Oct. 25, 1932. G. W. BORTON 1,884,544

CRUSHING MACHINERY

Filed Jan. 29, 1930 2 Sheets-Sheet 1

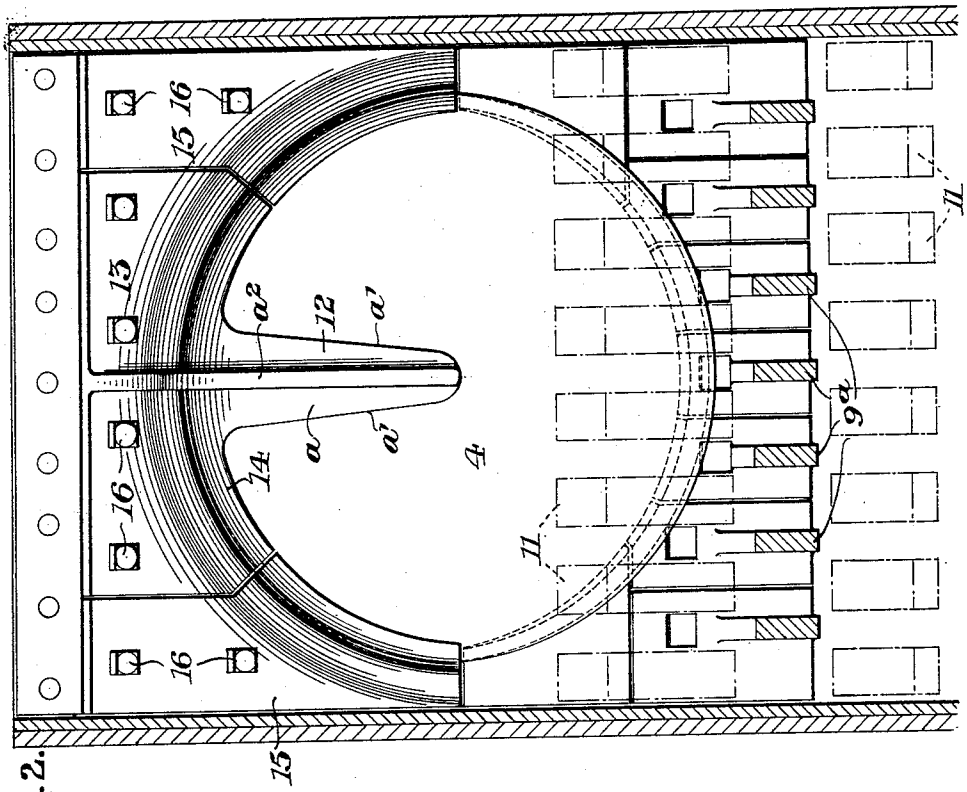


Fig. 2.

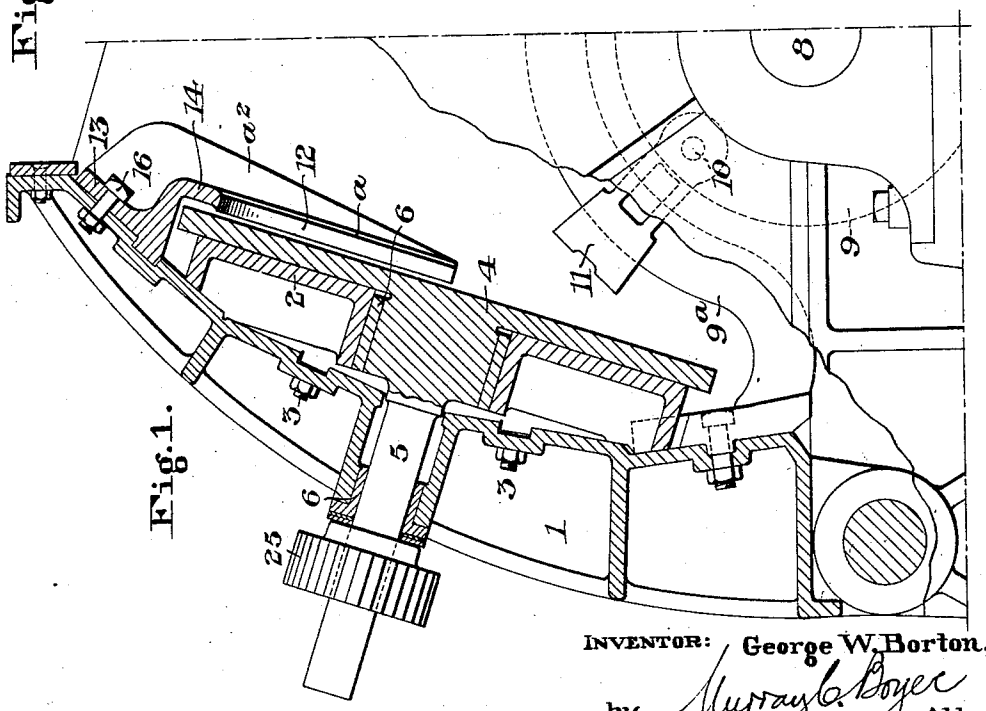


Fig. 1.

