

June 28, 1932.

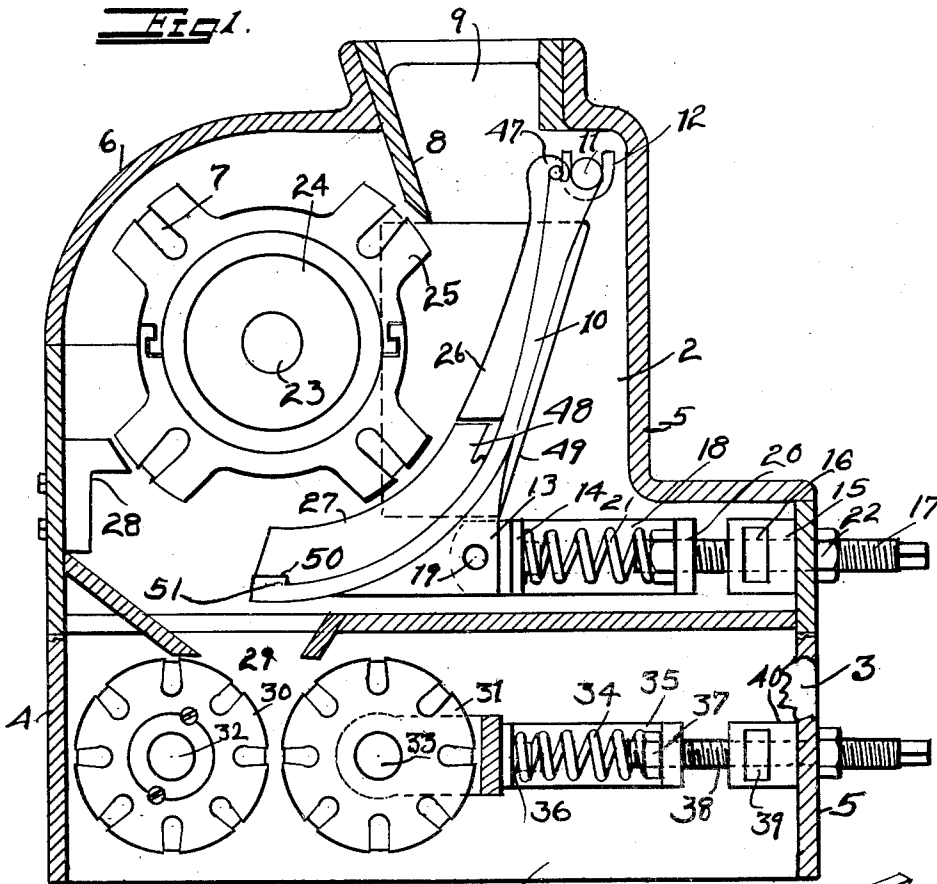
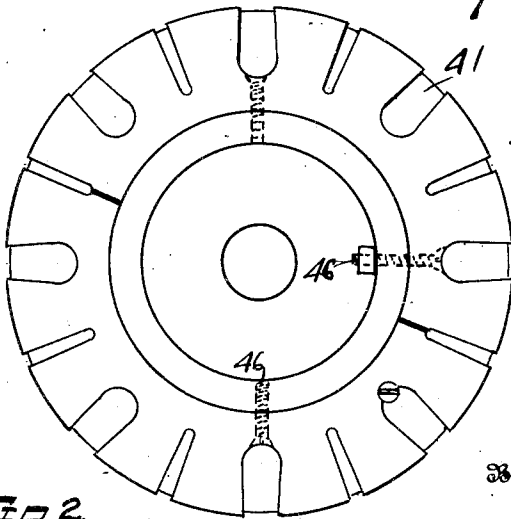
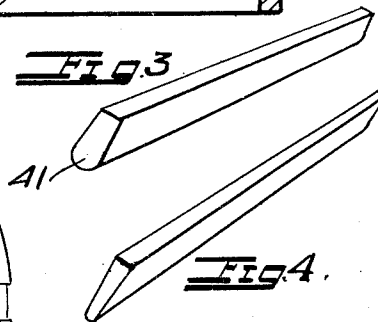
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1,864,973

ROCK BREAKER

Filed Sept. 7, 1929

3 Sheets-Sheet 1



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Fig. 5.

