P. S. KNITTEL.

PULVERIZING MACHINE.

APPLICATION FILED SEPT. 9, 1918.

1,424,922. Patented Aug. 8, 1922.

Fig. 1.

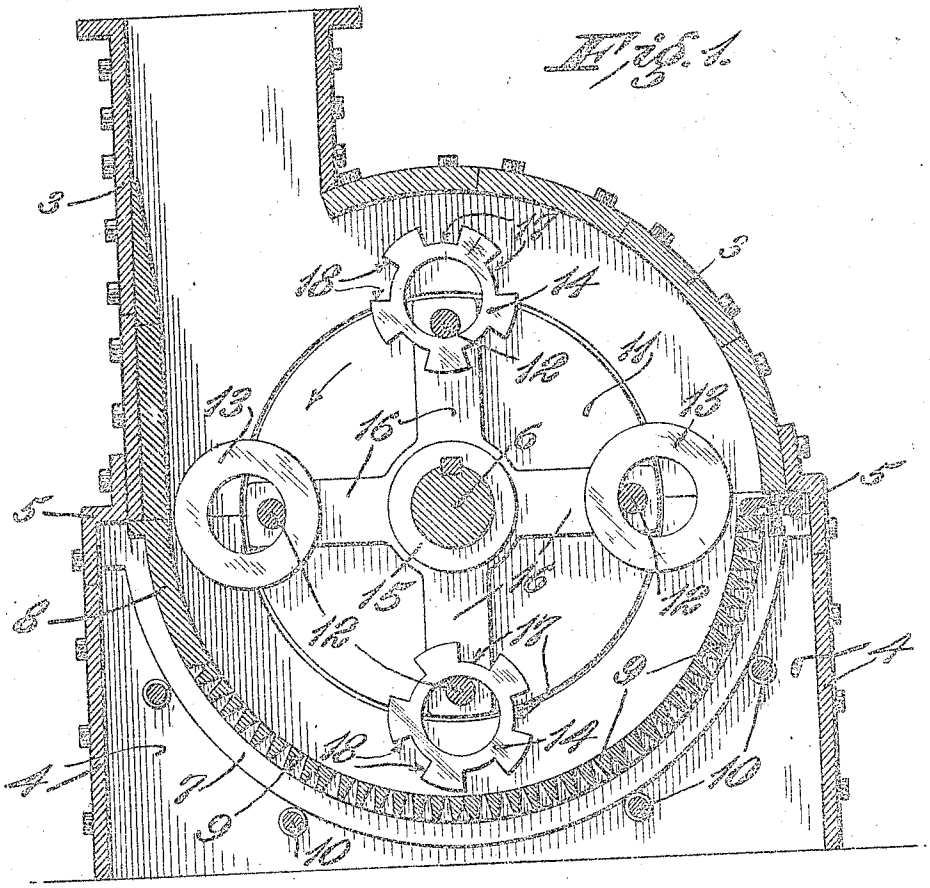
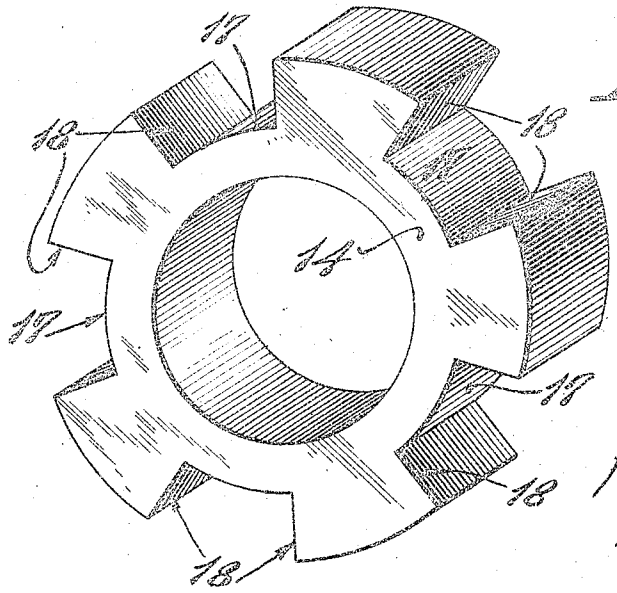


Fig. 2.



Inventor:
Paul S. Knittel,
by Cameron & Cameron
his Attys.

UNITED STATES PATENT OFFICE.

PAUL S. KNITTEL, OF ST. LOUIS, MISSOURI, ASSIGNOR TO AMERICAN PULVERIZER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

PULVERIZING MACHINE.

1,424,822. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed September 9, 1918. Serial No. 253,994.

To all whom it may concern:

Be it known that I, PAUL S. KNITTEL, residing in the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Pulverizing Machines, of which the following is a specification.

My invention relates to pulverizing machines of the type illustrated in the Roebbel Patent No. 1,015,344, dated January 23, 1912, wherein a series of rings and hammers are rotatably mounted within the casing.

In a pulverizer of the type shown in said Roebbel patent, the grinding rings are loosely mounted on their supporting rods, and are capable of moving bodily in the direction of the shaft when they strike large lumps of tough material or pieces of metal which are occasionally fed into the machine by accident. This is not true in regard to hammers which are pivoted on their supporting rods so as to swing laterally with relation thereto, and are not capable of moving bodily in the direction of the shaft. I find by experience that the material often wedges in between the outer ends of the hammers and the grate bars causing the hammers to straighten out. This action tends to bend or spring the shaft out of line, thus greatly reducing the speed of the machine and resulting in the bearings becoming worn and causing the driving belt to slip off.

