

No. 859,835.

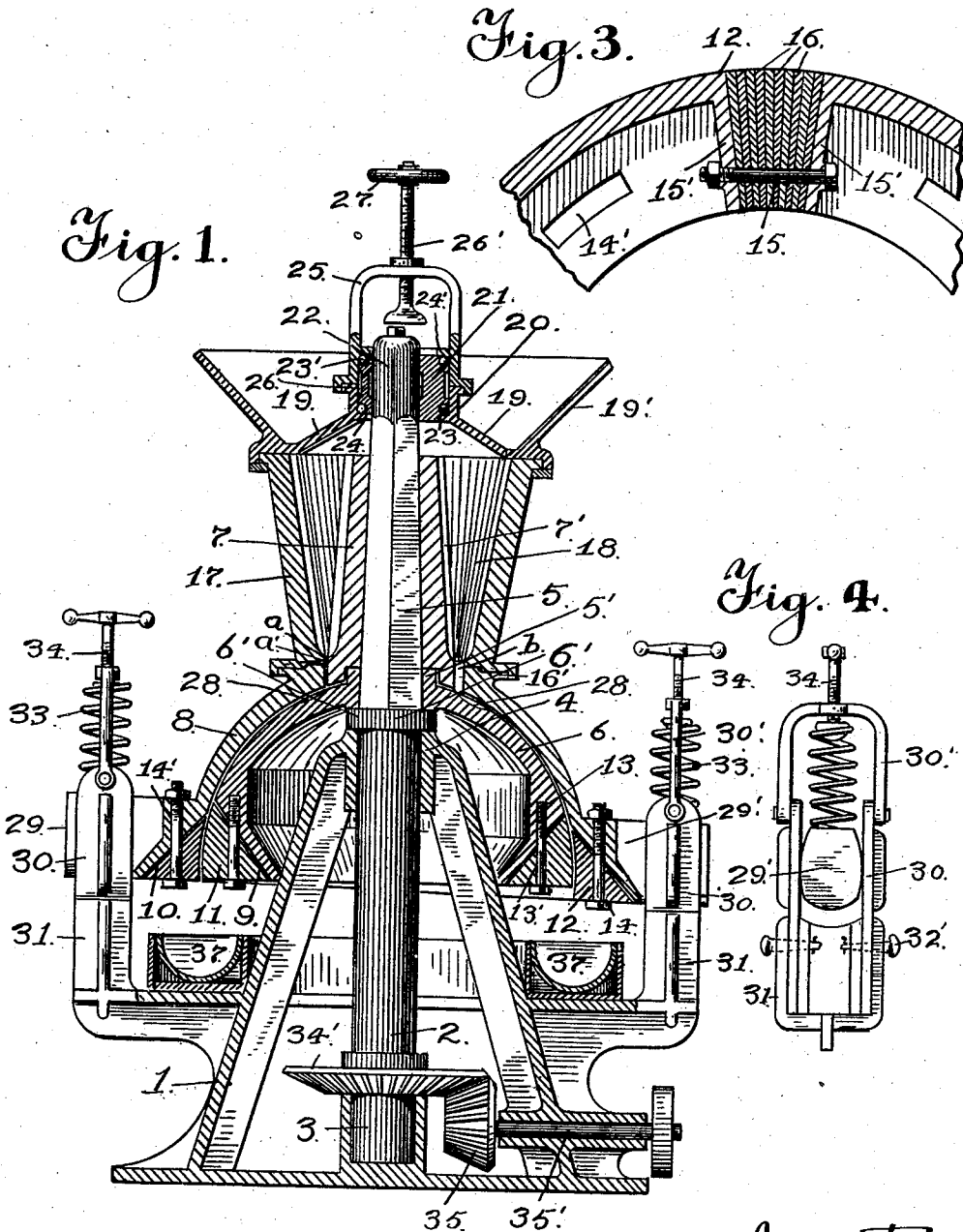
PATENTED JULY 9, 1907.