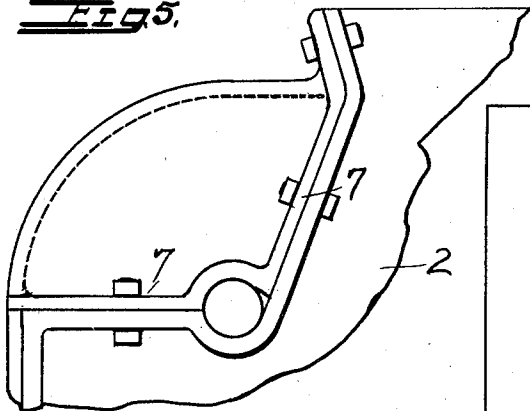
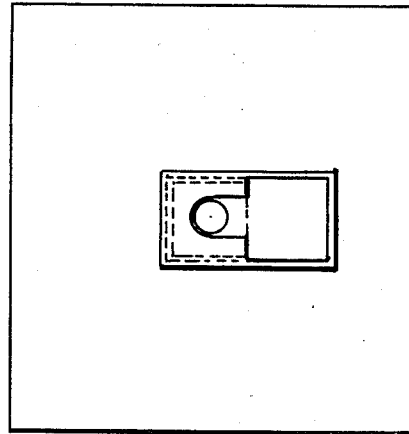


Fig. 6.

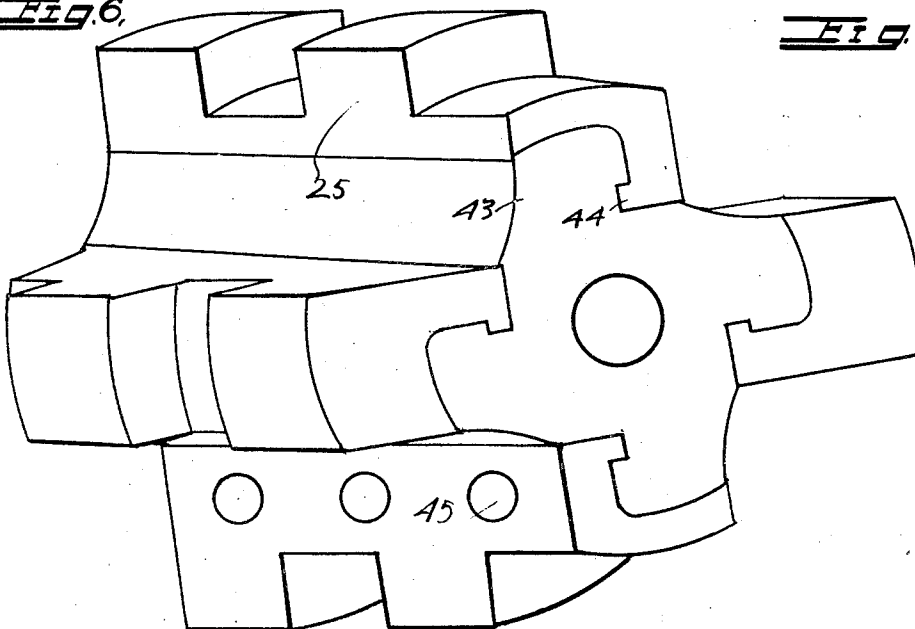


Fig. 7.

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Fig. 8.