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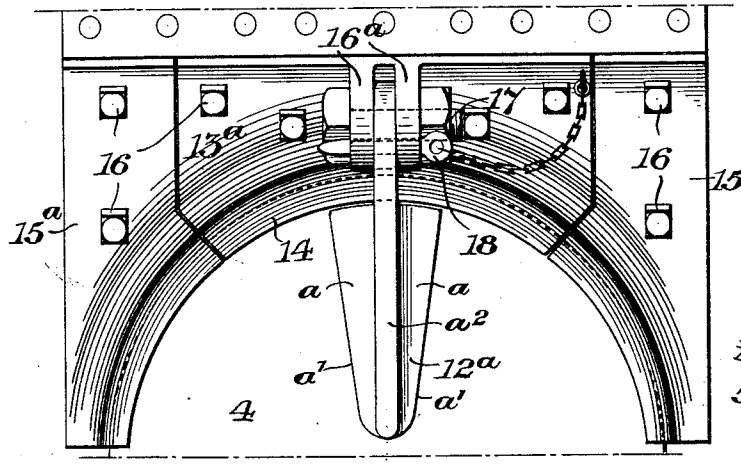
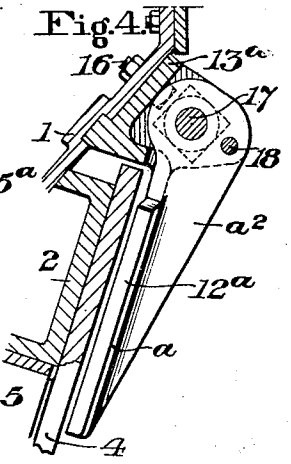


Fig. 3.



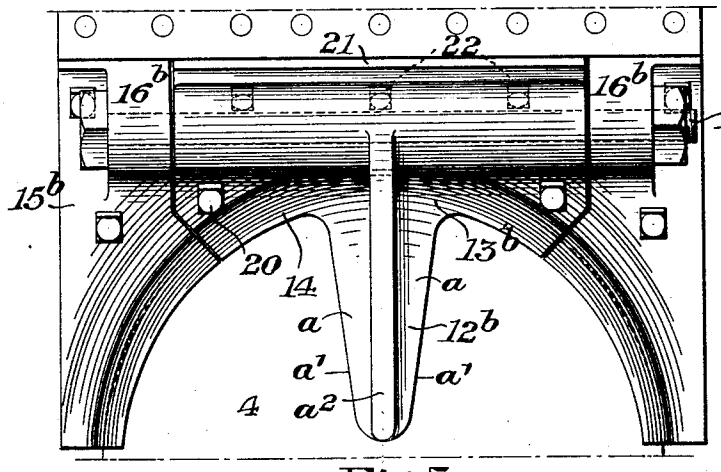
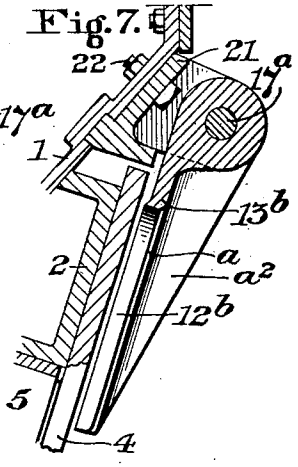


Fig. 5.



