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W. A. BATTEY

1,803,585

HAMMER CRUSHER

Filed Sept. 21, 1928

2 Sheets-Sheet 1

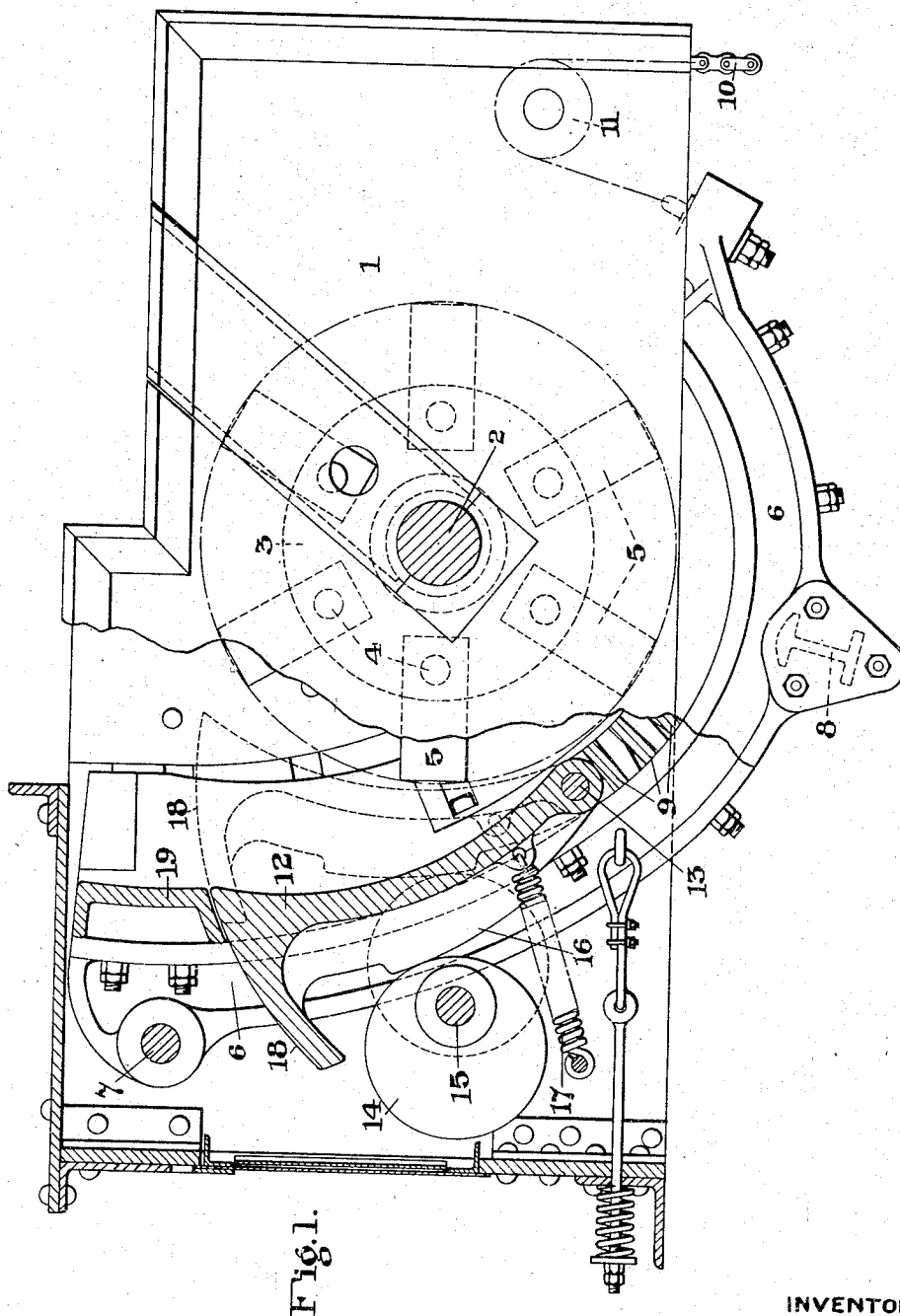


Fig. 1.

INVENTOR:

William A. Battey,

Murray C. Boyer
Atty.

May 5, 1931.