A. J. PETTER.

ORE CRUSHER AND PULVERIZER.

APPLICATION FILED MAY 16, 1905. RENEWED DEC. 6, 1906.

2 SHEETS—SHEET 1.



Witnesses:
 Arthur L. Slee.
 J. Compton.

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APPLICATION FILED MAY 15, 1905. RENEWED DEC. 8, 1906.

2 SHEETS—SHEET 2.

Fig. 2.

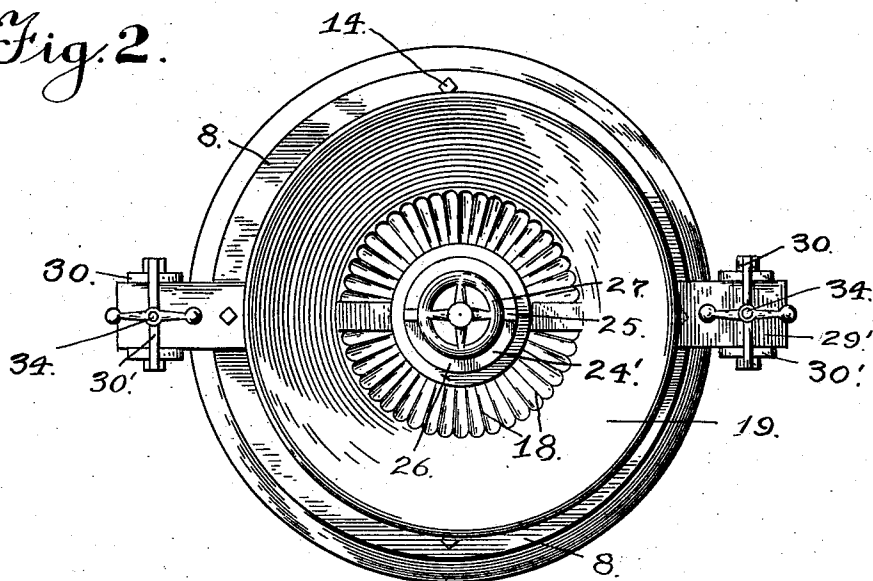
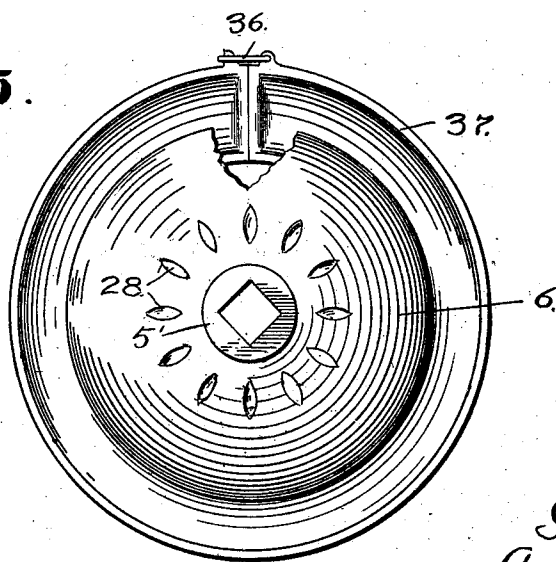


Fig. 5.



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UNITED STATES PATENT OFFICE.

ADOLPH J. PETTER, OF LOS ANGELES, CALIFORNIA.

ORE CRUSHER AND PULVERIZER.

No. 859,835.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed May 15, 1906. Renewed December 6, 1906. Serial No. 346,651.

To all whom it may concern:

Be it known that I, ADOLPH J. PETTER, a citizen of the United States, residing at the city and county of Los Angeles, State of California, have invented certain new and useful Improvements in Ore Crushers and Pulverizers; and I do hereby declare the following to be a full, clear, and exact description of the same.