The principal object of the present invention is to produce a ring hammer for pulverizers adapted to overcome the disadvantages hereinbefore mentioned. Other objects are to increase the number of hammer faces on each individual hammer and to make such a hammer as simple and cheap as practicable. The invention consists in a ring hammer for pulverizers having its periphery notched or corrugated and adapted to be loosely mounted on supporting rods arranged radially around the main shaft of the machine so as to rotate therewith; and it further consists in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings wherein like numerals refer to like parts wherever they occur,

Fig. 1 is a vertical transverse section through a pulverizer provided with ring hammers embodying my invention; and

Fig. 2 is a detail perspective view of one of the ring hammers.

In Fig. 1 of the drawing, my invention is illustrated in connection with a pulverizer comprising an upper casing 3 and a lower casing 4 having removable sections 5 for clamping them together. The main shaft 6 is mounted in bearings formed in the end walls of the lower casing. Each end wall of the lower casing is provided with a flange 7 which supports the ends of the grinding concave 8 and the grate bars 9. The end walls of the lower casing are secured together by means of rods 10 located inside the casing below the grinding concave and grate bars.

Mounted on the shaft 6 in a recess formed in the inner face of the end walls of the casing are end plates or disks 11. The disks are keyed to the shaft 6 so as to be rigid therewith and are connected to each other near the outer edge by a series of spaced parallel rods 12.

Arranged on the series of rods 12 are grinding rings 13 and ring hammers 14. Mounted on the shaft 6 between the disks 11 are spiders 15, the radially extending arms 16 of which are perforated to receive the supporting rods 12, thus forming supports for the same intermediate their ends. The radially extending arms 16 of the spiders 15 serve to space the grinding rings 13, and ring hammers 14 which are arranged alternately on the supporting rods. This same arrangement of spacing is carried out in the angular spacing of the grinding rings 13 and the ring hammers 14 on the supporting rods 12. The hub portions of the spiders 15 are keyed to the shaft 6 and abut against each other, thereby spacing the arms of the spiders the desired distance from each other. Each ring hammer 14 has a series of notches 17 cut in its periphery, the shoulders 18 formed by the notches forming hammer faces and the peripheral surfaces between the notches acting as grinding surfaces in the same manner as the peripheral surfaces of the grinding rings. By the arrangement described, the hammer faces of the ring hammer serve to loosen up any material which tends to pack on the grinding surfaces of the machine as well as to pulverize the material. The ring hammer is made symmetrical so as to be reversible. By reason of this fact, the ring

hammer may be used in a reversed position when the hammer faces of the same become worn. From the foregoing description it will be seen that this type of ring hammer overcomes the disadvantages of hammers of the old plain bar type which are pivoted to the supporting rod and have only four hammer faces. The above described ring hammer is loosely mounted on its supporting rod so as to move bodily inward upon striking an obstruction, and is provided with ten hammer faces in addition to its grinding surfaces.

The foregoing arrangement is considered only as an example; and I do not wish to be limited to the type of machine shown as my ring hammer is equally as well applicable to other types of pulverizers.

I claim the following as my invention:

1. A hammer and crushing member for pulverizing machines of the high-speed percussion and crushing type comprising an annular body of sufficient weight to serve as a crushing roller and having a relatively large central opening, the periphery of said body being offset at intervals to form extending crushing surfaces and hammer faces at the ends of said surfaces.

2. In combination with a pulverizing machine comprising a casing having grinding surfaces and a carrier rotatably mounted therein, ring hammers loosely mounted on said carrier and adapted to co-operate with said grinding surfaces, some of said hammers being plain rings and some being rings of substantially the same overall diameter as the plain rings but having their periphery offset outwardly at intervals to form hammer faces, substantially as and for the purpose set forth.

3. A pulverizing machine comprising a casing having grinding surfaces, a carrier rotatably mounted therein and heavy rings with offset peripheries forming radial shoulders, said rings being loosely supported by said carrier to rotate therewith to co-operate with said grinding surfaces, whereby said rings serve both as hammers and crushers.

4. In combination with a pulverizing machine comprising a casing having grinding surfaces and a carrier rotatably mounted therein, and having annularly spaced rods thereon, rings adapted to cooperate with said grinding surfaces as crushers, said rings being loosely supported on said annularly spaced rods, the peripheral surface of said ring being offset at intervals by radial shoulders so that the outermost portions form crushing surfaces and the shoulders at the ends of said crushing surfaces form hammer faces whereby the ring may be used in a reversed position.

5. A ring hammer for pulverizing machines of the high-speed percussion and crushing type, comprising an annular body whose inner and outer surfaces are substantially concentric but whose outer surface is offset at intervals to form radial hammer faces.

6. A ring hammer for pulverizing machines comprising an annular body whose inner and outer surfaces are substantially concentric, said outer surface having about five notches therein and at least one side of each notch having a substantially radially disposed surface adapted to constitute a hammer face.

7. A ring hammer for pulverizing machines comprising an annular body whose inner and outer surfaces are substantially concentric, said outer surface having about five notches therein and both sides of each notch having substantially radially disposed surfaces adapted to constitute hammer faces whereby said ring hammer is reversible.

8. A ring hammer for pulverizing machines of the high-speed percussion and crushing type, comprising an annular body whose inner and outer surfaces are substantially concentric but whose outer surface is offset at intervals to form radial hammer faces, the arcuate length of the notches being approximately equal to the arcuate length of the portions between them.

Signed at St. Louis, Missouri, this 5th day of September, 1918.

PAUL S. KNITTEL.