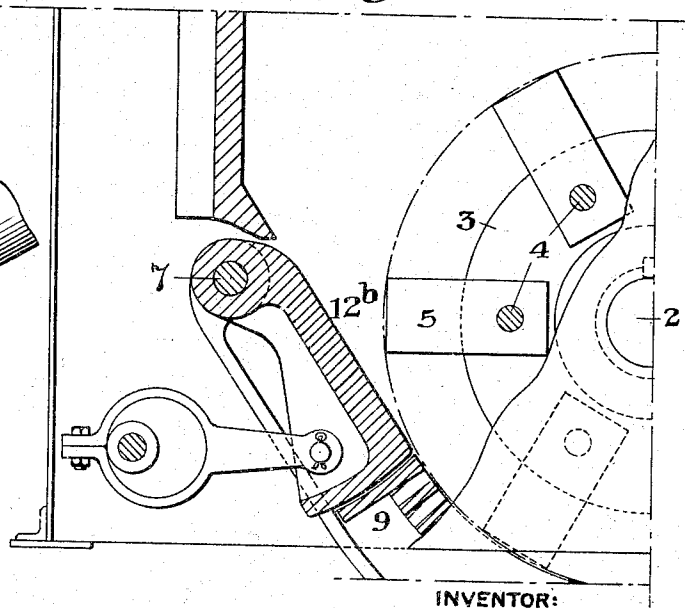
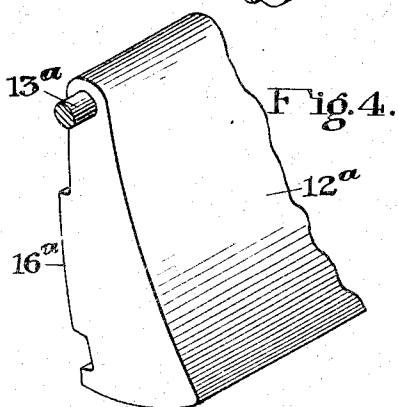
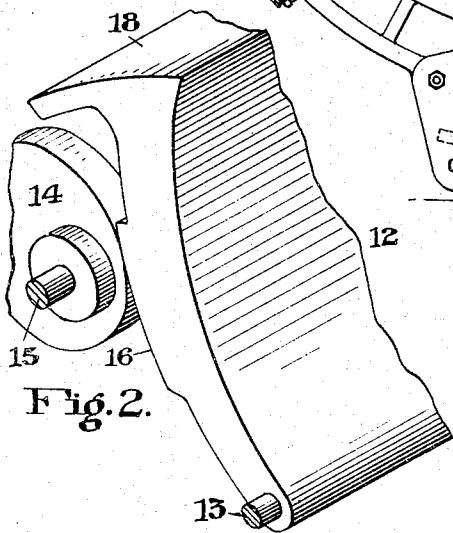
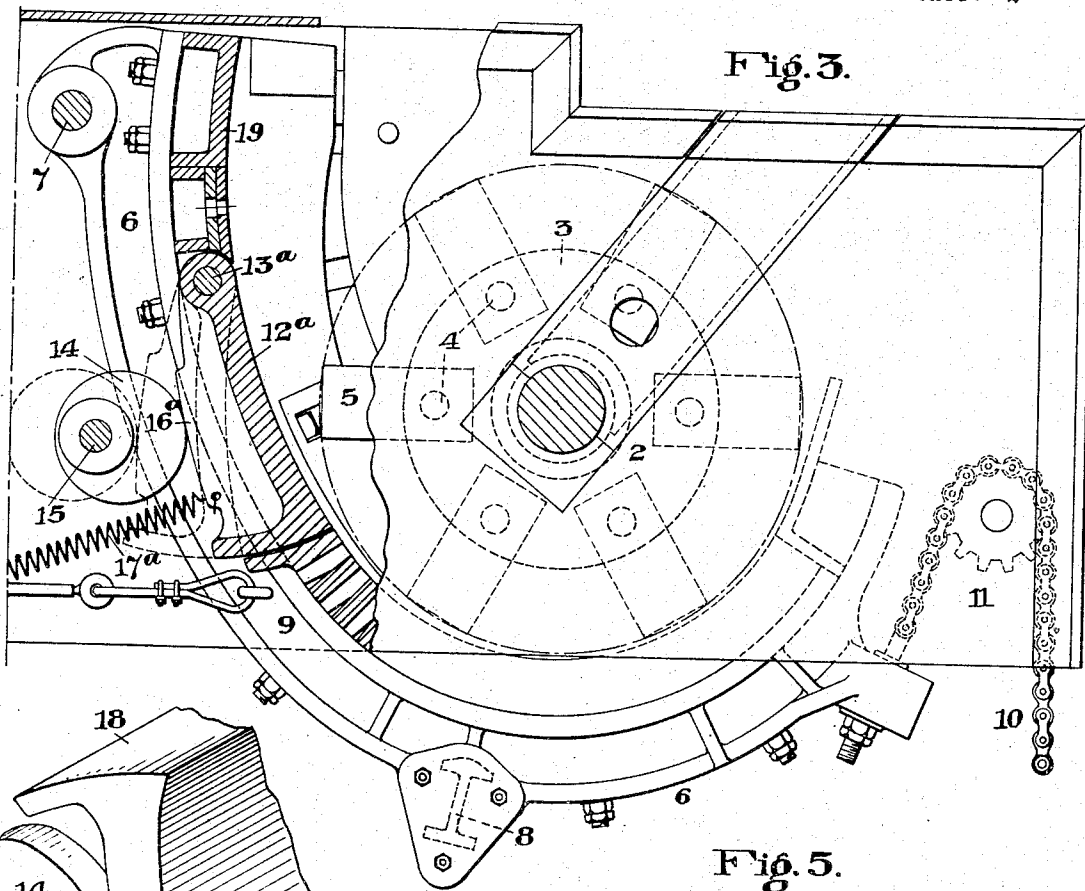
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2 Sheets-Sheet 2



