J. G. SIMPSON.

ROCK CRUSHER.

APPLICATION FILED MAR. 20, 1918.

1,354,855.

Patented Oct. 5, 1920.

3 SHEETS—SHEET 1.

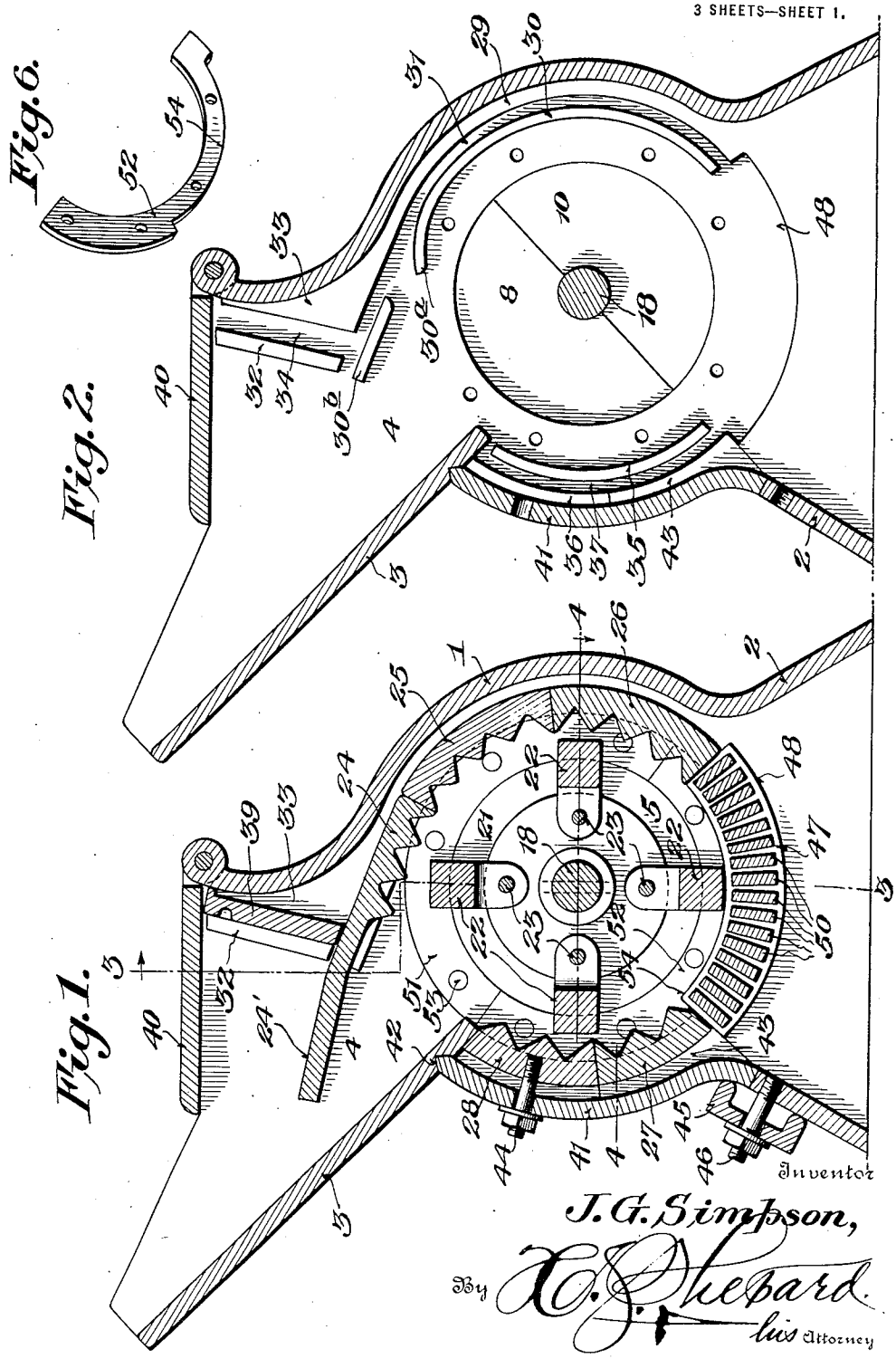


Fig. 6.

