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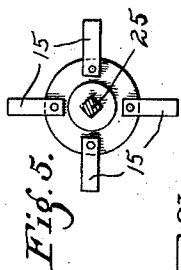
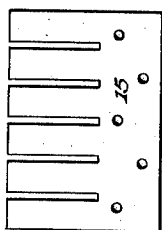
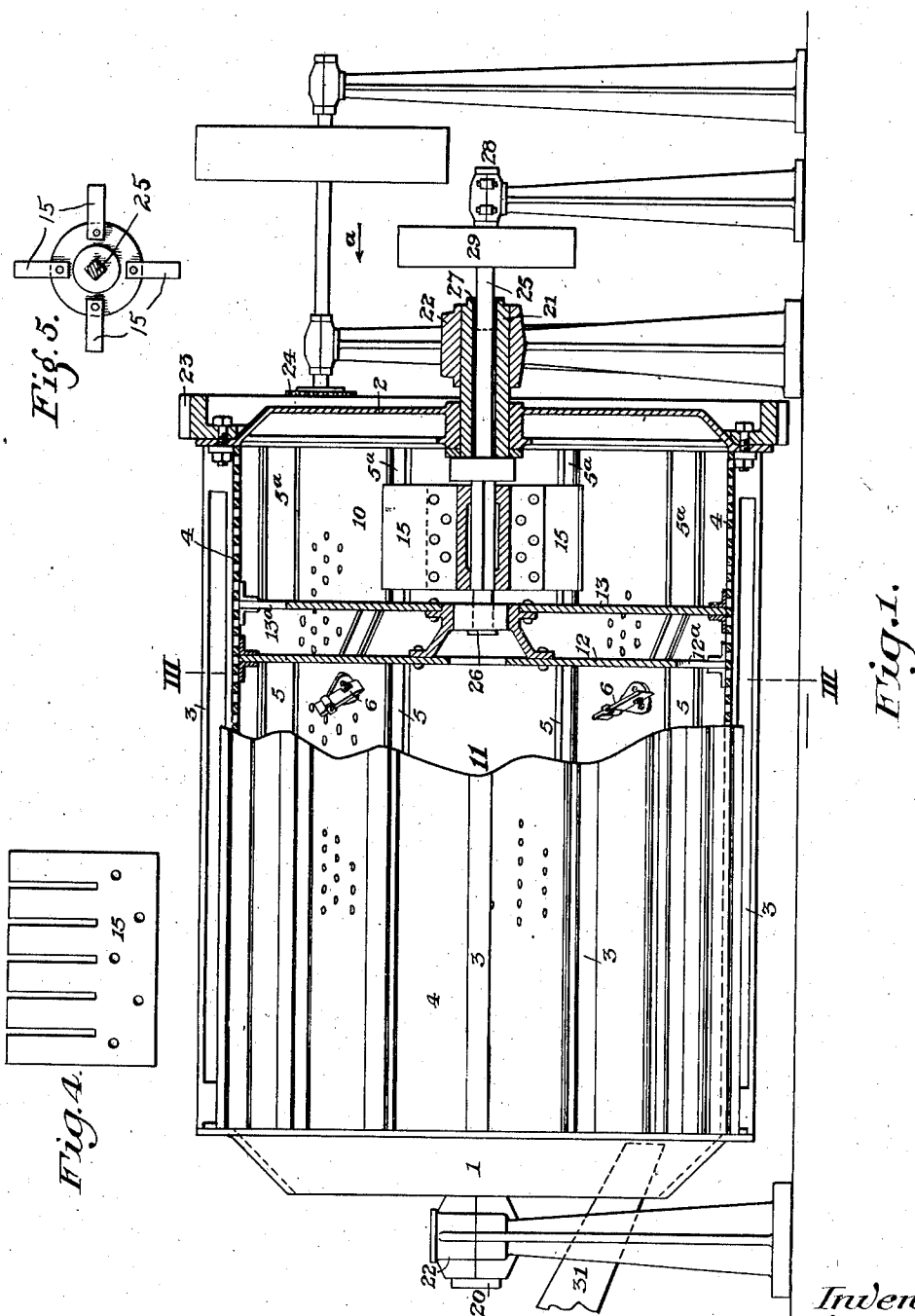
G. W. BORTON