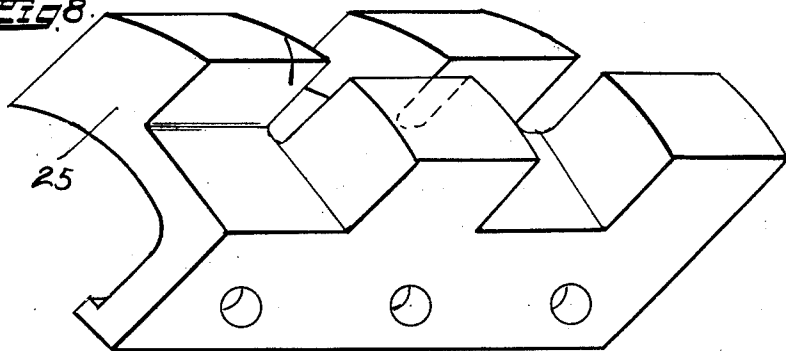
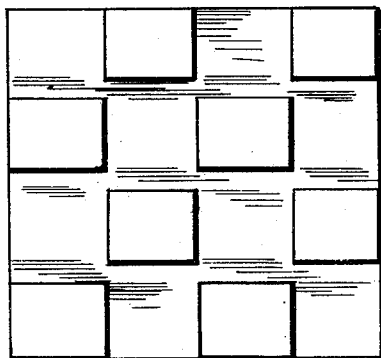


Fig. 9.

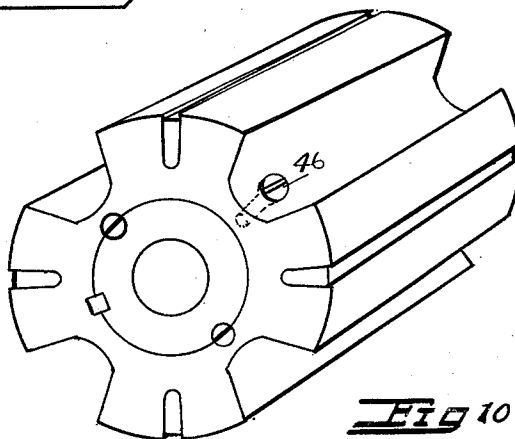


Fig. 10.

Fig. 11.

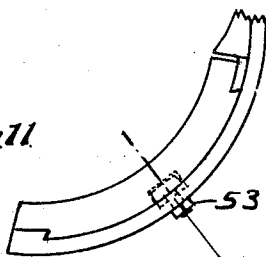
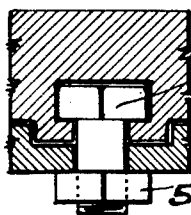


Fig. 12.

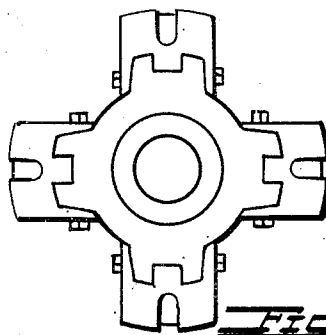


Fig. 13.

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UNITED STATES PATENT OFFICE

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ROCK BREAKER

Application filed September 7, 1929. Serial No. 390,990.

This invention relates to rock breakers.

Among the objects of the invention are to so construct, combine and arrange the parts that a single machine will function as a rock
5 breaker, granulator and pulverizer.

Another object is to minimize the cost of reducing the size of particles of material of every nature.

A further object is to minimize the size, the
10 cost of production, the cost of operation and wear and tear on machines of this character.

A still further object is to facilitate the replacement of worn parts and protect the operating parts from accidental breakage.
15 Other objects and advantages will appear as this description progresses.

In this specification and the accompanying drawings, the invention is disclosed in its preferred form, but it is to be understood that
20 it is not limited to such form because it may be embodied in other forms. It is also to be understood that in and by the claims following the description, it is desired to cover the invention in whatsoever form it may be
25 embodied.

In the accompanying three sheets of drawings:

Figure 1 is a vertical section of a rock breaker constructed in accordance with said
30 invention.

Figure 2 is a detail in end elevation of a modified form of rotor, for finer mesh pulverization.

Figures 3 and 4 are details in perspective of insert bars for the rotor.
35

Figure 5 is a fragmentary detail in side elevation of the housing and bearings for the rotor.

Figure 6 is an enlarged detail in perspective of a special type of rotor.
40

Figure 7 is a rear view of the stator showing the manner of attaching the wearing shoe to the stator.