Fig. 2.

Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 3.

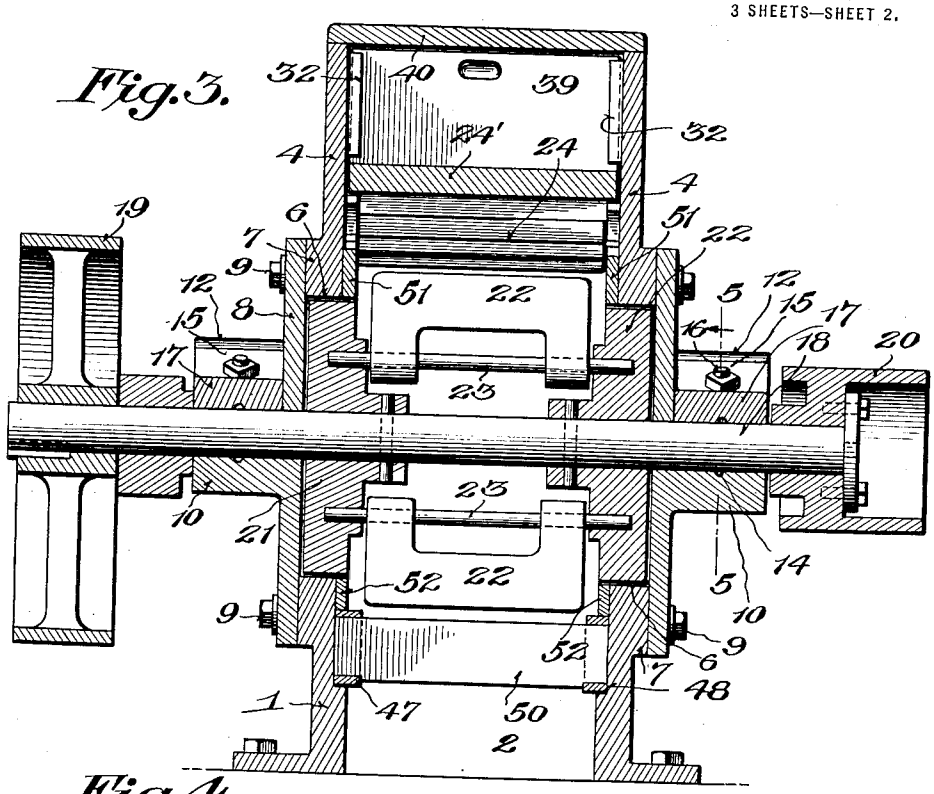


Fig. 4.

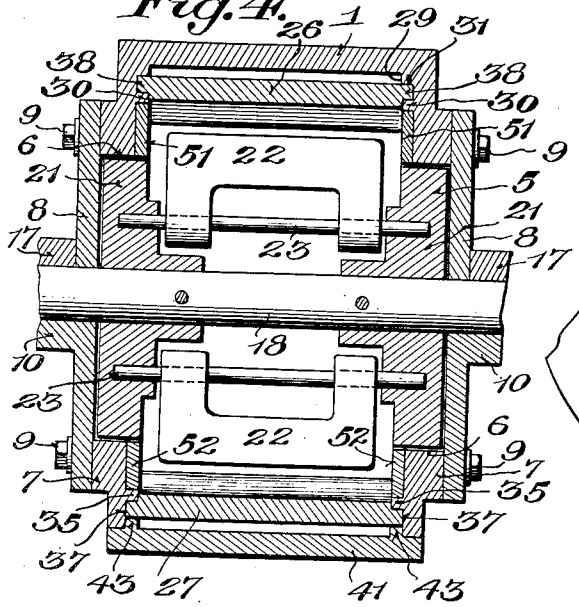
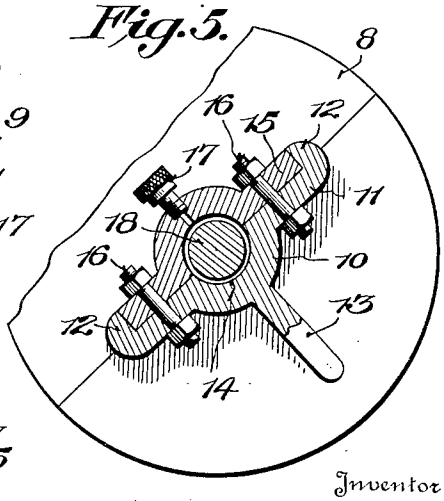