1,744,028

COAL BREAKER

Filed Oct. 28, 1927

2 Sheets-Sheet 1



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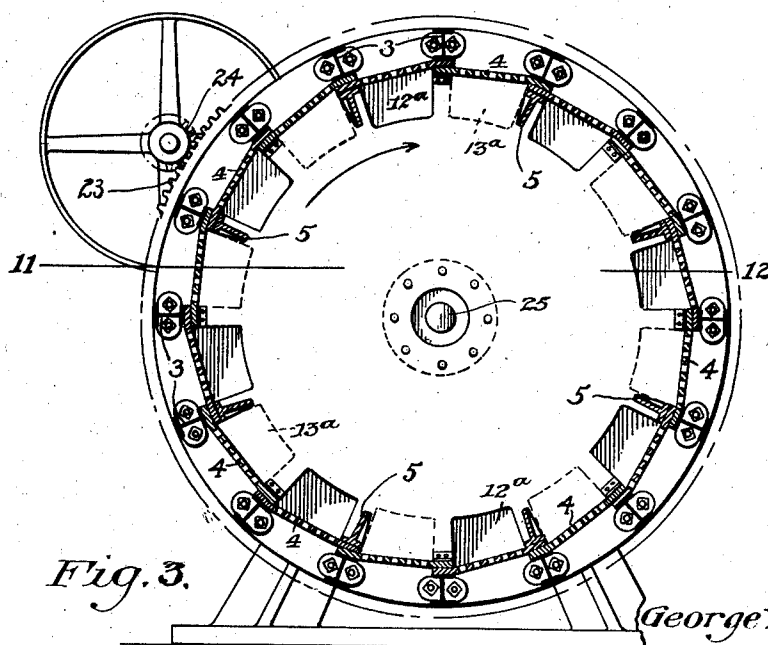
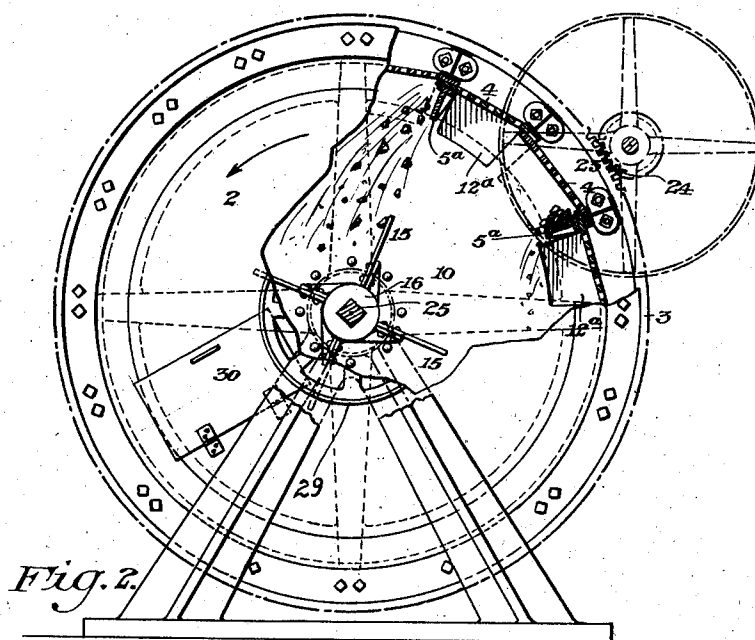
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COAL BREAKER

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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COAL BREAKER

Application filed October 28, 1927. Serial No. 229,323.

My invention relates to coal breakers of the Bradford type, and one object of my invention is to increase the efficiency of machines of this character and insure comminution of the material undergoing treatment to the desired size, and complete discharge of the same through the foraminous wall of the cylinder.