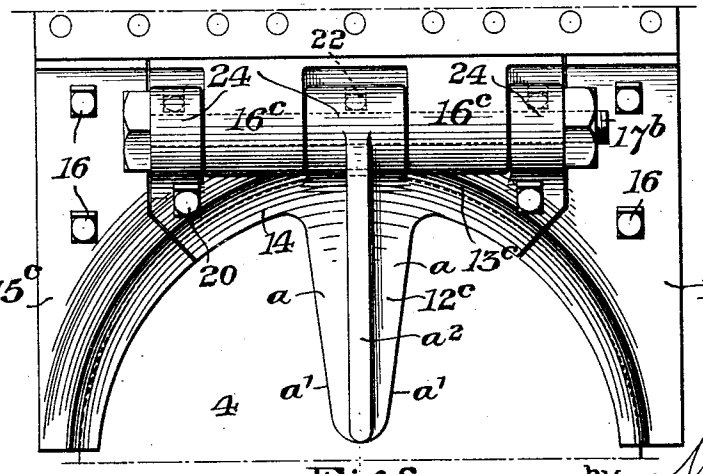
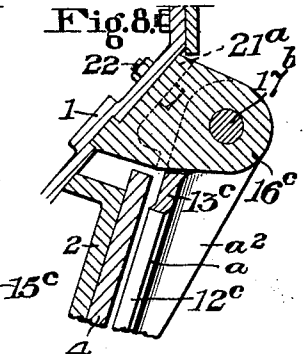


Fig. 6.



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Patented Oct. 25, 1932 1,884,544

UNITED STATES PATENT OFFICE

GEORGE W. BORTON, OF NEW LISBON, NEW JERSEY, ASSIGNOR TO PENNSYLVANIA CRUSHER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

CRUSHING MACHINERY

Application filed January 29, 1930. Serial No. 424,398.

My invention relates to crushing machinery of the type employing rotor structures carrying hammers which engage material delivered into their path and effect breakage or rupture thereof by beating the same against a breaking surface, plate or the like, forming one wall or part of one wall of the crushing chamber.

As set forth in my companion application filed December 12, 1929, Serial No. 413,474, certain materials which may originally contain a high moisture content or which may be subject to wet conditions during transit between the point of excavation and the point of crushing become so sticky that, in the operation of reducing the same, a mass of highly viscous mud builds up on the breaker plate and seriously affects the capacity of breaking machinery of this type.

The main object of my invention, therefore, is to provide means that will prevent this building up of a body of sticky and/or slimy material or mud upon the breaker plate.

A further object of my invention is to provide a movable breaking surface or breaker plate against which the material will be hurled by the rotary beaters or hammers.

A further object of my invention is to provide scraping means for the movable breaking surface or breaker plate which will serve to keep the same clean or substantially so during the crushing operation.

A further object of my invention is to provide a scraper blade or arm which may be mounted in relatively fixed position and beneath which the breaking surface or breaker plate is arranged to move.

And a still further object of my invention is to provide a scraper blade or arm that may be moved or swung out of its usual position with respect to the movable breaking surface in the event of hard rock being encountered and it becomes necessary or desirable to relieve the scraper arm.

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 cross sectional view of one form of crushing structure within the scope of my invention, showing a movable breaker plate and scraper means associated therewith.

Fig. 2 is a front elevation of the structure illustrated in Fig. 1.

Fig. 3 is a view in elevation, more or less diagrammatic and similar to the upper portion of Fig. 2, illustrating one manner of mounting the scraper blade or arm in order that it may be swung away from the breaking surface.

Fig. 4 is a side elevation of the arrangement illustrated in Fig. 3, partly in section.

Figs. 5 and 6 are views similar to Fig. 3, illustrating other mounts for a movable scraper blade or arm within the scope of my invention, and

Figs. 7 and 8 are side elevations of the mounts shown in Figs. 5 and 6, partly in section.

While applicable to many forms of crushing machinery, in the present instance I have shown my improved breaker plate and scraper construction as applied to crushing machinery of the type illustrated in my pending application, filed August 25, 1928, Serial No. 302,080, in which the crushing chamber is provided with a series of grid bars. These grid bars when employed may be carried by or associated with one wall of the crushing chamber so as to temporarily retard large masses of material to be crushed which are acted upon by the uprunning hammers as they pass between the grid bars.

In carrying out my present invention, I may associate with that part of the frame of the machine which may be termed the wall of the crushing chamber and indicated generally at 1, an auxiliary support or frame 2, which may be secured thereto in any appropriate manner, as by the bolts 3, and centrally of this support I provide a movable breaker plate 4 having a substantially flat surface. This breaker plate, preferably of disk form, may be carried by a shaft or arbor 5, suitably journaled as at 6 in the frame 2 and/or wall 1, and such disk plate may be integral with the shaft or arbor 5. In the present instance, this breaker plate is indicated as inclined slightly with respect to the perpendicular and it may have a diameter substantially the

width of the crushing chamber, as clearly indicated in Fig. 2. If desired, the wall 1 may be constructed with a flat face to take the place of the supplemental member 2, and the plate 4 or wall 1 may be vertically disposed, instead of being inclined as indicated in Fig. 1. In addition it may be set closer to the frame 1.