INVENTOR:

William A. Battey,

by *Murray C. Boyer* Att.

Atty:

UNITED STATES PATENT OFFICE

WILLIAM A. BATTEY, OF HAVERFORD, PENNSYLVANIA, ASSIGNOR TO PENNSYLVANIA CRUSHER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

HAMMER CRUSHER

Application filed September 21, 1928. Serial No. 307,505.

My invention relates to hammer crushers employed for the purpose of breaking rock, ore, coal and/or the like by means of hammers or beaters carried by a rotor structure mounted in a suitable frame; such beaters or hammers cooperating with the bars of a cage or screen the major portion of whose surface is substantially concentrically disposed with respect to the path of such beaters or hammers.

The screening cage usually employed with these hammer crushers is hung from a cross-bar mounted in side walls of the structure, and comprises semicircular side members in which screen bars are mounted to form the desired grid or grate through which the finally crushed material is delivered. The upper portion of this cage is inclined to provide one side of the hopper and just above the bars of the screen a surface is usually provided which performs the function of a breaker plate, against which the initial crushing of the material undergoing treatment may take place. In the crushing of various materials under ordinary conditions this surface is self-cleaning, but if wet material is being crushed there is a tendency of the same to cling to this surface and greatly impair the initial crushing action.

The object of my invention is to obviate this condition, and for such purpose I provide a movable breaker plate substantially continuous with and forming part of one wall of the hopper. In one arrangement, this plate may be pivoted at its lower end and disposed for oscillation on such pivot. Movement may be effected by eccentric members mounted on a suitable shaft which may be rotated in any suitable manner, and such eccentric may be arranged to engage bosses on the rear of the breaker plate and move the same toward the path of the hammers; springs being employed to return the plate after the forward movements. Other moving means may be employed.

The extent of movement of the breaker plate is such as to bring a greater portion of the same close to the path of the hammers with the result that any wet material

accumulating on the surface of the same will be swept off. Any material which may rest upon the top surface of the movable breaker plate section during the time such surface occupies an innermost position relatively to the path of the hammers, will be scraped off by a fixed wall disposed above the breaker plate as the latter is periodically restored to its normal position.

In lieu of pivoting the breaker plate at its lower end, it may be pivoted at the upper end, in which instance the lower end will be swung toward and away from the path of the hammers and a pocket will be formed above the screen bars when the plate is in the outermost position. When movement is imparted to such plate to restore the same to normal position wherein the surface of such breaker plate forms a continuation or substantial continuation of the hopper and/or the screen surface, the accumulated material will be swept out of such pocket and into the path of the beaters or hammers.