The invention relates more particularly to a new and useful ore crusher and pulverizer for use in connection with laboratories and for prospecting purposes, the object thereof being to provide a simple, inexpensive, compact and durable machine for the accomplishment of the desired purpose, the same being so constructed that the parts may be easily and quickly detached and put together.

To comprehend the invention reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a vertical sectional view of the machine in side elevation, said view disclosing the relative arrangement of the spheroidal shells between which the ore is pulverized and the location of the crushing jaws between which the ore to be pulverized is fed and acted on and crushed prior to being delivered by the said spheroidal shells; Fig. 2 is a top plan view of the mechanism disclosed by Fig. 1 of the drawings; Fig. 3 is a detailed plan view disclosing a portion of one of the die or wear rings, which rings are secured respectively to the circumferential lower edge of the inner and outer spheroidal shells; Fig. 4 is a detail view in side elevation of the means for locking the outer spheroidal shell against movement; and Fig. 5 is a top plan view of the machine, with the outer shell and its connected parts removed, the central shaft being broken away above the inner shell.

In the drawings, the numeral 1 is used to indicate any suitable frame, through which extends the central rotatable shaft 2. This shaft works in bearings 3 and 4, of the frame 1, the upper extension 5 of the said shaft being made square. On this square portion or extension of the rotatable shaft is fitted the hub 5', from which depends the convexed or spheroidal-shell 6. The hub 5' of the said spheroidal shell rests upon the circular shoulder 6', of the central shaft 2, the inner spheroidal shell 6 being thus supported.

To the extension 5, of the central shaft, there is fitted a cone-shaped crushing jaw or head 7, which at its lower end rests upon the upper surface of the hub 5'. This cone-shaped crushing jaw or head is formed on its outer face with a series of vertically disposed teeth or crushing ribs 7'.

The inner spheroidal shell 6 is enveloped by an outer concaved spheroidal shell 8, which shell fits closely on the said shell 6. Between these shells the crushed ore is received and pulverized.

The inner spheroidal shell 6, is formed at its lower edge with an inwardly inclined circular bevel 9, while

the outer spheroidal shell at its lower edge terminates in an outwardly inclined circular bevel 10, which bevels receive respectively the inclined faces of the die or wear rings 11 and 12, Fig. 1 of the drawings. These wear rings are held in position by means of the adjusting screws or bolts 13 and 14, which screws extend through vertical slots 13' and 14', formed respectively in the die or wear rings 11 and 12. The die or wear rings are split ones, one of said wear rings being illustrated by Fig. 3 of the drawings, each being held together by means of a lock bolt 15, which bolt extends through the inturned end flanges 15' of each split ring and the shims 16, placed between the said inturned end flanges 15'. By means of these shims 16, the number of which may be increased or decreased at will, the distance between the flanges 15' may be varied, thus allowing for the die or wear rings to be expanded and contracted.

To a circular shoulder 16', at the upper edge of the outer spheroidal shell 8, is bolted or otherwise secured the reversed cone-shaped crushing jaw or head 17, which acts in conjunction with the jaw 7, to crush or break up the ore delivered between the said heads or jaws. The said head or jaw 17, on its inner face is provided with a series of vertically disposed teeth or ribs 18.

A spider 19 is bolted or otherwise secured to the upper edge of the head or jaw 17, which spider has preferably formed integral therewith an upwardly extending hopper 19', into which the ore to be crushed is delivered.

The opening of the hub 20 of the spider, is of somewhat greater diameter than that of the extension 5 of the central shaft 2, over which it fits, and between said hub 20 and the shaft extension 5, is located an eccentric 21. This eccentric fits loosely on the upper rounded portion 22 of the shaft extension 5, and is free to turn thereon, said eccentric working on the ball bearings 23—23', which rest respectively on the inturned shoulder 24 of the hub 20, and shoulder 24' of the yoke plate 25. This yoke plate is bolted or otherwise secured to the projections 26 of the spider's hub 20.