A further object of my invention is to provide a breaker of the Bradford type with beating mechanism disposed at one end of the cylinder and toward which the material undergoing treatment is advanced by suitable means, for instance, deflectors such as those disclosed in the patent of J. A. Plimpton, Number 1,700,687, which deflectors may alternate with shelves extending longitudinally of the cylinder forming the breaker structure, whereby the material undergoing treatment is successively lifted and dropped for the purpose of breakage and at the same time is fed longitudinally of the breaker chamber from the receiving end of the same.

A further object of my invention is to provide at one end of the chamber a beater structure which may comprise a rotor carrying suitable blades or hammers rotating at a speed greater than that of the cylinder, whereby such portion of the material undergoing treatment reaching said chamber is subjected to impact in addition to the fracture which may be effected by falling from the shelves and striking the lower portion of the structure.

These and other features of my invention are more fully described hereinafter; reference being had to the accompanying drawings, in which:

Figure 1 is a view in elevation, partly in section, of a breaker structure embodying my present improvements.

Fig. 2 is an end elevation partly in section looking in the direction of the arrow *a*, Fig. 1.

Fig. 3 is a cross section on the line III—III, Fig. 1.

Figs. 4 and 5 are views illustrating details of my invention.

The breaker structure as a whole is of substantially the same type as those illustrated in the patent of Borton and Hiller, No.

1,086,129, Feb. 3, 1914, and the patent of Hiller No. 1,322,568, Nov. 25, 1919; having a foraminous wall which may be made up of plates of the type set forth in the patent of J. H. Doerres, No. 1,563,173, dated Nov. 24, 1925, which plates are flat for the greater portion of their extent and are provided with edge flanges disposed in lapped relation when assembled to form the cylinder of the breaker structure. It will be understood, of course, that while plates of this type are preferred, the present invention is not limited in any sense to the use of plates of this type in constructing the breaker cylinder.

As illustrated in the patents referred to and in the accompanying drawings, the cylinder comprises end frames or spiders 1 and 2, connected by I beams 3, which may be of rail type if desired, and between which the foraminous plates 4, which make up what may be termed the screen portion of the breaker, are confined. Internally of the drum or cylinder shelves 5 are provided, which may extend throughout the length of the same and in practice these shelves may be associated with alternate beams extending longitudinally of the structure and secured to the latter by the fastening means employed for the plates. The inner wall of the cylinder may be provided with deflectors 6, of the type illustrated in the Plimpton patent referred to, set at a suitable angle, so that material fed into one end of the cylinder, in the present instance at the left, will be moved toward the right as the cylinder rotates.

In the present instance I have shown at the right hand end of the cylinder a separate chamber 10 in which I mount a beater structure 15. This chamber 10 may be separated from the main chamber of the breaker by a pair of walls or diaphragms 12 and 13, each provided with openings 12^a and 13^a offset or staggered with respect to each other and disposed adjacent the periphery of the chamber, so that as the material undergoing treatment is slowly moved toward the beater chamber, it will pass into the space between the walls 12 and 13, and by means of plows or deflectors of suitable type disposed therein will pass thence to the beater chamber 10.

where it will be carried up by shelves 5^a, which may be extensions of the shelves 5, or may be independently mounted in the beater chamber alone in case such shelves are omitted in the chamber between the spaced walls 12 and 13. These shelves will lift the material undergoing treatment and discharge the same into the zone of the blades or hammers 15, carried by the rotor 16, of the beater structure 15, disposed within said chamber.

Breakers of the type described are mounted upon trunnions; those in the present instance being indicated at 20 and 21 and carried by the frames or spiders 1 and 2 at each end of the cylinder. These trunnions may be supported by suitable bearings 22 in which they may turn. In order that motion may be imparted to the cylinder, the frame or spider at one end of the same is provided with a spur gear 23, to which motion may be imparted from a pinion 24, driven in any suitable manner. The trunnion 21 at the end of the structure adjacent the beater chamber is hollow, and receives the shaft 25, upon which the rotor 16, carrying the beaters is mounted; supports for the bearing 26 of the latter being provided by the spaced walls 12 and 13, and the outboard bearing being formed by a bronze bushing 27 supported by the trunnion 21. If desired a further bearing may be provided as indicated at 28. The shaft 25 carries a pulley or other member 29 whereby it may be driven at the desired speed, which is in excess of the speed of the main cylinder. Any suitable form of driving means may be employed.