Figure 8 is a detail in perspective of the rotor shoe shown in Figure 6.
45

Figure 9 is a face view of the same.

Figure 10 is a detail perspective view of a special rotor.

50 Figure 11 is a fragmentary detail illus-

trating the manner of attaching the wearing shoes to the stator.

Figure 12 is an enlarged cross section of the same, showing the attaching bolt with its head in the recessed shoe.
55

Figure 13 is an end elevation of a special type of rotor.

In detail the construction illustrated in the drawings referring to Figure 1, comprises the enclosing housing having the base 1,
60 adapted to be fixed to a suitable foundation.

This housing is a box-like structure having the sides and ends 2, 3, 4, 5, respectively, rising from the base.

The upper portion of the housing has the removable cover 6, flanged and bolted to the flange of the housing at 7—7. The top of the housing is open to receive the spout 8 of the
65 hopper 9 into which the material to be reduced is fed.

The anvil or stator 10 has the trunnions 11 hung within the saddles 12 formed on the sides 2—3 of the housing adjacent the top. This stator swings downward and forward beneath the hopper 9 so that the material fed
70 therefrom faces thereupon.

The rear portion of the stator has the lug 13 holding the spring seat 14. The lug 15 is formed on the end wall 3 and has a recess cored therein to receive the threaded nut 16.
75 The spindle 17 is threaded into this nut and extends forward in alignment with the spring seat 14. The yoke 18 forms part of the spring seat 14 which is pivotally attached to the lug 13 by the cross pin 19. The spindle 17 passes through the bend of the yoke 18 and has the nut 20 threaded thereon. This yoke is free to move longitudinally on the spindle 17.
80

The spring 21 expands between the seat 14 and the nut 20 to hold the stator resiliently forward as shown. The position of the stator is adjustable by turning the spindle in the nut 16 and locking the adjustment by means of the jam nut 22.
85

The rotor shaft 23 is journaled in suitable bearings formed in the sides 2—3 and the cover 6. The rotor head 24 is fixed on this shaft and has breaker lugs 25—25 fixed thereto. The segmental sweep of the stator 10 may be
90 100

partly concentric with the periphery of said rotor. The rotor may be installed and removed from the housing by removing the cover 6. It is driven by a suitable pulley and belt or other transmission between the shaft 23 and a prime mover.

The material to be reduced is fed into the hopper 9 in the usual manner down which it descends until struck by the breakers 25 and projected against the armor shoes 26—27 fixed to the face of the stator.

The peripheral speed of the breakers 25 is such that the impact against the inertia of the material is such that it is broken up by first impact with the breakers and by reaction against the stator. The particles rebounding from the stator enter the orbit of the breakers 25 and are thus reacted upon until reduced to the desired mesh.

The size of the ultimate pulverization is adjusted by turning the spindle 17 to advance or retract the stator with respect to the rotor. The closer the stator, the finer the reduction, and vice versa, owing to the tangent of the plane of the stator with respect to the rotor.

This mode of operation is not to be confused with rolling, crushing and grinding mills. The material is not crushed between the stator and rotor by compression, but by suspended impact of the material with the rotor and stator.

The resilient element 21 is interposed as a safety element to prevent breakage of parts should a push bar, a piece of steel, or any unbreakable object drop through the hopper. In this event, the stator would resiliently back up and permit the obstruction to drop through.

The baffle bar 28 is fixed to the end 4 to prevent the material carrying around with the rotor and gorging its operation.

The broken or pulverized material flows off the lower end of the stator and drops through the outlet 29 in the partition.

An efficient speed for the rotor is 300 to 400 R. P. M. for primary breaking, and 500 to 800 R. P. M. for granulating or pulverizing.