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 8.

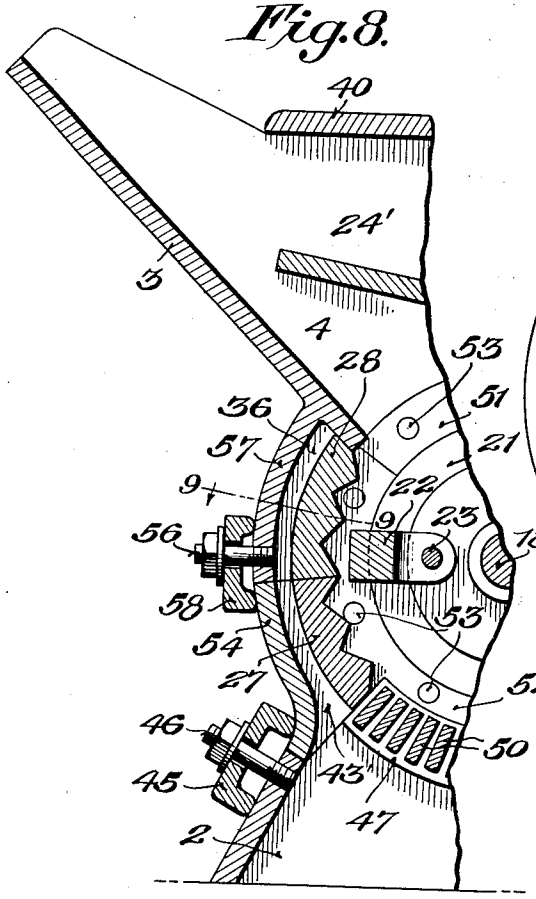


Fig. 7.

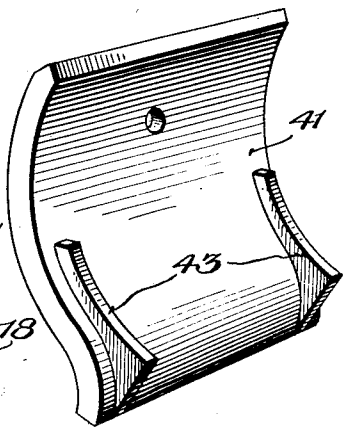


Fig. 10.

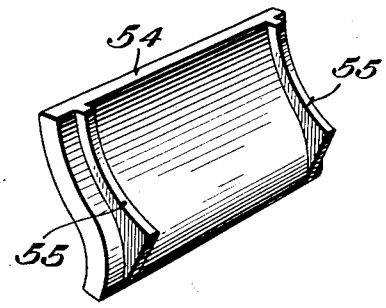
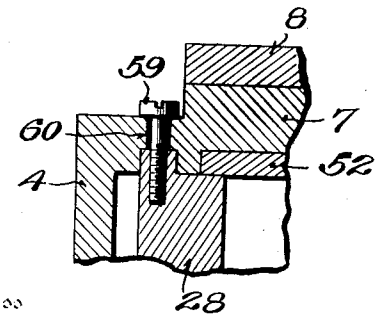


Fig. 9.



Witness

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UNITED STATES PATENT OFFICE.

