

F. L. BUCHANAN.
CRUSHER AND PULVERIZER.
APPLICATION FILED JULY 11, 1910.

1,044,441.

Patented Nov. 12, 1912.

2 SHEETS—SHEET 1.

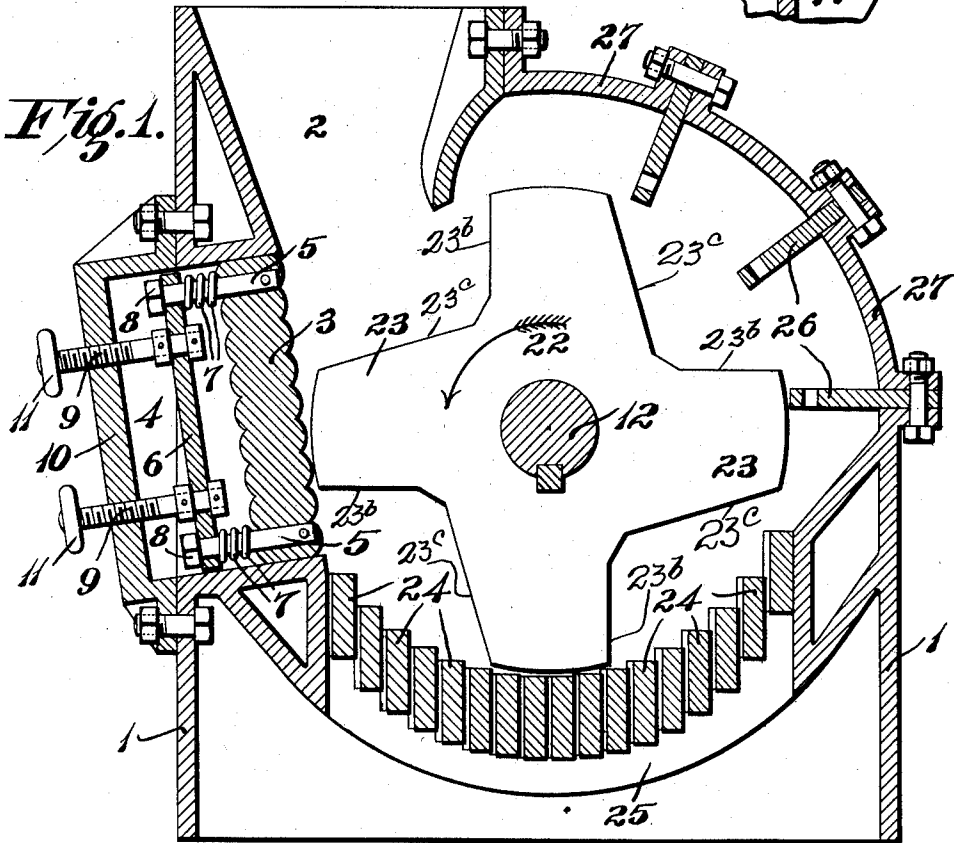
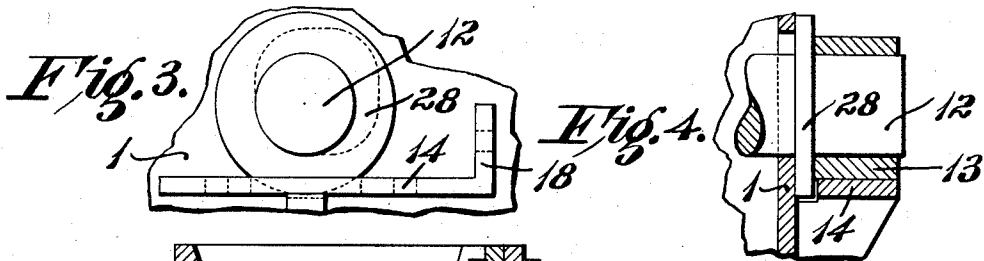
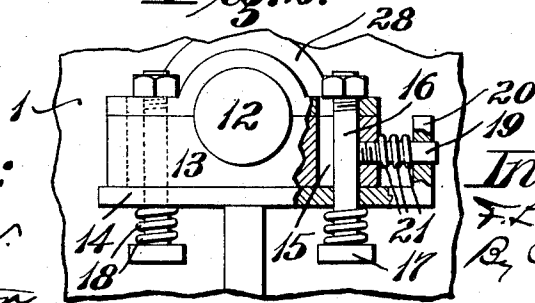


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 5.

