Aug. 30, 1960 O. DANYLUKE 2,950,870

PERIPHERAL FEED BREAKER

Filed May 1, 1958 2 Sheets-Sheet 1

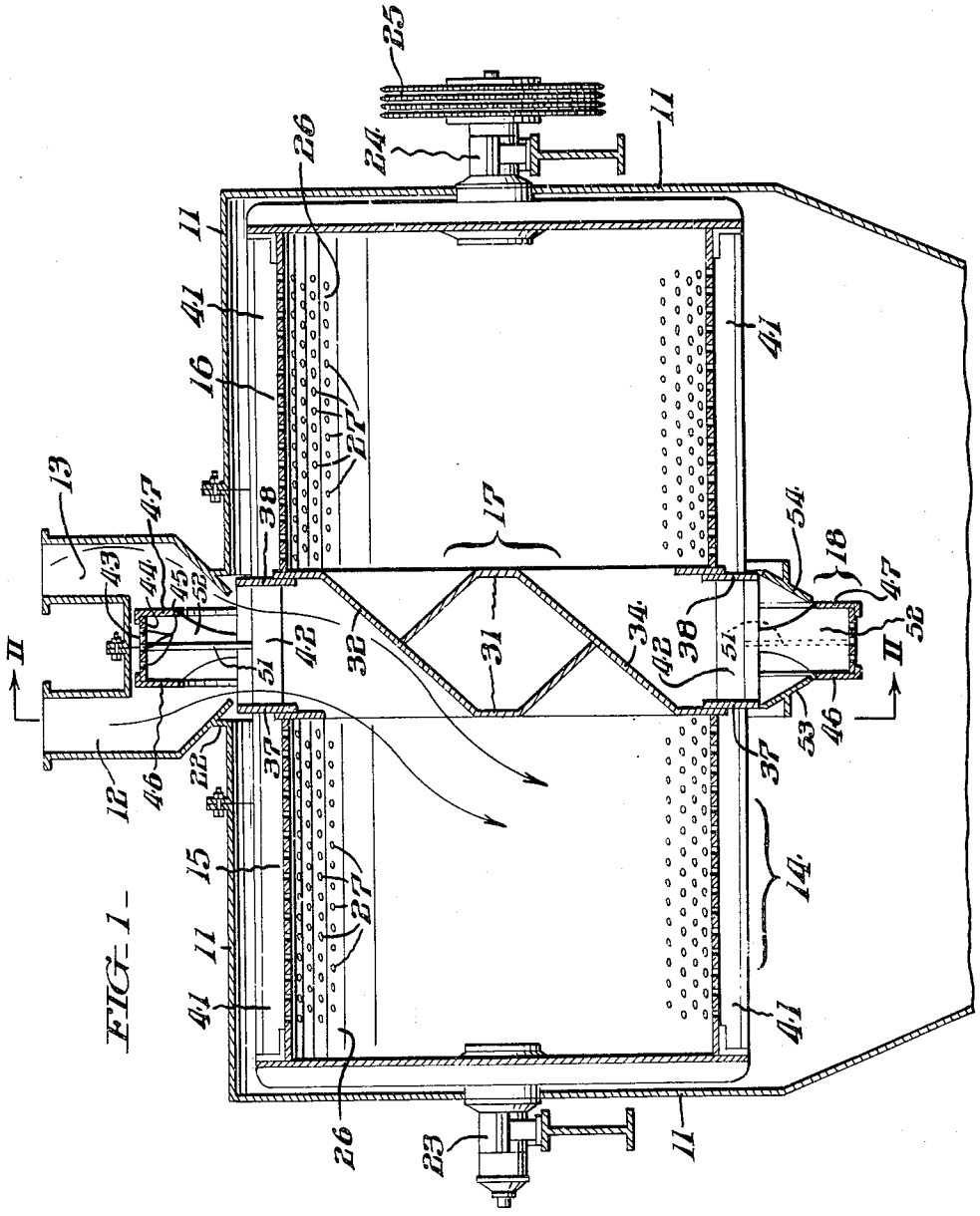


FIG. 1

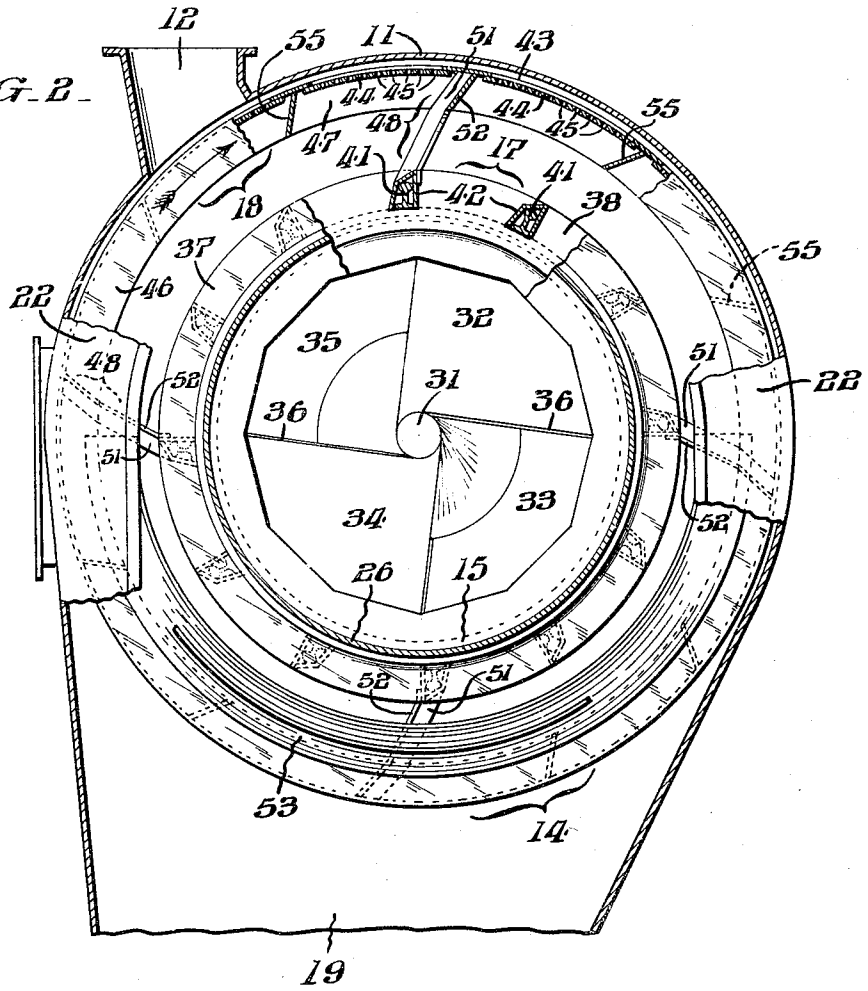
INVENTOR.
Ostap Danyluke,
BY Paul & Paul
ATTORNEYS.

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FIG. 2.



INVENTOR.
Ostap Danyluke,
BY
Paul & Paul
ATTORNEYS.

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PERIPHERAL FEED BREAKER

Ostap Danyluke, Newtown Square, Pa., assignor to Bath Iron Works Corporation, Bath, Maine, a corporation of Maine

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10 Claims. (Cl. 241—91)

This invention relates to improvements in a peripheral feed breaker, and more particularly concerns a peripheral feed breaker of the Bradford type.

Peripheral feed breakers heretofore proposed have included a rotatable center feed chute for feeding the material to be broken (for example, coal) into rotatable drums which are positioned on both sides of the center feed chute. The drums broke the coal into the required size and passed them into an exit chute that led to a receiving hopper. However, some of the coal, instead of passing into the breaker drums, by-passed the breaker drums and spilled directly through the center feed chute into the exit chute. This passes oversize particles into the exit chute and is objectionable even though it may be only up to 3 percent of the material passing through the breaker.

Accordingly, it is an object to overcome the aforementioned disadvantages, and to prevent oversize particles of spillage which passes through the center feed chute from passing into the exit chute.

It is another object to gather up the spillage and drop it back into the center feed chute for distribution to the breaker drums.

It is another object of this invention to drop the spillage at a point of center feed chute travel within the quadrant defined by a horizontal and a vertical plane passing through the axis of rotation of the center feed chute. In other words, as the center feed chute rotates clockwise, the spillage is dropped at a point of rotation between 9 o'clock and 12 o'clock.

Other objects and advantages of this invention, including the ease with which it may be adapted for use with existing equipment, will further become apparent hereinafter and in the drawings, in which:

Fig. 1 is a sectional view in elevation of a Bradford type breaker constructed in accordance with this invention; and

Fig. 2 is a staggered sectional view of the breaker shown in Fig. 1 generally taken as indicated by the lines and arrows II—II which appear in Fig. 1.