JOHN G. SIMPSON, OF KNOXVILLE, TENNESSEE.

ROCK-CRUSHER.

1,354,855. Specification of Letters Patent. Patented Oct. 5, 1920.

Application filed March 20, 1918. Serial No. 223,539.

To all whom it may concern:

Be it known that I, JOHN G. SIMPSON, a citizen of the United States, and resident of Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Rock-Crushers, of which the following is a specification.

This invention relates to grinding mills, and in particular to rock crushers of the rotary beater type.

Important objects of the present invention are to simplify the construction and arrangement of such devices; to provide a strong and durable device having a minimum number of parts; to obtain an efficient and satisfactory breaking up and crushing of the rock or other material fed to the device; to facilitate the assemblage and replacing of the several parts of the device; and to give convenient access to the interior of the device for the purpose of removing any obstructions which may lodge in the interior of the device and interfere with the operation of the rotary beater.

With these and other objects in view, the present invention consists in the combination and arrangement of parts as will be hereinafter more fully described, shown in the drawings and particularly pointed out in the appended claims, it being understood that changes in the form, proportion size and minor details may be made within the scope of the claims, without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing,

Figure 1 is a vertical central sectional view of a rock crusher embodying the features of the present invention.

Fig. 2 is a similar view of the casing, the rotary beater and coöperating parts being removed.

Fig. 3 is a vertical cross-sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a plan section on the line 4—4 of Fig. 1.

Fig. 5 is a detail sectional view on the line 5—5 of Fig. 3.

Fig. 6 is a detail perspective view of one of the wear plates.

Fig. 7 is a detail perspective view of the removable wall portion shown in Figs. 1, 2 and 4 of the drawings.

Fig. 8 is a fragmentary vertical sectional view showing another arrangement of removable wall portion.

Fig. 9 is a detail sectional view on the line 9—9 of Fig. 8.

Fig. 10 is a detail perspective view of the removable wall portion as employed in Fig. 8.

The casing of the present device consists of a main central substantially cylindrical portion 1, an open base 2, and a hopper portion 3. These parts are in the form of an integral casting, thereby to provide a strong, durable and inexpensive casing for the device. The upright side walls of the casing, designated 4 in Fig. 3 of the drawings, are straight and parallel, while the front and rear walls, as shown in Figs. 1 and 2, are curved and define the substantially cylindrical main central portion of the casing.

Each side 4 of the casing is provided with a central circular opening 6, surrounded externally by a boss 7. Each opening is closed by a closure plate 8 secured flat against the boss 7 by means of suitable fastenings 9. As best indicated in Fig. 5, it will be seen that the closure plate 8 is divided diametrically into two sections. One of these sections is provided with a segmental boss 10 having flanges 11 extending along the straight or diametric edge of the plate, each flange terminating in an outstanding shoulder 12. A brace rib 13 extends between the back of the boss 10 and the adjacent face of the plate. The straight edge of the boss is provided with a semi-cylindrical seat or recess 14 constituting a shaft bearing. A removable and coöperating bearing member 15 is fitted to the straight face of the boss 10 between and in engagement with the shoulders 12, suitable fastenings being employed to hold this detachable bearing member in place. A suitable oil cup 17 is provided upon the bearing member 15.

A rotatable shaft 18 is mounted in the cover or face plates 8 and projects at opposite ends beyond the sides of the device. A suitable fly-wheel 19 is provided upon one end of the shaft and a belt pulley 20 upon the other end of the shaft.

Within the casing and suitably secured to the shaft 8 are duplicate circular heads 21 located in the respective openings 6 in the sides of the casing. Located between these heads is a series of substantially U-shaped beaters 22, the arms of which are pierced by rods 23 which have their ends rotatably mounted in suitable seats or bearings in the inner faces of the heads 21, whereby the

beaters 22 swing outwardly under centrifugal force when the shaft 18 is rotated.