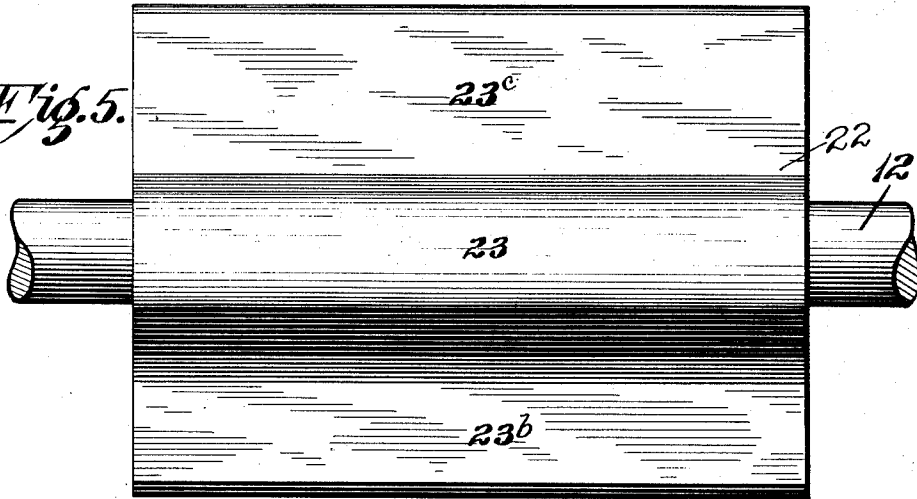


Fig. 6.

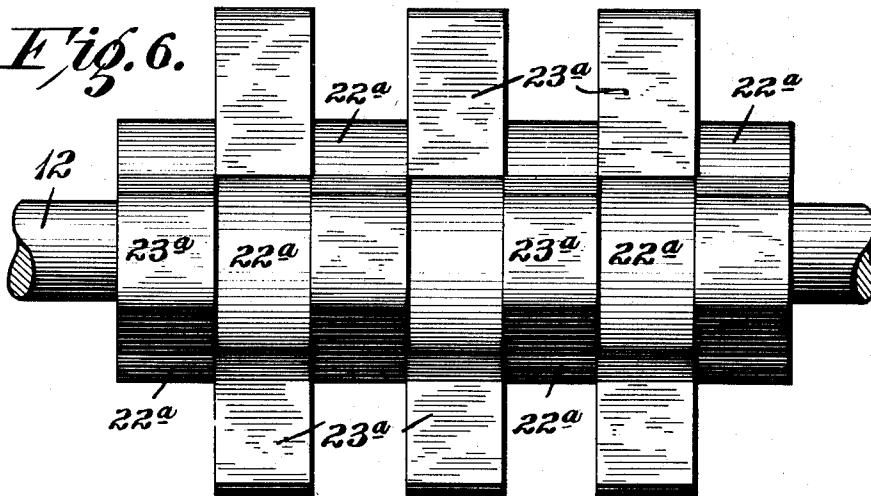
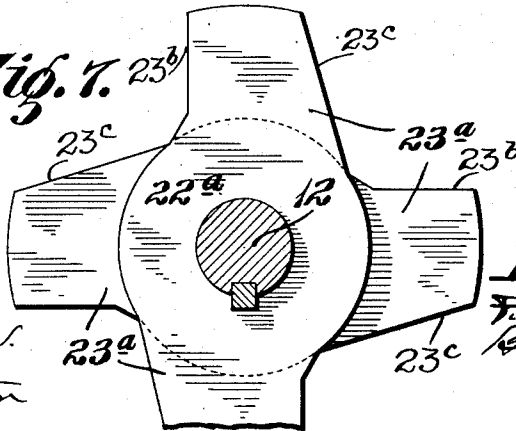


Fig. 7.