In describing the preferred embodiment of the invention illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, it is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, there is shown a Bradford type breaker for breaking friable material into particles no larger than a desired size, which breaker includes an outer casing 11, peripheral feed chutes 12 and 13, a rotatable drum 14 supported in casing 11 and provided with drum sections 15 and 16, a centrally located and rotatable center feed chute 17, a shroud 18 positioned around and rotatable with the center feed chute 17, and an exit chute 19 formed in casing 11 below drum 14.

The friable material which is to be broken into particles

no larger than a desired size is passed into the breaker through peripheral feed chutes 12 and 13 and is dropped into drum sections 15 and 16 by center feed chute 17. The material is broken in drum sections 15 and 16 by being repeatedly lifted by the internal lifting shelves and dropped on the screens 26 and particles no larger than the desired size fall through the drum 14 into exit chute 19. The shroud 18 prevents particles of material which pass directly through center feed chute 17 without being dropped into the rotatable drum 14 from passing directly into exit chute 19, as is hereinafter more fully described.

Outer casing 11 is provided with a hump section 22 which fits closely around the upper half of shroud 18 in order to contain the particles gathered up by shroud 18 within the shroud. Drum 14 is provided with hubs 23, 24 which are rotatably supported, and is driven by sprocket 25. Drum 14 is provided with screens 26 which have perforations 27 formed therein, and it is through these perforations 27 that the particles no larger than the desired size pass into exit chute 19.

Center feed chute 17 includes a hub 31, guide plates 32, 33, 34, and 35, and partition plates 36. Guide plates 32—35 are arranged alternately to direct the material, for example, first into drum section 15, then into drum section 16, then into drum section 15, then into drum section 16, and so on. Center feed chute 17 also includes radial flanges 37 and 38, rail beams 41 which extend the length of drum 14, and rail beam guards 42. For a more detailed discussion of the construction of the breaker including center feed chute 17, reference is made to my Patent No. 2,708,075 for a Peripheral Feed Breaker which issued on May 10, 1955. The numbers of the patent correspond to the numbers here as follows (Fig. 3 in the patent compared to Fig. 2 here): patent number 74 is here number 36 on the left hand side of the drawing; patent number 70 is here number 35; patent number 69 is here number 32; patent number 65 is here number 36 on the right hand side of the drawing; patent number 68 is here number 33; patent number 52 is here number 34; patent number 62 is here number 31; patent number 56 is here number 37; patent number 37 is here number 41; and patent number 55 is here number 38.

Shroud 18 includes a ring 43 with screen plates 44 in which are formed the perforations 45. Positioned at each side of ring 43 are the shroud side walls 46 and 47. Ring 43 is connected to rail beam guards 42 of center feed chute 17 by lift flights 48. Lift flights 48 are provided with a centrally located support fin 51 and have a necked-down position 52 which aids in admitting the material from feed chutes 12 and 13 to center feed chute 17 by providing a larger passageway through which the material passes.

Fixed to the interior of casing 11 and positioned about the lower half of shroud 18 are the confining plates 53, 54 which confine any spillage which passes directly through center feed chute 17, and directs such spillage into shroud 18 while preventing it from passing directly into exit chute 19.

Shroud 18 is also provided with smaller lift flights 55 which are affixed to the inner surface of ring 43, but which are not atttached to center feed chute 17.

In operation, the drum 14 and the center feed chute 17 with its shroud 18 are rotated. The friable material to be broken passes through the peripheral feed chutes 12 and 13, and falls into center feed chute 17 through the opening provided between shroud side walls 46, 47 and the center feed chute 17. The material is directed by guide plates 32—35 into drum sections 15 and 16 in an alternate fashion. However, some of the particles of material instead of passing into drum sections 15 and 16 pass directly through center feed chute 17. These

particles, known as spillage, are prevented from passing through the exit chute **19** through the action of confining plates **53**, **54** and the shroud **18**. The perforations **45** of the screen plates **44** in shroud ring **43** pass fines (particles which are no larger than the desired size) directly into exit chute **19**, but oversized particles of spillage are retained within shroud **18** and are lifted by flights **48**, **55** toward the peripheral feed chutes **12** and **13**. When these spillage particles reach a point in rotation of flights **48**, **55** within 90° of top dead center, the particles of spillage are dropped into center feed chute **17** and directed into drum sections **15** and **16**, and are dropped onto screen **26** of drum **14**. Such spillage thus rejoins the material which was originally directed into drum sections **15** and **16** by center feed chute **17**.