Through the yoke plate 25 works the vertically movable adjusting screw 26', the lower end of which bears onto the upper projecting end of the central shaft 2. By means of the hand wheel 27, the screw 26' is turned to move the yoke plate 25 toward and from the shaft 2, thus raising and lowering the outer spheroidal shell 8, relative to the surface of the inner spheroidal shell 6, the purpose of such adjustment being to vary the position of the outer shell, to accommodate the distance between the grinding surface of the inner and outer spheroidal shells in accordance with the degree of fineness to which it is desired to pulverize the material being treated in the machine.

The lower end portion of the inner crushing jaw or

head 7, from the point *a*, and of the outer crushing jaw or head 17 from point *a'*, is made substantially straight and free of teeth, ribs or corrugation, the circular passage-way *b* thus formed between the unbroken surfaces communicating with a series of what shall be termed "drop" grooves 28, which grooves receive the material from the passage-way *b* and gradually distributes the same over the upper surface of the inner spheroidal shell 6.

From the outer spheroidal shell laterally project the handles 29 and 29', which handles are engaged by the vertically movable lock rods or plates 30, said plates being pivoted or hinged to the yoke plate 30'. The lock plates straddle the said handles 29 and 29', and the lower end of said lock plates fit within the seats or sockets 31, formed in the projections 32 of the main frame, the lock devices being held in their seats or sockets by means of lock pins 32'. When the lock plates are thus secured, within the seats or sockets 31, they serve to hold the handles or projections of the outer spheroidal shell locked against movement in a horizontal plane. By means of the spring 33 interposed between the handles or projections 29 and 29', and the screw rod 34, which works through the yoke 30', the tension applied through the medium of said spring onto the outer spheroidal shell, may be adjusted so as to control the vertical vibration of the said outer spheroidal shell 8, during the operation of the machine.

It will be understood that the lock devices or plates 30 and 30' are only employed for the purpose of locking the outer spheroidal shell against horizontal movement, when such movement is applied to the inner spheroidal shell through the medium of an oscillating, or a rotatable motion being transmitted to the central shaft 2, which motion is given the shaft through the medium of the gear 34' secured to the lower end thereof, meshing with the pinion 35 mounted on the drive shaft 35'. In case it is desired to perform the work of crushing and pulverizing the ore by means of motion given to the outer spheroidal shell, the said described locking means is released to free the projecting handles, in order to permit of the operator grasping the same and by means thereof oscillate the said outer spheroidal shell; for such purpose it is required that the central shaft 2 be held against movement by any suitable lock device.

Inasmuch as the eccentric 21 is loose on the upper end of the shaft 2, the same will act in the capacity of an irregular or idle toggle, and will only be brought into action in case the material fed into the ore receiving hopper tends to choke or lodge between the crushing heads or jaws 7 and 17, which would thus bind the machine and hold the same against movement. Should such choking of the machine take place, the loosely mounted eccentric will transmit, by reason of the motion given to the working parts, an irregular toggle action, in an opposite direction to the strains placed thereon, which will serve to gradually move or swing the outer crushing jaw or head laterally, causing the teeth of the jaws to bite or remove a portion of the obstructing rock, and so reduce the size thereof as to permit of the same being treated between the crushing surfaces proper of the heads or jaws 7 and 17. The loose mounting of the said eccentric

is an important feature, for should the same be secured to the rotatable central shaft, and be carried thereby, it would simply act in said capacity to impart a regular movement to the working parts, but by mounting the said eccentric loose on the shaft, an irregular toggle movement is brought to bear on said parts, which gives a more effective crushing action to the head or jaws.