If very fine pulverization is desired and the material is suitable, a pair of rotors such as 30—31 may be provided to receive the broken material at the outlet 29. The shaft 32 is mounted in bearings fixed in the sides 2—3. The shaft 33 is mounted in bearings similarly located but having a slight lateral freedom. The spring 34 is interposed within the yoke 35 and expands between the spring seat 36 and the nut 37 on the end of the spindle 38 which is threaded in the nut 39 held in the lug 40 on the end 2. This mounting and adjustment is similar to the resilient mounting of the stator described. The yoke 35 extends past each end of the roll 31 and engages the shaft 33 to take the lateral thrust of this shaft in operation.

The shafts 32—33 are driven in unison with the shaft 23 by any suitable gearing. Belt and pulley or slack chain drives are preferred as best calculated to withstand shock and the gritty atmosphere within which they must operate.

The rollers 30—31 are preferably formed of hard material such as chilled iron, cast steel or the like, having longitudinal grooves therein, filled with soft steel bars such as 41. (See Figures 2, 3, 4.) The purpose of the soft fillers is that they wear away, leaving the throats between the breaker edges 42, which engage the particles of material with the impact results above described.

The rollers can be operated at different speeds, in different directions, and have different forms of breaker surfaces in order to accomplish the desired results with different forms of materials.

For convenience in replacing the roller surfaces and forming the same, they can be made in segments to be mechanically attached to their respective rotors or shafts. (See Figures 1, 2, 6, 8, 13.)

The preferred manner of attaching the breaker shoes such as 25 is shown in Figures 6 and 8. The rotor is provided with the undercut lugs 43 to receive the overhanging feet 44 of the breakers. This foot and lug structure takes the strain of centrifugal force and the circumferential impact of the breakers with the material. The breakers are held in assembly by the transverse bolts or cap screws 45. (See Figures 6, 8, 13.)

The rotors 30—31 for finer granulation and pulverization, as shown in Figures 1 and 2, may be cast in segments and bolted to the rotor head by the bolts 46, in the bottoms of the grooves as shown in Figures 2 and 10.

The wearing shoes 26, 27 are attached to the stator by forming a hook 47 on the upper edge of the shoe 26 to engage a lug on the top of the stator. The shoe 27 has the lug 48 overhanging the foot 49 on the shoe 26. The shoe 27 has a notch 50 engaging the transverse lug 51 on the stator. These shoes are thus interlocked with each other and the stator. They are fixed to the stator by means of a dove tail recess formed in the back of the shoe 27 to receive the head of the bolt 52, passing through the stator 10 to receive the nut 53. (See Figures 11 and 12.)

The offset lug type of breaker shown in Figure 8 is particularly adapted to the breaking up of coarse texture friable rock, such as concrete road foundations, and bituminous slabs of road and pavement material for reclaiming. Such breakers are effective on even such tenacious material, and are self-cleaning by centrifugal force and attrition. This form of breaker is also well adapted to reducing tan bark and other fibrous materials.

The finer and the greater the number of breakers on the rotor, as in Figure 2, and the

greater its peripheral speed, and the closer the stator is thereto, and the longer the distance of proximity, the finer the product of pulverization.

5 A breaker in accordance with this invention is practically universal in its adaptability as to materials and the quality and quantity of output by simple modifications as to the size of the machine and the choice of breakers applicable to the rotor. For fine break-
10 ing such as spices and the like, very small machines may be made in accordance with this invention.

15 The output is very rapid, since the rotor aids gravity in passing the material through the machine.

Having thus described this invention, what I claim and desire to secure by Letters Patent is:

20 1. A breaker including an enclosing casing, a rotor in said casing, breakers having longitudinal slots therein and detachably mounted on said rotor, interlocking lugs on said breakers to hold said breakers together,
25 soft iron fillers in the longitudinal slots in said breakers, means engaging said fillers and said breakers to hold said fillers in said breakers and means to fix said breakers to said rotor, and a stator held in resilient proximity to said rotor.

30 2. A breaker including an enclosing casing, a rotor and a stator in said casing, circumferentially interlocking segments encircling said rotor and having breakers thereon
35 with tapered slots therein; tapered fillers removably engaging said slots.

In testimony whereof I have hereunto set my hand this 28th day of August, A. D. 1929.

FRANK L. BUCHANAN.