The shroud **18** prevents the spillage from passing through the rotatable center feed chute **17** into the exit chute **19**, but passes the fines directly to exit chute **19** through the perforations **45** of the screen plates **44** in the shroud itself. Flights **48**, **55** of shroud **18** rotate with it and breaker drum **14**, and lift the spillage in the direction toward peripheral feed chutes **12**, **13**. The flights **48**, **55** are positioned at an angle, preferably in the range of 30–45 degrees, away from a radius drawn from the axis of the center feed chute **17**, so that the spillage slides back into the rotatable central feed chute **17** and is dropped into drum sections **15** and **16**. The shroud **18** carries only oversize particles of spillage, and passes fines through its screen plates **44** to exit chute **19**.

This breaker is designed to handle friable material (such as coal) which can be broken into particles by dropping the material onto a perforated plate, and is particularly concerned with insuring that the particles are no larger than a maximum desired size. The particles may be smaller in size, and dust-like particles (called fines) are no problem. The drum **14** utilizes a screen which restricts the top size of the coal.

The necked down portion **52** of lift flights **48** allow for feeding the material to be broken through the peripheral feed chutes **12**, **13** into the rotatable center feed chute **17**.

Confining plates **53**, **54** cover the shroud **18** in the lower half of the rotation path of the rotatable center feed chute **17**, and serve the function of confining the spillage. The spillage is confined in the upper half of center feed chute travel by the hump section **22** of outer casing **11**.

The angle of the flights **48**, **55** away from a radial line of the center feed chute **17**, and the speed of rotation of shroud **18** are of importance. The angle of the flight is designed so that all of the spillage gathered up by the flight is dropped from the flight before reaching the top of the breaker. The rotation speed of shroud **18** is slow enough that centrifugal force does not keep the spillage on the outer periphery of the shroud as it would do if the drum **14** were rotated too fast. On the other hand, the rotational speed of shroud **18** is fast enough that the particles of spillage are carried up by the flights **48**, **55** and do not merely roll over the flights, never being carried more than 90 degrees from the bottom of the shroud **18**. Unless the spillage particles are carried more than 90 degrees from the bottom of the shroud, there is no drop of the spillage particles onto the central feed chute **17**.

Very satisfactory results have been obtained with a drum and center feed chute unit which is 25 feet 6 inches in axial length, the drum being 14 feet in diameter. In this unit the center feed chute is 3 feet 6 inches in axial length so that there remains 22 feet of screening length. The drum is rotated preferably in the range of 11 to 13 r.p.m. and the flights are positioned at an angle in the range of 30 to 45 degrees from a radial line of the drum.

It is to be understood that the form of the invention herein shown and described is to be taken as a preferred embodiment. Various changes may be made in the shape, size and arrangement of parts. Equivalent elements may be substituted for those described herein, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A breaker for breaking friable material into particles no larger than a desired size, comprising a rotatable drum having a screen with perforations large enough to pass particles of a size up to and including said desired size; rotatable chute means for directing said friable material into said drum; said breaker having a peripheral passage for admitting said friable material to said rotatable chute means; means forming an exit chute for receiving the particles passing through the perforations of said drum; and shroud means rotatable with said drum preventing oversize particles of said friable material from passing directly from the rotatable chute means to the exit chute, and means to lift and drop said oversize particles into said drum.

2. The breaker defined in claim 1, wherein said shroud means includes lift flight means positioned at an angle from the radius of said breaker with their outermost ends ahead of their innermost ends in the direction of rotation of the drum for lifting and dropping said oversize particles into the drum as said shroud means is rotated.

3. The breaker defined in claim 1, wherein said shroud means includes a ring spaced away from the periphery of said rotatable chute means, and lift flights connecting said ring to said rotatable chute means.

4. The breaker defined in claim 3, wherein said lift flights are positioned at an angle from a radius of said rotatable chute in the range of 30 to 45 degrees with their outermost ends ahead of their innermost ends in the direction of rotation of the drum.

5. The breaker defined in claim 3, wherein both sides of said lift flights are provided with a necked-down portion positioned radially inward of the ends of the flights for allowing passage of the friable material to said rotatable chute means.

6. The breaker defined in claim 3, wherein said ring is provided with screen plates in its periphery through which it passes fines to the exit chute means.

7. The breaker defined in claim 3, wherein said shroud means is provided with a stationary confining plate positioned on each side of the lower half of the travel path of the ring for preventing oversize particles from passing into said exit chute means.

8. The breaker defined in claim 3, wherein said drum is 14 feet in diameter.

9. The breaker defined in claim 3, wherein said shroud ring is provided with side walls extending inwardly toward the axis of rotation of said breaker.

10. The breaker defined in claim 9, wherein said breaker is provided with an outer casing and said outer casing is formed about the ring and side walls of said shroud means to keep said oversize particles within said shroud means.

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