Under both conditions indicated, the surface of the breaker plate will be kept clean and in condition to properly perform its function whether the material is dry or wet. The operating means for effecting movement of the breaker plate may be so arranged as to be disconnected at any time so that if the material being crushed is dry, or substantially so, the breaker plate may be maintained in a fixed or relatively fixed position.

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

Figure 1 is a view in elevation, more or less diagrammatic in character and partly in section, illustrating one type or form of hammer crusher and one form of movable or oscillating breaker plate within the scope of my invention operatively mounted therein.

Fig. 2 is a perspective view of the breaker plate shown in Fig. 1.

Fig. 3 is a view similar to Fig. 1, showing another form of movable or oscillating

breaker plate within the scope of my invention.

Fig. 4 is a perspective view of the breaker plate shown in Fig. 3, and

Fig. 5 is a view illustrating another arrangement of a movable breaker plate within the scope of my invention.

In the drawings, 1 represents the frame or housing of the crusher in which is mounted the usual rotor structure which may comprise the shaft 2, carrying the usual disks 3, supporting rods 4, from which the beaters or hammers 5, are hung; such rotor structure being driven in any suitable or usual manner by means common in the art to which my invention relates. The hammers or beaters of the rotor structure cooperate with a screen or cage made up of side frames 6, which may be hung from a shaft 7; such side frames being connected by cross members 8, and supporting spaced bars 9, against which the material is crushed by the beaters or hammers until reduced to the desired size for passage through the spaces between such bars. The opposite end of the cage or screen may be adjustably hung from chains 10, passing over sprocket wheels 11, which are controlled by a suitable gear train and held in adjusted positions by suitable means.

The upper portion of the cage or screen which forms part of the hopper delivering material to the crushing zone includes a surface which performs the function of a breaker plate, against which the initial crushing of the material undergoing treatment will take place. In the crushing of various materials under ordinary or usual conditions this surface is self-cleaning, but if wet or sticky material is being crushed there is a tendency of the same to cling to and build up on this surface and impair the crushing action and plug up the hopper.

To prevent this clogging of wet and/or sticky material I provide a movable breaker plate, pivotally mounted and arranged for oscillation. In the arrangement shown in Fig. 1, this plate, indicated at 12, may be pivoted at its lower end as indicated at 13, and may be oscillated by eccentrically mounted members 14, which may be mounted on a shaft 15, rotated in any suitable manner (they may be driven from the shaft 2); such members 14 being arranged to engage bosses 16 at the rear of the plate 12 and move the same toward the path of the hammers. Suitable springs 17, may be employed to move the plate 12 in the opposite direction after the forward movements have been effected by the eccentrics. Other forms of moving means may be employed to effect movement or oscillation of the breaker plate and such movements may be fast or slow as the condition of the material being crushed may warrant. The extent of movement is such as to bring the greater portion

of the breaker plate close to the path of the hammers, as indicated by dotted lines, with the result that any wet or sticky material accumulating on the surface of the same will be swept off by the hammers in their movement past such surface. Any material which may collect upon the top surface 18 of the movable breaker plate during the time such surface occupies an innermost position relatively to the path of the hammers will be scraped off by the wall of the cross member 19 disposed above the breaker plate as the latter is periodically restored to its normal or relatively normal position, indicated by full lines.

In lieu of providing a breaker plate pivoted at the lower end, I may provide a breaker plate pivoted at its upper end, in which instance its lower end will be moved or oscillated toward and from the path of the hammers. Such arrangement is shown in Fig. 3, wherein the breaker plate is indicated at 12^a, and is pivotally mounted on a cross-bar or rod 13^a arranged below the shaft supporting the screen or cage. In this arrangement of my invention a pocket will be formed above the screen or the bars 9 when the breaker plate is in the outermost position away from the path of the hammers, as indicated by dotted lines. When the operating means cause movement of the plate back to normal or relatively normal position wherein such breaker plate forms a continuation or substantial continuation of the screen surface or hopper wall, any accumulated material will be swept out of such pocket by the movement of the plate and into the path of the hammers.

A somewhat similar construction is shown in Fig. 5, in which the movable breaker plate member 12^b is shown as supported by the shaft 7 from which the cage or screen is hung. In other respects the structure shown in Fig. 5, is substantially like that shown in Fig. 3.