While I have shown a structure in which a pair of walls or diaphragms, indicated at 12 or 13 are employed, it is possible to construct and operate my improved device with a single diaphragm or wall having restricted openings adjacent to the periphery, and such construction is within the scope of my invention. A single wall will provide proper support for the inner end of the shaft 25.

In some instances the walls 12 and 13 forming the intermediate chamber may be omitted and the inner bearing for the shaft 25 may be supported by struts forming a spider and extending inwardly from the end frame or spider 2. It will be noted that this end of the structure is closed, although this is not essential. When of closed form, it will be provided with a door 30.

In operation, coal to be broken is fed into the cylinder by means of a chute 31 at the left hand end of the cylinder, and is subjected to such breakage or fracture as may be occasioned by normal operation wherein the material is carried up by the shelves and dropped into the lower portion of the revolving cylinder in the usual manner. The deflectors mounted upon the walls of the cylinder gradually move the material forward during the lifting and dropping actions toward the wall

12 of the intermediate chamber; such material finding its way into and through such chamber via the openings 12^a and 13^a and being deflected therefrom by plows or other means into the beater chamber 10, which may be provided with shelves similar to those of the main chamber whereby the material delivered to such chamber may be raised, and in dropping from these shelves such material falls into the zone of the beaters and is finally broken; passing from such chamber through the foraminous wall after being broken to the desired size.

The beaters employed may be flat blades occupying substantially the entire width of the chamber 10, or such beaters may be of the shape indicated in Fig. 4. In lieu of beaters, individual pivoted hammers 15^a, such as illustrated in Fig. 5, may be carried by the rotor structure. In all instances the rotor carrying the blades or hammers is rotated at a speed much greater than that of the cylinder.

By providing the walls 12 and 13 with restricted openings, offset with respect to each, ample provision is made for the passage of the material undergoing treatment. At the same time such arrangement prevents the passage of large pieces or masses of foreign and uncrushable material which may be accidentally introduced into the main chamber of the breaker.

The construction herein described and shown in the accompanying drawings, is highly efficient in use in that it gives a minimum of fines on hard coals, and will establish a maximum diameter of product which is very desirable for stoker feed.

I claim:

1. In a crushing structure, the combination of a rotating cylinder having a foraminous wall, a series of shelves extending longitudinally of said cylinder internally of the same whereby material introduced therein may be lifted for gravitational discharge to the lower portion thereof for fracture and subsequent discharge through said foraminous wall, means for carrying such material forward in the cylinder, a pair of walls placed across the cylinder and dividing the interior thereof into a plurality of chambers; the space between said walls forming an intermediate chamber and said walls having openings adjacent the periphery of the cylinder whereby material passed into said intermediate chamber from the preceding chamber will be subjected to annular movement for a short distance and then diverted to an end chamber, and independently operated beating mechanism disposed in said end chamber.

2. In a crushing structure, the combination of a rotating cylinder having a foraminous wall and a plurality of chambers internally disposed, means for rotating said cylinder, a series of shelves extending longitudinally of said chambers internally of the same whereby

material introduced into one of said chambers may be lifted for gravitational discharge to the lower portion thereof for fracture and subsequent discharge through the foraminous wall, means for carrying such material forward in the chambered cylinder, and independently operated beating mechanism disposed in the end chamber toward which material is moved during rotation of the cylinder.