The beaters or hammers 22 rotate in a circular zone defined by the breaker plates designated 24, 25, 26, 27 and 28, which breaker plates have their edges supported in grooves or channels provided upon the inner faces of the upright sides 4 of the casing. These grooves or channels are best indicated in Fig. 2 of the drawing, wherein it will be seen that 29 designates a segmental rib at the back of the casing, and 30 designates a similar rib in front of the rib 29 and defining therewith an arcuate groove or channel 31. In the hopper portion of the casing at the back thereof there are two spaced upright ribs 32 and 33 defining a groove 34. At the front of the casing there is an arcuate rib 35 extending from the lower side of the hopper downwardly to about the beginning of the base 2 of the casing. In front of the rib 35 is a parallel rib 36 extending downwardly from the hopper, but only about half of the length of the rib 35, thereby defining a groove or channel 37. The breaker plates 26, 25 and 24 are put into place through the open top of the hopper with their flanges 38 in the respective grooves 31 and pushed along in said grooves or channels until the breaker plates have assumed their proper positions where they will be supported in a manner as will be hereinafter described. Each of the breaker plates is provided upon its inner or concaved face with transverse ribs or corrugations, between which and the hammers the rock or other material is designed to be crushed. The upper breaker plate 24 is provided with a straight flat extension 24′ extending longitudinally of the hopper and designed to act as a guard overhanging the lower portion of the hopper for the purpose of preventing crushed portions of the rock from being thrown upwardly and beyond the upper breaker plate 24. A closure plate 39 is introduced into the grooves 34 and rests upon the top of the breaker plate 24, thereby to effectually close the space between the top of the breaker plate 24 and the adjacent casing portion. A hinged cover 40 is provided for the horizontal top portion of the hopper which lies above the guard portion 24′ of the upper breaker plate.

To facilitate the introduction and removal of the breaker plates 28 and 27, the front convex wall of the casing is omitted between the bottom of the hopper 3 and the top of the base 2, whereby the breaker plate 28 may be introduced from below the rib 36 and moved upwardly to engage its flanges 38 with the respective grooves 37, and thereafter the breaker plate 27 is fitted in place with its flanges lying against the front convex sides of the respective ribs 35. A closure plate 41, constituting the front convex wall of the casing is then fitted in place, the upper end of the closure plate being received within a seat or recess 42 in the bottom of the hopper. The upper portion of this front plate bears against the front of the rib 36, and its lower portion is provided with two ribs 43 which constitute continuations of the ribs 36 and bear against the flanges of the breaker plate 27. A suitable stud bolt 44 is passed through the upper part of the front plate 41 and into a threaded seat or socket in the breaker plate 28, whereby the upper part of the front plate is held in place. The lower end of the front plate is held in place by means of a shoe 45 and a stud bolt 46 passing through the shoe and engaged in a threaded opening in the casing.

The space between the lower ends of the breaker plates 27 and 26 is bridged by a screen or grating through which the crushed rock is designed to fall into the base portion 2 of the casing. This screen or grating is made up of a pair of spaced arcuate side bars 47, each of which fits in a similarly shaped seat 48 provided in the inner face of each straight side of the casing. Each of these side bars is provided with a series of openings 49 which are substantially radial with respect to the shaft 18, and a plurality of cross bars 50 have their ends received within said openings and thereby supported transversely beneath the series of rotary beaters or hammers and in spaced relation so as to form the screen or grating. This screen or grating is fitted in place through one or the other of the openings 6 in the straight sides of the casing, and is fitted in place prior to the introduction of the breaker plates. It will now be understood that the breaker plates 27 and 26 rest at their lower ends against the respective ends of the screen or grating, and therefore do not require any extraneous fastening means to hold them in place.

Those portions of the inner faces of the upright sides 4 of the casing which lie between the circular walls of the openings 6 and the several breaker plates are protected by the arcuate wear plates 51 and 52 which are held in place by suitable fastenings 53. The lower wear plate 52 is notched as at 54 so as to accommodate the screen or grating.