Crushing machinery of this type is provided with a hammer-carrying rotor structure of the character illustrated in my application before referred to, and such rotor structure may include a shaft 8, suitably journaled, carrying disks 9, supporting rods 10, upon which hammers 11 are mounted. The wall 1 of the crushing chamber may support a series of grid bars 9^a between which the hammers pass, although it will be understood that such grid bars may be omitted in the use of the construction forming the subject of my present invention.

For the purpose of preventing any building up upon the breaker plate or breaking surface with which the hammers cooperate, of the material being crushed or reduced, I have arranged such breaker plate or breaking surface as a rotatably movable member and provide means for removing any material tending to build up on the same in the form of a scraper blade or arm 12, beneath which the breaker plate or the breaking surface is arranged to be rotated. In the form illustrated in Figs. 1 and 2 of the drawings, the scraper blade is shown as carried by and it may form part of what may be termed a guard plate 13, mounted at the upper portion of the wall 1 and partly overhanging the rotatable breaker plate, as indicated at 14. The scraper blade or arm 12 depends from the plate 13 and may extend substantially to the centre of the rotatably movable breaker plate 4. In addition to the plate 13, I preferably provide side plates 15, which partially overlie the rotatable plate 4, as clearly indicated in Fig. 2. The several plates, 13 and 15, may be secured to the frame 1 by bolts 16.

The scraper blade or arm 12 illustrated in Figs. 1 and 2 is in fixed position with respect to the rotatable breaker plate 4. In the operation of crushing machinery of this type it may happen that the presence of hard rock encountered during a crushing operation will make it desirable to temporarily displace the scraper blade or arm, and in Figs. 3, 4, 5, et seq., I have shown forms of scraper blades and mounts therefor of a type or character that will permit the scraper blade to be swung out of its position with respect to the rotatable breaker plate 4.

In the arrangement illustrated in Figs. 3 and 4 the plate 13^a, which is mounted at the upper end of the frame and is substantially the same as the plate 13 shown in Fig. 2, is shown as provided with ears 16^a, intermediate its ends, between which a scraper blade or arm 12^a may be pivotally hung; a bolt 17 being provided for the purpose. In order that the scraper blade or arm may be maintained in proper position relatively to the breaker plate 4, I may provide a removable locking pin 18, suitably supported. When it is desired to displace the scraper blade or arm the locking pin is removed and then the blade may be raised out of the way and supported in any suitable manner as, for instance, by the locking pin arranged in another position. The side plates 15^a may be of the same character and function in a manner similar to those illustrated in Fig. 2.

In the arrangement shown in Figs. 5 and 7 the plate 13^b is mounted for swinging movement. It is illustrated as integral with the scraper blade or arm 12^b, and is provided with the hub 19 whereby it may be pivotally hung with respect to a bolt 17^a carried by ears 16^b which may be carried by or form part of the side plates 15^b. This form of blade may be held in the operative position relatively to the plate 4 by means of bolts 20. As the pivotal connection for the mount illustrated in Figs. 5 and 7 is spaced away from the frame 1, it may be desirable to employ a filler piece 21 behind the hub, which filler piece may be secured to the frame by suitable bolts 22.

The arrangement illustrated in Figs. 6 and 8 is substantially the same as that illustrated in Figs. 5 and 7 except that the filler piece 21^a is shown as provided with ears 16^c and the plate 13^c is shown as provided with butts 24 fitting adjacent said ears 16^c so that it may be pivotally hung in operative position upon a bolt 17^b. As in the arrangement illustrated in Figs. 5 and 7, the plate 13^c may be held in operative position with respect to the plate 4 by means of bolts 20 which may be secured to the frame 1. The side plates 15^c shown in Fig. 6 are of the same character as those shown at 15^a in Fig. 3.

The shaft or arbor 5 carrying the movable breaker plate may be driven in any suitable manner and such movement may be continuous, or it may be rocked back and forth substantially to an extent of 360°. For this purpose the shaft 5 may be provided with a pinion 25, which may be engaged by a suitable driving gear or pinion, or by rack rods, or such shaft may be actuated by any means that will insure the desired rotation or rocking movement and total movement of at least 360°. The movement of the breaker plate insures that the action of the cooperating scraper blade will serve to keep the breaker plate substantially clean throughout its entire surface.