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UNITED STATES PATENT OFFICE.

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CRUSHER AND PULVERIZER.

1,044,441.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed July 11, 1910. Serial No. 571,274.

To all whom it may concern:

Be it known that I, FRANK L. BUCHANAN, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Crushers and Pulverizers, of which the following is a specification.

This invention relates to crushers and pulverizers and has for its principal objects to produce a machine by the use of which large pieces of rock, ores and other materials may be either pulverized or merely crushed, as desired, without being preliminarily crushed or sized and to secure certain advantages hereinafter more fully appearing.

The invention consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings which form part of this specification and wherein like symbols refer to like parts wherever they occur, Figure 1 is a vertical section through a crushing and pulverizing machine embodying my invention; Fig. 2 is a fragmentary view, partly in elevation and partly in section, showing the resiliently mounted bearing for the shaft of the crushing element; Fig. 3 is a fragmentary view showing the arrangement for covering the opening in the casing through which the shaft projects; Fig. 4 is a section through a bearing block for the shaft and the portion of the casing adjacent thereto; Fig. 5 is a detail elevation of the rotatory crushing element illustrated in Fig. 1; Fig. 6 is an elevation of a modification of the crushing element; and Fig. 7 is an end elevation of the crushing element shown in Fig. 6.

The machine comprises a casing 1 having a feed opening or hopper 2 in the front top portion thereof. Below the feed opening or hopper 2 is an inclined breaker plate 3 which is preferably corrugated transversely. This breaker plate is fitted loosely in a pocket 4 and it is provided with outwardly projecting pins or bolts 5 which are slidably fitted in perforations in a follower plate 6. Springs 7 are coiled around the respective pins or bolts 5 and interposed between the breaker plate and the follower plate; and retaining heads or nuts 8 are mounted on the outer ends of said bolts or pins 5. Adjusting screws 9 are swiveled at their inner ends to the follower plate 6 and they are

projected through screw-threaded openings in the outer wall 10 of the pocket 4. On the outer ends of the screws are fixed hand-wheels 11 so that the same can be easily manipulated.

Extending transversely through the casing is a rotatory shaft 12. This shaft 12 is journaled in bearing blocks 13 which are slidably supported on brackets 14 on the outer side of the opposite side walls of the casing 1. The bearing blocks 13 are provided with vertical slots 15 through which securing bolts 16 are passed. These bolts 16 are fitted loosely through perforations in the bracket 14 so as to move vertically; and they have retaining heads 17 on their lower ends between which and the bottom of the bracket are interposed coiled springs 18. Projecting from the rear end of the bearing block 13 is a horizontal pin or stud 19 which is slidably fitted through a perforation in an upstanding portion 20 on the rear portion of the bracket 14. A spring 21 is coiled around the pin 19 between the end of the bearing block and said upright portion 20 on the bracket member so as to yieldingly hold the bearing block normally in forward position.

Fixed on the shaft 12 is a rotatory crushing element 22 having a series of longitudinal rigid projections 23 preferably formed integrally therewith. For crushing and pulverizing, the projections 23 are preferably formed continuous and extend throughout the entire width of the machine. The peripheral faces of these ridges or projections 23 are curved on a common radius from the axis of the shaft 12. The crushing element is mounted so that its peripheral face travels close to the breaker plate 3 and also close to a grinding and sifting cage 24. The grinding and sifting cage is arranged concentric with the shaft 12 in its normal position. Any suitable form of arcuate cage may be employed, but preferably the cage comprises flat rectangular bars which are set on edge on arcuate ribs 25 on the inner sides of the side walls of the casing. The arcuate ribs are provided with stepped seats which are so arranged that the upper edges of the bars touch in a circular arc concentric with the shaft 12.