In Fig. 8 of the drawings there has been shown a slightly different arrangement of the removable wall portion. Instead of having a large removable wall portion as shown in Figs. 1 2 and 7 the same results may be obtained by the use of a smaller removable front wall portion such as shown at 54 in Figs. 8 and 10 of the drawings. This removable front wall portion 54 is in front of the lower breaker plate 27 and is provided with ribs 55 forming continuations of the

ribs 36 which latter are the same as in Figs. 1 and 2. The upper end of the removable wall portion 54 is held in place by means of a stud bolt 56 which is threaded into the fixed or integral front wall portion 57 there being a suitable shoe 58 straddling the joint between the parts 54 and 57 and bearing against the latter. The bottom of the removable wall portion 54 is held in place by a stud bolt and shoe the same as is shown in Fig. 1.

The upper front breaker plate 28 is held in place by screws, one of which has been shown at 59 in Fig. 9 of the drawings, said screw passing through an opening 60 in one of the upright walls 4, and engaging a threaded seat or socket in the breaker plate.

It will of course be understood that the opening which is closed by the removable part 54 is large enough to permit the insertion of the upper breaker plate 28 which is moved up into its normal position and fixed in place by screws 59 and thereafter the lower breaker plate 27 is fitted in place and finally the removable wall portion 54 is secured in place with its ribs 55 bearing against the flanges of the lower breaker plate.

In order to facilitate the fitting in place of the breaker plates 25 and 26, which are arcuate in shape, the rib 30 is divided into a main part and an upper supplemental part 30^b which is spaced a suitable distance from the upper end of the part 30, said upper end being bowed or curved downwardly, as at 30^a, so as to permit the flanges of the breaker plates 25 and 26 being introduced into the upper end of the groove 29 through the space between the rib 30^b and the rib 30.

What is claimed is:

1. A rock crusher comprising a casing having a removable part, said casing being provided on its interior with opposite channels, a breaker plate having its edges mounted in the respective channels, the removable part of the casing having portions constituting outer walls of the channels in the casing, the breaker plate being removable through the opening closed by the removable part of the casing.

2. A rock crusher comprising a casing having a removable part, said casing being provided on its interior with opposite channels, corresponding portions of the outer walls of the channels being omitted, breaker plates having their edges received within the channels and insertible and removable through the open fronts of the channels, the removable part of the casing having ribs constituting portions of the outer walls of said channels.

3. A rock crusher comprising a casing provided on its interior with opposite channels, the lower ends of the outer walls of the channels terminating above the lower ends of the inner walls of the channels, the casing being provided with a removable part opposite the channels, said removable part having ribs constituting lower continuations of the outer walls of the channels, and breaker plates having their edges received within the channels and insertible and removable through the opening in the casing which is closed by the removable part.

4. A rock crusher comprising a casing having a removable part, said casing being provided on its interior with opposite channels having corresponding front wall portions omitted, the removable part of the casing having ribs constituting parts of the front walls of the channels, a screen or grate in the bottom of the casing, and superimposed breaker plates having their edges seated in channels and insertible and removable through the opening in the casing closed by the removable part of the casing, the lowermost breaker plate resting at its bottom upon a part of the screen or grating.

5. A rock crusher comprising a casing provided with a hopper, opposite walls of the casing being provided with front and rear upright channels, a screen or grating within the bottom of the casing, breaker plates occupying the rear channels and insertible and removable through the hopper, the lowermost breaker plate resting upon a part of the screen or grating, and front breaker plates in the front channels, the lowermost front breaker plate being supported upon a part of the screen or grating, and the front of the casing having a removable part closing an opening through which the front breaker plates are insertible and removable.

6. A rock crusher comprising a casing, a rotary beater therein, the side walls of the casing being provided with corresponding upright arcuate grooves or channels having their upper end flared to form enlarged entrances at the tops of the grooves, and an arcuate breaker plate having side flanges received through the enlarged upper ends of the grooves.

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In the presence of—
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R. B. MAYES.