate 101, 102, 103, 104 respectively. The backing plate is also pie shaped and has a conical surface and extends from the mid section of the chute member to a hub. The surface 105 of the backing plates are preferably continuous with the adjacent chute surfaces 52.

The partition plates preferably extend from the side of the hub or off center from the central axis in order to set the partition plates at a slight angle to the radii of the drum.

These plates and members may be bolted together in any convenient and conventional manner. The representation of the connections, flanges, bolts and nuts have been omitted for purposes of simplicity and clarity of representation. The chute members may be made of a number of flat triangular shaped plates with flanges along the edges at an angle to form the conical surface 52. The partition plates may also be fastened to the chute member and the radial flange and rail beams. The deflection plates 58, 59, 60 may be mounted on the flanges or the rail beams.

The material enters between the enclosing radial walls 55, 56 which form passages or openings 50 from outside of the drum to within the drum.

The rail beams 37 traversing the space between the walls 55, 56 have deflection plates 58, 59 and 60. Deflection plate 60 faces in the direction of rotation of the drum and hits the material as it leaves the feed 41. The plate faces inwardly towards the feed chute so that the material hit by the plate is deflected inwardly out of the path of the plate 60 and rail beam 37. The plates 58 and 59 on the top and rear of the rail beam are moving away from the entering stream of material. The top plate 59 is sloped rearwardly and inwardly to deflect the material into the following opening. The plates 59 and 60 meet at their outer edges so that the outer peripheral space between the radial walls 55, 56 presents a substantially continuous opening 49 around the feed structure. The lower rear plate 58 is at a greater angle to the entering material and deflects it directly into the feed chute.

The greater portion of the entering material passes directly through the opening 50 in the form of a ribbon and strikes against the inclined surface 52 and is directed into the drum section 13. The surface 52 is substantially of a convex conical shape extending inwardly from the inner edge of the radial wall 55 to an axially positioned hub 62. As the inclined surface extends inwardly the surface narrows down to the hub. On each side of the feed chute are partition plates 67, 68 extending from the deflection plate 60 to the hubs 61 and 62 respectively. The upper portion of the plate 67 forms a wall between the feed chute 45 and feed chute 48 and similarly the upper portion of the plate 68 forms a wall between the feed chute 45 and feed chute 46. These upper wall portions confine the material to the particular feed chute and prevent it from spilling into adjacent chutes. The lower portions provide additional guide surface to confine the entering material to within the feed chute and direct it into the drum section.

The radial walls 55, 56 have radial portions 107, 108 extending inwardly from the rail beams 37 to form a retaining wall or surface along the screen and prevent material from falling through the openings 50 at the bottom of the feed structure. The width of this retaining wall should be large enough to prevent the spilling of the material piled in the bottom of the drum into the openings 50 and small enough so as not to restrict the flow of material through the opening. The width of the radial portion is preferably half of the width of enclosing radial walls 55, 56. The partition walls extend upwardly in between these walls to the deflecting plates

60. The outer surface of the deflecting plates 60 and the trailing surfaces 75 preferably form continuous surfaces from the periphery of the feed structure to the hub of the feed chute.

Considering the action of the entering material the conveyor 17 drops the material into the feed passage 41 in which the material spreads laterally to form a ribbon of material that slides into the feed structure at an angle between 40 and 50 degrees. The material passes through the openings 50 and drops on the inclined surface. The leading wall 74 moves away from the entering stream and only momentarily receives an impact of material. The material primarily strikes along the length of the inclined surface. The inclined surface deflects the material at an acute angle into the drum section and the material pours over the hub of the feed structure. The trailing surface 75 being in a substantially horizontal position at the beginning of the reception of the material into the feed chute catches entering material and tends to hold it so that it piles up. As the surface 75 moves to a vertical position the material slides off the sub end into the drum section.

The deflection plates 58, 59, and 60 interrupt the smooth flow of material into the chute. The plate 60 is tilted to face inwardly and imparts a forward component of movement to the material tending to carry the material with the plate surface. The pitch of the plate imparts an inward component which moves the material away from the plate 60 and into the chute. The plate 59 is sloped inwardly in the opposite direction and deflects the material into the succeeding chute.