The ore fed into the hopper is delivered between the crushing heads or jaws 7 and 17, and the same is crushed or reduced by the action of the teeth thereof during the gyratory or oscillatory motion imparted to the working parts. As the ore is crushed or broken, it gradually works downwardly towards the pulverizing spheroidal shells, the same first entering the circular passage-way *b*, where it is subjected to a slight grinding action, flowing from said passage-way into the drop grooves 28, from which the material distributes over the upper surface of the inner spheroidal shell, so as to deliver the same between the grinding surfaces of the co-acting inner and outer spheroidal shells. It will be understood that a muller action takes place between these surfaces, which serves to pulverize or grind the material being treated to any degree of fineness desired, the pulverized material being delivered from between the die rings, secured to the lower edge of the spheroidal shells, into the circular trough 37, which is located below the said shells for the purpose of receiving the pulverizing material. This trough is preferably formed of rubber, it being a split or open one, the abutting edges being held together or locked by means of the wire loop 36, as disclosed by Fig. 5 of the drawings.

In order to vary the diameter of the wear rings for any purpose whatsoever, it is only necessary that the lock bolt 15 of the said split wear rings be released from within the inturned end flanges 15' which will permit of the removal of one or more of the shims, or the insertion of additional shims, when the lock nut 15 is properly secured and the end flanges 15' tightly drawn together. By this means a proper adjustment between the die rings for effective work may be maintained.

Having thus described the invention, what is claimed as new and desired to be protected by Letters Patent is—

1. A crushing and pulverizing apparatus, the same comprising a suitable base, a central rotatable shaft, a spheroidal shell secured thereon, a crushing jaw secured to the shaft above the said shell, an idle eccentric on the upper end of the said rotatable shaft, an outer spheroidal shell inclosing the inner spheroidal shell, a circular die ring secured to the lower edge of each spheroidal shell, a crushing jaw secured to the upper edge of the outer shell, an ore hopper carried by said crushing jaw, a spider forming connection between the outer crushing jaw and the central shaft, the idle eccentric working within the hub of said spider, and means for adjusting the outer crushing jaw and its connected parts vertically relative to the central rotatable shaft.

2. A crushing and pulverizing apparatus, the same comprising a suitable base, a central rotatable shaft, a spheroidal shell secured thereon, an outer spheroidal shell surrounding the said inner shell, an open circular die ring adjustably secured to the lower edge of each shell, devices for contracting and expanding the die rings to compensate for wear, means for adjusting the outer shell vertically relative to the inner shell and crushing jaws arranged above the inner and outer spheroidal shell.

3. In a combined crushing and pulverizing apparatus, the combination with the vertically disposed rotatable shaft, of a spheroidal shell secured thereto, of a crushing jaw secured to the shaft immediately above the said shell, 5 an eccentric loosely mounted on the upper end of the shaft, of an outer spheroidal shell surrounding the inner shell, a crushing jaw carried by said outer shell, of a hopper above the said jaw, a spider adjustable on the rotatable shaft and to which spider the hopper is secured, 10 the hub of the spider encircling the loose eccentric, of means attached to the hub of the spider for adjusting the outer spheroidal shell vertically relative to the inner shell, means for regulating the pressure of the outer shell, and a die ring adjustably secured to the lower edge of each shell. 15
4. In a combined crushing and pulverizing apparatus, the combination with the vertically disposed rotatable shaft, of an inner spheroidal shell secured thereon, of a crushing jaw

on said shaft immediately above the shell, an outer spheroidal shell surrounding the inner shell, of a crushing jaw carried thereby, of handles projecting from the outer shell, 20 of devices for locking said handles to prevent horizontal movement of the outer shell, of tension means for regulating the pressure on said shell, of a spider forming connection between the outer shell and the rotatable shaft, a loose eccentric interposed between the hub of the spider 25 and the rotatable shaft, and of means for imparting vertical adjustment to the outer spheroidal shell through the medium of the connecting spider.

In testimony whereof I have hereunto affixed my signature in the presence of witnesses.

A. J. PETTER.

In the presence of—

G. RAHMEL,

F. O. CORNELIUS.