The respective scraper blades or arms 12, 12^a, et seq. may have a cross section substantially like that illustrated in Fig. 9, of my companion application referred to; being

rounded on top as indicated at a and having side cutting edges a'; the under surface being inclined away from said cutting edges and merging with the concave under side of the blade. Additionally these blades preferably have a central rib a^2 extending to the supporting plate, and in the arrangement illustrated in Figs. 3 and 4 including the pivotal connection.

It will be understood, however, that I do not wish to be limited to this particular form of blade, since other forms may be employed without departing from my invention; the important point being to provide a suitable form of scraper blade which may be mounted or disposed in proper position to cooperate with the rotatably movable breaker plate and prevent objectionable accumulation thereon of the sticky or slimy portion (or portions) of the material operated upon, whether such breaker plate rotates continuously or is arranged to rock to an extent that will insure the entire surface of the same passing beneath such scraper blade.

While I have indicated the scraper blade as overlying the upper portion of the rotatable breaker plate it will be understood that it may be otherwise disposed with respect to said plate without departing from my invention, so long as it extends a sufficient distance across the plate to insure that the relative scraping action will keep the surface of the latter substantially clean.

I claim:

1. The combination, in crushing machinery, of a rotor structure having hammers, a rotatable breaking surface movable in a single plane at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by the action of said hammers, and a scraper blade mounted for cooperation with said rotatable breaking surface.

2. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a flat breaking surface movable in a single plane at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by the action of the hammers, means for rotating said breaking surface, and a relatively fixed scraper blade overlying said rotatable breaking surface.

3. The combination, in crushing machinery, of a rotor structure having hammers, a flat breaking surface at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by the action of said hammers, a pivotally mounted scraper blade overlying and mounted for cooperation with said flat breaking surface, and means for maintaining said scraper blade in operative position with respect to said breaking surface.

4. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a rotatable breaking surface against which material undergoing crushing may be thrown by the action of the hammers, guard plates overlying the edge of said rotatable breaking surface and a scraper blade carried by a guard plate and overlying said rotatable breaking surface.

5. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a rotatable breaker plate against which material undergoing crushing may be thrown by the action of said hammers, guard plates overlying the edge of said rotatable breaking surface, a scraper blade pivotally mounted in a guard plate, and means for maintaining said scraper blade in position for cooperation with the face of said movable breaker plate.

6. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a flat breaker plate rotatable in a single plane at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by the action of said hammers, a scraper blade mounted for cooperation with the face of said movable breaker plate, and a shaft supporting said breaker plate.

7. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a flat inclined breaker plate rotatable in a single plane at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by the action of said hammers, a scraper blade overlying said inclined movable breaker plate, and a shaft supporting said breaker plate.

8. The combination, in crushing machinery, of a rotor structure having hammers, a flat breaker plate rotatable in a single plane at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by the action of said hammers, a relatively fixed scraper blade mounted for cooperation with the face of said breaker plate, a shaft supporting said plate, and means for imparting movement to said shaft.

9. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a flat breaker plate against which material undergoing crushing may be thrown by the action of said hammers, a scraper blade overlying the face of said breaker plate, and means for imparting rotary movement to said flat breaker plate, at right angles to the plane of movement of said rotor structure.

10. The combination, in crushing machinery of the rotary beater type, of a rotor structure having hammers, a rotatable breaker plate against which material undergoing

crushing may be thrown by the action of said hammers, guard plates overlying the upper edge of said rotatable breaking surface, a scraper blade depending from one of said guard plates and overlying the face of said breaker plate; said blade occupying a relatively fixed position with respect to the breaker plate, and means for rotating said breaker plate.

11. The combination, in crushing machinery, of a rotor structure having hammers, a rotatably mounted flat breaking surface at right angles to the plane of movement of said rotor structure and against which material undergoing crushing may be thrown by said hammers, and a scraper blade for cooperation with said flat breaking surface.

12. The combination, in crushing machinery, of a rotor structure having hammers, a flat breaking surface against which material undergoing crushing may be thrown by said hammers, a scraper blade overlying said breaking surface, and means for rotatably moving said breaking surface with respect to said scraper blade.

13. The combination, in crushing machinery, of a rotor structure having hammers, a flat breaking surface against which material undergoing crushing may be thrown by said hammers, a scraper blade mounted in fixed position over a portion of said breaking surface for cooperation therewith, and means for rotating said breaking surface.

14. The combination, in crushing machinery, of a rotor structure having hammers, a rotary breaking surface against which material undergoing crushing may be thrown by said hammers, a scraper blade centrally disposed above said breaking surface, and means for moving said breaking surface.

In witness whereof I have signed this specification.

GEORGE W. BORTON.