It is preferable that the slope of plate 59 should be great enough to present the plate always at an inward angle to the material feed. With the plate at this angle and moving away from the entering material. The impinging material deflects off of the plate into the succeeding opening. The angle and speed of movement of the plate reduces the spilling and scattering effect to a negligible amount thus reducing the lost material to an inconsequential amount.

The plate 58 is at an even greater angle to the entering material and deflects the impinging material into the chute. With the feed 41 midway down the upper quadrant of the drum any material carried by the deflection plates or bouncing upwardly has an opportunity to drop through the opening into the chute while the chute is still in a feeding position. The chute remains in a feeding position after the trailing partition plate has passed the feed 41 and the succeeding chute is receiving the entering material. The remaining material in the chute has time to slide out before the inclined surface is turned on its side and thence into the reverse or upside down position, Any material caught or carried by the deflection plates will drop into the chute before being carried to the bottom of the drum.

The material dropping into the drum section falls on the drum walls 36, 37 and piles up at the entrance end. The radial plates extending inwardly from the drum wall form a retaining wall. This wall prevents the material from falling through the opening 50 into the exit chutes. The moving drum wall carries the material up the side of the drum wall. The material of the proper size is screened through the openings 21 in the drum wall. The oversized material is progressively moved to the end of the drum section. In the embodiment shown in Fig. 1 rotating hammers are provided at the exit end to reduce the oversized material reaching the exit end to the desired size. The material is picked up by the end lifting shelves and dropped in the hammercircle. The rotating hammers break up the remaining pieces of material. The unbreakable pieces such as tramp iron and the like is picked up by the ploughs 33, 34 and forced out into the refuse chutes 18, 19.

As the entering material drops onto the inclined surface it receives its initial breaking or reducing action. The incline of the surface 52 clears the material so that the material is continually smashing against the surface. Further reduction action occurs as the material drops on to the drum wall. With the entering material pouring into the drum the greatest accumulation of material occurs at the entrance end of the drum. The initial tumbling action causes the greatest amount of material to pass through the drum wall openings at the entrance end. At the exit end of the drum the amount of material reduced and sifted through the drum is considerably less than the entrance end. With the shortened drum length the higher productive portion is utilized and the less protective portion eliminated. The feed structure as shown permits the inclusion of two of these high productive drums in the same length of previous drums. It is thus seen that the effective breaking and sifting area is nearly double in comparison to that of a single feed drum of the same overall length. These two high output drum areas within a given drum length greatly increase the capacity of the unit.

In addition two separate outputs are provided. This permits greater flexibility in the type of secondary hammermill that receives the material. The hammermills may be placed directly under the exit chute thus eliminating the space consuming feed splitter. This reduces the overall space requirements of the breaker and hammermill.

The feed structure shown permits breakers not only of increased output but of greater versatility. With two separate drums different types of fines may be within a given drum length. One drum section may be set for one size and the other drum section for another size fine. Also the length of the two drum sections may be different to accommodate the requirements of the succeeding hammermills.

Although a particular embodiment has been shown and described various modifications and changes may be made without departing from the scope of the invention.

I claim:

1. A Bradford type breaker comprising a rotatable drum having evenly spaced parallel rail beams arranged to form a cylindrical shape and drum walls mounted on said beams to form two axially spaced crushing drum sections, two circumferential flanges on adjacent spaced edges of said drum walls to form a peripheral passage from outside of said drum to within said drum and forming a retaining wall along the edge of said drum section, said passage intersected by said rail beams to form spaced openings in said passage outside of said drum walls, two axially spaced hubs in the center of the drum and in the radial plane of a respective flange to form concentric ring shaped openings in the plane of the respective flanges, sectorial deflecting chutes uniformly arranged around the axis and extending radially at a longitudinal angle to the axis of the drum from the inner edge of a flange to the hub in the plane of the opposite flange and with adjacent chutes facing in opposite directions so that as the drum rotates material entering through the passage is alternately deflected into one drum section then into the other.

2. A Bradford type breaker as claimed in claim 1 wherein partition plates are positioned between adjacent deflecting chutes to form feed chutes and prevent material from passing from one chute into an adjacent chute.

3. A Bradford type breaker as claimed in claim 2 wherein the partition plate on the trailing edge of the deflecting chute extends the full length of the chute from the peripheral flanges to the hub.