Secondary breaker plates 26 are provided in the top portion of the casing. These preferably comprise flat rectangular plates which

extend transversely across the casing and are radially disposed with respect to the axis of the shaft 12. The plates are inserted between the flanged joints of segmental cover sections 27 which constitute the top of the casing. The plates 26 are preferably provided with a series of perforations adjacent to their margins so that securing bolts can be inserted through the same and alining perforations in the flanges of the cover segments. To permit of reversing the plates to compensate for the wear on one edge, a set of perforations are provided along each marginal portion of the plate.

The arrangement of the grinding and sifting cage or concave is set forth and claimed in my copending application, Serial No. 562,365, filed May 20, 1910; and said application also shows and describes a series of secondary breaker plates arranged somewhat like those herein set forth. These elements may be eliminated from the present machine in some cases and, therefore, are not claimed as a part of the present invention.

A machine arranged as above described is adapted for crushing and pulverizing, the material being initially crushed upon the breaker plate 3 and reduced to a powder or flour on the grate bars between which it is sifted. Any material which is not sufficiently crushed on the initial breaker plate is carried against the secondary plates 26 and there crushed. The breaker plate 3 by reason of its being resiliently supported will yield should a piece of metal or other hard or tough substance enter the machine. The arrangement of the vertical blocks 13 is also such that the same will yield to permit the shaft 12 and the crushing member carried thereby to move away from the plate. Also, should any exceedingly hard material get between the rotatory crushing members and the grate bars the crushing element will yield upwardly owing to the arrangement of the bolts 16 in the journal blocks 13.

To prevent the escape of the material through the openings in the side wall of the casing through which the shaft 12 projects, collars or cover plates 28 are sleeved on the shaft so as to overlap the openings in whatever position the shaft may be with respect thereto.

In some cases, when it is desired to make macadam from stone or to crush material into small particles without pulverizing or reducing the same to a flour, a rotatory breaker 22^a having a series of spaced lugs or projections 23^a is substituted in place of the crushing element 22 which is provided with the continuous lugs 23; and the cage bars are removed from the machine. In this instance, the secondary breaker plates 26 may also be dispensed with. The material is fed

through the hopper 2 and the rapidly rotated projections 23^a crush it upon the initial breaker plate 3. In some cases, however, the grate bars and secondary breaker plates may be retained in the machine, but the grate bars are spaced a greater distance apart than when the machine is arranged to pulverize the material.

Preferably, the striking faces 23^b of the lugs or ribs 23 or 23^a, as the case may be, are arranged parallel with a diametrical line through the center of the crushing element 22 or 22^a, and the opposite face 23^c is tapered or inclined so that said projections are wider at their base than at their peripheral portion.

Obviously, the device admits of considerable modification without departing from my invention. Therefore, I do not wish to be limited to the specific construction and arrangement shown.

What I claim is:

1. A crushing and pulverizing machine comprising a relatively heavy, substantially cylindrical rotor having a multiplicity of re-entrant circumferential portions extending longitudinally thereof, providing rigid members having lateral breaker faces and relatively wide peripheral crushing faces, and an inclined breaker plate extending tangentially in working relation to said rotor.

2. A crushing and pulverizing machine comprising a relatively heavy, substantially cylindrical rotor having a multiplicity of re-entrant circumferential portions extending longitudinally thereof providing rigid members having lateral breaker faces and relatively wide peripheral crushing faces, an inclined breaker plate extending tangentially in working relation to said rotor, and adjustable and resilient means for holding the rotor and inclined breaker plate in working relation.

3. A crushing and pulverizing machine comprising a relatively heavy, substantially cylindrical rotor having a multiplicity of re-entrant circumferential portions extending longitudinally thereof, providing rigid members having lateral breaker faces on one side, said breaker faces lying parallel with a diametrical line through the rotor and the opposite side faces of said members being inclined with respect to said diametrical line, the circumferential faces of said members being relatively wide, and an inclined breaker plate extending tangentially to said rotor.

Signed at St. Louis, Missouri, this 6th day of July, 1910.

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Witnesses:

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