In the arrangement shown in Fig. 3, positive means for effecting oscillation of the breaker plate in both directions may be employed, as in the structure shown in Fig. 1. In lieu of this I may employ an eccentric actuating a pitman which may be pivotally connected to the plate; such eccentric being carried by a shaft which may be operatively connected to the rotor operating means, or independently driven.

Other forms of mechanism may be employed to effect oscillation of the breaker plate of either form and such movement may be fast or slow as the condition of the material may warrant. In all instances the breaker plate is periodically brought into position relatively to the path of the hammers and the movement of the breaker plate is such as to insure complete removal of the accumulated material and

discharge of the same into the path of the hammers, when occupying the respective positions indicated by full lines.

Under the conditions indicated, both forms of the breaker plate will be kept clean and in condition to properly perform its function, whether the material operated upon is dry, wet, or sticky.

I claim:

1. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber with a screen in the bottom thereof and a hammer-carrying rotor in said chamber, of a pivotally mounted breaker plate disposed in cooperative relation with respect to said rotor, and means for oscillating said breaker plate toward and from the path of the hammers.

2. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber, a frame pivotally hung in said crushing chamber and having a screen in the bottom thereof and a hammer-carrying rotor in said chamber, of a breaker plate pivotally mounted in said pivotally hung frame and disposed in cooperative relation with respect to said rotor, and means for oscillating said breaker plate on its pivotal connection toward and from the path of the hammers.

3. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber with a screen in the bottom thereof and a hammer-carrying rotor in said chamber, of a pivotally mounted breaker plate disposed in cooperative relation with respect to said rotor; said breaker plate being oscillated on its pivotal mounting during operation of the rotor, eccentric members for effecting movement of said breaker plate toward the rotor, and means for effecting movement of said plate in the opposite direction.

4. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber with a screen in the bottom thereof and a hammer-carrying rotor in said chamber, of a pivotally mounted breaker plate disposed in cooperative relation with respect to said rotor, said breaker plate being oscillated on its pivotal mounting during operation of the rotor; eccentric members for moving said breaker plate toward the rotor, and springs for effecting movement of said plate in the opposite direction.

5. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber with a screen in the bottom thereof and a hammer-carrying rotor in said chamber, of a pivotally mounted breaker plate disposed in cooperative relation with said rotor; said plate having a shelf at its upper end, and means for oscillating said breaker plate; said shelf be-

ing cleaned of accumulated material when the breaker plate is moved away from the rotor.

6. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber with a grating in the bottom thereof and a hammer-carrying rotor in said chamber, of a pivotally mounted plate in cooperative relation with said rotor; said plate being arranged to swing on a pivot disposed in a plane below the axial plane of the rotor and having a shelf at its upper end, and means for oscillating said breaker plate; said shelf being cleaned of accumulated material when the breaker plate is moved away from the rotor.

7. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber, a frame pivotally hung in said crushing chamber and having a screen in the bottom thereof, a shaft on which said frame is hung and a hammer-carrying rotor in said chamber, of a pivotally mounted breaker plate disposed in cooperative relation with respect to said rotor; said plate being arranged to swing on the shaft on which said frame is pivotally hung, and means for oscillating the breaker plate on said shaft.

8. The combination, with crushing or grinding means including a housing having a hopper, a crushing chamber, a frame pivotally hung in said crushing chamber and having a screen in the bottom thereof, a shaft on which said frame is hung and a hammer-carrying rotor in said chamber, of a pivotally mounted breaker-plate disposed in cooperative relation with respect to said rotor; said plate being arranged to swing on the shaft on which said frame is pivotally hung, a shelf formed adjacent the upper end of the grate across which the lower end of said breaker plate is arranged to swing to clean the same of accumulated material, and means for moving the breaker plate on said shaft.

9. The combination with crushing or grinding means including a housing having a hopper, a crushing chamber with a grate in the bottom thereof, and a hammer-carrying rotor disposed in said crushing chamber, of a breaker plate pivotally mounted on a horizontal axis and disposed in cooperative relation with respect to said rotor, and means for oscillating said breaker plate with respect to the path of the hammers.

In witness whereof I have signed this specification.

WILLIAM A. BATTEY.