4. A Bradford type breaker as claimed in claim 3 wherein said partition plate on the trailing edge extends a slight angle to the radial and is tangential to the hub at a point to provide the partition plate with a forward tilt.

5. A Bradford type breaker as claimed in claim 3

wherein a radial extending plate is positioned adjacent the leading edge of the rail beam to deflect entering material into a respective feed chute.

6. A Bradford type breaker comprising a supporting drum frame having end spiders and longitudinal parallel bars uniformly spaced on said spiders in a cylindrical shape, drum walls with screening openings mounted on said bars to form two axially aligned drum sections having adjacent ends axially spaced to form a peripheral opening for material to enter into said drum sections each with initial screen area adjacent the passage, two circumferential flanges each extending radially through the peripheral opening and positioned on the adjacent spaced edges of said drum walls to form an entering passage from outside of said drum to within said drum, hubs position on the axis and at adjacent ends of the drum to form openings between the corresponding flanges said passage intersected by said rail beams to form spaced openings around the outer portion of said passage, a material feed at approximately forty-five degrees and positioned at a point approximately forty-five degrees from the horizontal position to feed material into the passage, a deflecting structure secured to the rail beams and rotating therewith having at least four feed chutes sectorially dividing the space between said drum sections to alternately feed the material received from the material feed through the passage on to the respective initial screen areas of the drums as the breaker rotates, each feed chute comprising a deflecting surface, a leading surface and a trailing surface, said deflecting surface extending from a hub point on the axis of the drum and in the plane of one of the radial flanges and widening outwardly to the inner peripheral edge of the opposite radial flange for diverting the radially entering material from the material feed longitudinally at an angle through the opening between the hub and the inner edge of the corresponding flange, said leading surface being axially disposed crosswise of the passage and extending inwardly towards the hub from the bars to the intersectors of adjacent deflecting surfaces for separating one preceding feed chute from one succeeding feed chute, said trailing surface being axially disposed crosswise of the passage and extending inwardly to the hub to provide a diverting surface between said deflecting surface and the plane of the concentric opening to collect entering material and direct it in cooperation with the deflecting surface onto the screen area of a respective drum section, said initial screening area sorting out the oversize material and passing it along the drum, lift shelves mounted on the drum walls extending along the screen areas to the respective end spiders to pick the material up and drop it on the drum wall to break it to the proper size for passing through the openings, hammer rotors rotatably mounted on the spiders at each end of the drum for receiving the remaining oversize material and reducing it to the proper size.

7. A Bradford type breaker comprising a supporting drum frame having end spiders and longitudinal parallel bars uniformly spaced between said spiders in a cylindrical shape, drum walls with screening openings mounted on said bars to form two axially aligned drum sections having adjacent ends axially spaced to form a peripheral opening for material to enter said drum sections each with an initial screening area adjacent the passage, two circumferential flanges each extending radially to the peripheral opening and positioned at the adjacent spaced edges of said drum walls to form an entering passage from outside of said rail beams to within said drum, said passage intersected by said rail beams to form spaced openings around the outer portion of said passage, a material feed at aproximately forty-five degrees to the horizontal and at a point approximately forty-five degrees above the horizontal on the side of the drum to feed material into the passage, a deflecting structure secured to the rail beams and rotating with the supporting drum frame at least four feed chutes sectorially dividing the space between said drum sections to alternately feed the material received from the material feed through the passage on to the respective initial screen areas of the drums as the breaker rotates, each feed chute having a deflecting surface extending from a point on the axis of the drum and in the plane of the radial flanges and widening outwardly to the inner peripheral edge of the opposite radial flange for diverting the radially entering material from the material feed longitudinally at an angle through the opening between the center point and the inner edge of the flange and drop it on to the respective initial screening area for sorting out the oversize material and passes it along the drum, lift shelves mounted on the respective drum walls extending along the screening area to the end spider to pick the material up and break it to the proper size for passing through the openings, hammer rotors rotatably mounted on the spiders at one end of each drum section for receiving the final oversize material and reducing it to the proper size.