10 3. In a crushing structure, the combination of a rotating cylinder having a foraminous wall, a series of shelves extending longitudinally of said cylinder internally of the same whereby material introduced therein may be lifted for gravitational discharge to the lower portion thereof for fracture into a size permitting discharge through said foraminous wall, means for carrying such material forward in the cylinder, a pair of walls placed across the cylinder and dividing the interior thereof into a plurality of chambers; the space between said walls forming an intermediate chamber and said walls having openings in staggered relation adjacent to the periphery of the cylinder whereby material passed into said intermediate chamber from the preceding chamber will be subjected to annular movement for a short distance and then diverted to an end chamber, beating mechanism disposed in said end chamber, means for driving the cylinder at a relatively slow speed, and independent means for driving the beating mechanism at a much higher speed whereby material unbroken by impact against the cylinder wall and delivered to said final chamber will be broken by impact of the beating mechanism to a size permitting passage through that portion of the foraminous wall enclosing said beating chamber.

40 4. In a crushing structure, the combination of a rotating cylinder having a foraminous wall and a plurality of chambers internally disposed, a series of shelves extending longitudinally of said chamber internally of the same whereby material introduced into one of said chambers may be lifted for gravitational discharge to the lower portion of said chamber whereby it may be broken into a size permitting discharge through the foraminous wall, means for carrying such material forward in the chambered cylinder, beating mechanism disposed at one end of said cylinder, means for driving the cylinder at a relatively slow speed, and independent means for driving the beating mechanism at a much higher speed whereby material unbroken by impact against the cylinder wall and delivered to the beating zone will be broken by impact of the beating mechanism to a size permitting passage through that portion of the foraminous wall enclosing said beating chamber.

5. In a coal breaker, the combination of a cylinder having foraminous walls throughout

and divided into a plurality of compartments which may be termed main, intermediate and beating compartments, means carried by the walls of said cylinder for lifting and advancing coal delivered to the main compartment and delivering a portion of the same to the intermediate compartment, means within the intermediate compartment for delivering the coal entering therein to the beater compartment, and independently operated beater means arranged within said beater compartment.

6. In a coal breaker, the combination of a cylinder having foraminous walls throughout and divided into a plurality of compartments which may be termed main, intermediate, and beating compartments, means carried by the walls of said cylinder for lifting and advancing coal delivered to the main compartment and delivering a portion of the same to the intermediate compartment, means within the intermediate compartment for delivering the coal entering therein to the beater compartment, beater means within said beater compartment, means for driving the cylinder at a relatively slow speed, and independent means for driving said beating means at a relatively high speed.

7. In a coal breaker, the combination of a cylinder comprising end frames or spiders and a foraminous wall, longitudinal beams supporting said wall, shelves within the cylinder for lifting material introduced therein for gravitational fracture, beater mechanism located at one end of said cylinder, a plurality of walls forming an intermediate chamber and constituting an end support for the shaft of the beater mechanism, trunnions carried by the end frames or spiders for supporting the cylinders; one of said trunnions being in the form of a sleeve and receiving the shaft of the beater mechanism, means for driving the cylinder at a relatively slow speed, and independent means for imparting high speed to the beater mechanism.

8. In a coal breaker, the combination of a cylinder comprising end frames or spiders and a foraminous wall, longitudinal beams supporting said wall, shelves within the cylinder for lifting material introduced therein for gravitational fracture, beater mechanism located at one end of said cylinder, a plurality of walls forming an intermediate chamber and constituting an end support for the shaft of the beater mechanism; said walls having offset openings adjacent the periphery of the cylinder for the passage of material undergoing treatment, trunnions carried by the end frames or spiders for supporting the cylinder; one of said trunnions being in the form of a sleeve and receiving the shaft of the beater mechanism, means for driving the cylinder at a relatively slow speed, and independent means for imparting high speed to the beater mechanism.

9. In a crushing structure, the combination of a rotating cylinder having a foraminous outer wall, a cross wall or diaphragm dividing the interior of the same into a plurality of chambers, means for rotating said cylinder, a series of shelves extending longitudinally of said chambers internally of the same whereby material introduced into one of said chambers may be lifted for gravitational discharge to the lower portion of the same for fracture and subsequent discharge through the foraminous wall, means for carrying such material forward in the chambered cylinder, and independently operated beating mechanism disposed in an end chamber toward which material is moved during rotation of the cylinder.

In witness whereof I have signed this specification.

GEORGE W. BORTON.