8. A Bradford type breaker comprising a supporting drum frame having end spiders and longitudinal parallel bars uniformly spaced between said spiders in a cylindrical shape, drum walls with screening openings mounted on said bars to form two axially aligned drum sections having adjacent ends axially spaced to form a peripheral opening for material to enter said drum sections each with an initial screening area adjacent the passage, two circumferential flanges each extending radially to the peripheral opening and positioned at the adjacent spaced edges of said drum walls to form an entering passage from outside of said rail beams to within said drum, said passage intersected by said rail beams to form spaced openings around the outer portion of said passage, a material feed to feed material into the passage, a deflecting structure secured to the rail beams and rotating with the supporting drum frame at least four feed chutes sectorially dividing the space between said drum sections to alternately feed the material received from the material feed through the passage on to the respective initial screen areas of the drums as the breaker rotates, each feed chute having a deflecting surface extending from a point on the axis of the drum and in the plane of the radial flanges and widening outwardly to the inner peripheral edge of the opposite radial flange for diverting the radially entering material from the material feed longitudinally at an angle through the opening between the center point and the inner edge of the flange and drop it on to the repective initial screening area for sorting out the oversize material and passes it along the drum, lift shelves mounted on the respective drum walls extending along the screening area to the end spider to pick the material up and break it to the proper size for passing through the openings, hammer rotors rotatably mounted on the spiders at one end of each drum section for receiving the final oversize material and reducing it to the proper size.

9. A Bradford type breaker comprising a supporting drum frame having end spiders and longitudinal parallel bars uniformly spaced between said spiders in a cylindrical shape, drum walls with screening openings mounted on said bars to form two axially aligned drum sections of equal length having adjacent ends axially spaced to form a peripheral opening midway between the spiders for material to enter said drum sections each with an initial screening area adjacent the passage, two circumferential flanges each extending radially to the peripheral opening and positioned at the adjacent spaced edges of said drum walls to form an entering passage from outside of said rail beams to within said drum, said passage intersected by said rail beams to form spaced openings around the outer portion of said passage, a material feed at approximately forty-five degrees to the horizontal and at a point approximately forty-five degrees above the hori-

zontal on the side of the drum to feed material into the passage, a deflecting structure secured to the rail beams and rotating with the supporting drum frame at least four feed chutes sectorially dividing the space between said drum sections to alternately feed the material received from the material feed through the passage on to the respective initial screen areas of the drums as the breaker rotates, each feed chute having a deflecting surface extending from a point on the axis of the drum and in the plane of the radial flanges and widening outwardly to the inner peripheral edge of the opposite radial flange for diverting the radially entering material from the material feed longitudinally at an angle through the opening between the center point and the inner edge of the flange and drop it on to the respective initial screening area for sorting out the oversize material and passes it along the drum, lift shelves mounted on the respective drum walls extending along the screening area to the end spider to pick the material up and break it to the proper size for passing through the openings, hammer rotors rotatably mounted on the spiders at one end of each drum section for receiving the final oversize material and reducing it to the proper size.

10. A Bradford type breaker comprising a supporting drum frame having end spiders and longitudinal parallel bars uniformly spaced on said spiders in a cylindrical shape, drum walls with screening openings mounted on said bars to form two axially aligned drum sections of equal length having adjacent ends axially spaced to form a peripheral opening midway between the spiders for material to enter into said drum sections each with initial screen area adjacent the passage, two circumferential flanges each extending radially through the peripheral opening and positioned on the adjacent spaced edges of said drum walls to form an entering passage from outside of said drum to within said drum, hubs positioned on the axis and at adjacent ends of the drum to form openings between the corresponding flanges said passage intersected by said rail beams to form spaced openings around the outer portion of said passage, a material feed at approximately forty-five degrees and positioned at a point approximately forty-five degrees from the horizontal position to feed material into the passage, a deflecting structure secured to the rail beams and rotating therewith having at least four feed chutes sectorially dividing the space between said drum sections to alternately feed the material received from the material feed through the passage on to the respective initial screen areas of the drums as the breaker rotates, each feed chute comprising a deflecting surface, a leading surface and a trailing surface, said deflecting surface extending from a hub point on the axis of the drum and in the plane of one of the radial flanges and widening outwardly to the inner peripheral edge of the opposite radial flange for diverting the radially entering material from the material feed longitudinally at an angle through the opening between the hub and the inner edge of the corresponding flange, said leading surface being axially disposed crosswise of the passage and extending inwardly towards the hub from the bars to the intersectors of adjacent deflecting surfaces for separating one preceding feed chute from one succeeding feed chute, said trailing surface being axially disposed crosswise of the passage and extending inwardly to the hub to provide a diverting surface between said deflecting surface and the plane of the concentric opening to collect entering material and direct it in cooperation with the deflecting surface onto the screen area of a respective drum section, said initial screening area sorting out the oversize material and passing it along the drum, lift shelves mounted on the drum walls extending along the screen areas to the respective end spiders to pick the material up and drop it on the drum wall to break it to the proper size for passing through the openings, hammer rotors rotatably mounted on spiders at each end of the drum for receiving the remaining oversize material and reducing it to the proper size.

11. A Bradford type breaker comprising a supporting drum frame having end spiders and longitudinal parallel bars uniformly spaced between said spiders in a cylindrical shape, drum walls with screening openings mounted on said bars to form two axially aligned drum sections having adjacent ends axially spaced to form a peripheral opening for material to enter said drum sections each with an initial screening area adjacent the passage, two circumferential flanges each extending radially to the peripheral opening and positioned at the adjacent spaced edges of said drum walls to form an entering passage from outside of said rail beams to within said drum, said passage intersected by said rail beams to form spaced openings around the outer portion of said passage, a material feed to feed material into the passage, a deflecting structure secured to the rail beams and rotating with the supporting drum frame at least four feed chutes sectorially dividing the space between said drum sections to alternately feed the material received from the material feed through the passage on to the respective screen areas of the drums as the breaker rotates, each feed chute having a deflecting surface extending from a point on the axis of the drum and in the plane of the radial flanges and widening outwardly to the inner peripheral edge of the opposite radial flange for diverting the radially entering material from the material feed longitudinally at an angle through the opening between the center point and the inner edge of the flange and drop it on to the respective initial screening area for sorting out the oversize material.

12. A Bradford type breaker comprising a rotatable drum of generally cylindrical shape and having two axially spaced crushing drum sections, two circumferential flanges extending radially and spaced axially from one another to form a peripheral passage between adjacent ends of said drum sections, sectorial deflecting chutes uinformly arranged around the axis and alternately facing in opposite longitudinal directions to extend radially inwardly from a respective flange at a longitudinal angle to the axis of the drum in the path of material entering between said flanges and alternately deflecting said material into the drum sections.

13. A Bradford type breaker as claimed in claim 12 wherein plates are provided on the radial sides of the deflecting chutes to form radial deflecting passages from between said flanges into respective drum sections.

14. In a breaker type mill the combination of a rotatable drum of generally cylindrical shape, an aperture girdling said drum and rotating therewith for introducing material into the drums, feeding means positioned exteriorly to and above the upper half of said drum for projecting material into said aperture, deflecting means rotating with said drum extending radially inwardly and longitudinally at an angle to the axis of rotation of the drum across the radial projection of said aperture to directly receive the radially projected material from said feeding means and deflect said material longitudinally into said drum within half a rotation of the drum.

15. A breaker mill comprising a rotatable drum having walls formed in generally cylindrical shape with perforations for passing comminuted material thereto, opening means girdling said drum and rotating therewith for continuous introduction of material into the drum and intermediately positioned in said drum walls dividing said drum into two crushing zones, deflecting means interiorly and radially spaced from said opening means and having a plurality of chutes extending longitudinally at an angle to the central axis to extend radially across said opening means and arranged to alternately face in opposite longitudinal directions for alternately deflecting said substantially radially entering material to project into a respective crushing zone for comminution by said drum to the desired size.

16. In a breaker type mill the combination of a rotata-

ble drum of generally cylindrical shape having two longitudinally spaced crushing zones, feeding means in said drum between said zones comprising a plurality of apertures consecutively and contiguously arranged around the periphery of said drum, deflecting means contiguous to and extending radially inwardly from said apertures and having a plurality of deflecting surfaces forming radially extending passages from said apertures to the interior of the crushing zones, each surface radially coextensive with a respective aperture and alternately extending longitudinally at an angle to the axis of rotation of the drum to alternately deflect material entering said drum into said crushing zones.

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