W. H. HESS.

PULVERIZER.

APPLICATION FILED APR. 30, 1907.

910,196. Patented Jan. 19, 1909.

3 SHEETS—SHEET 1.

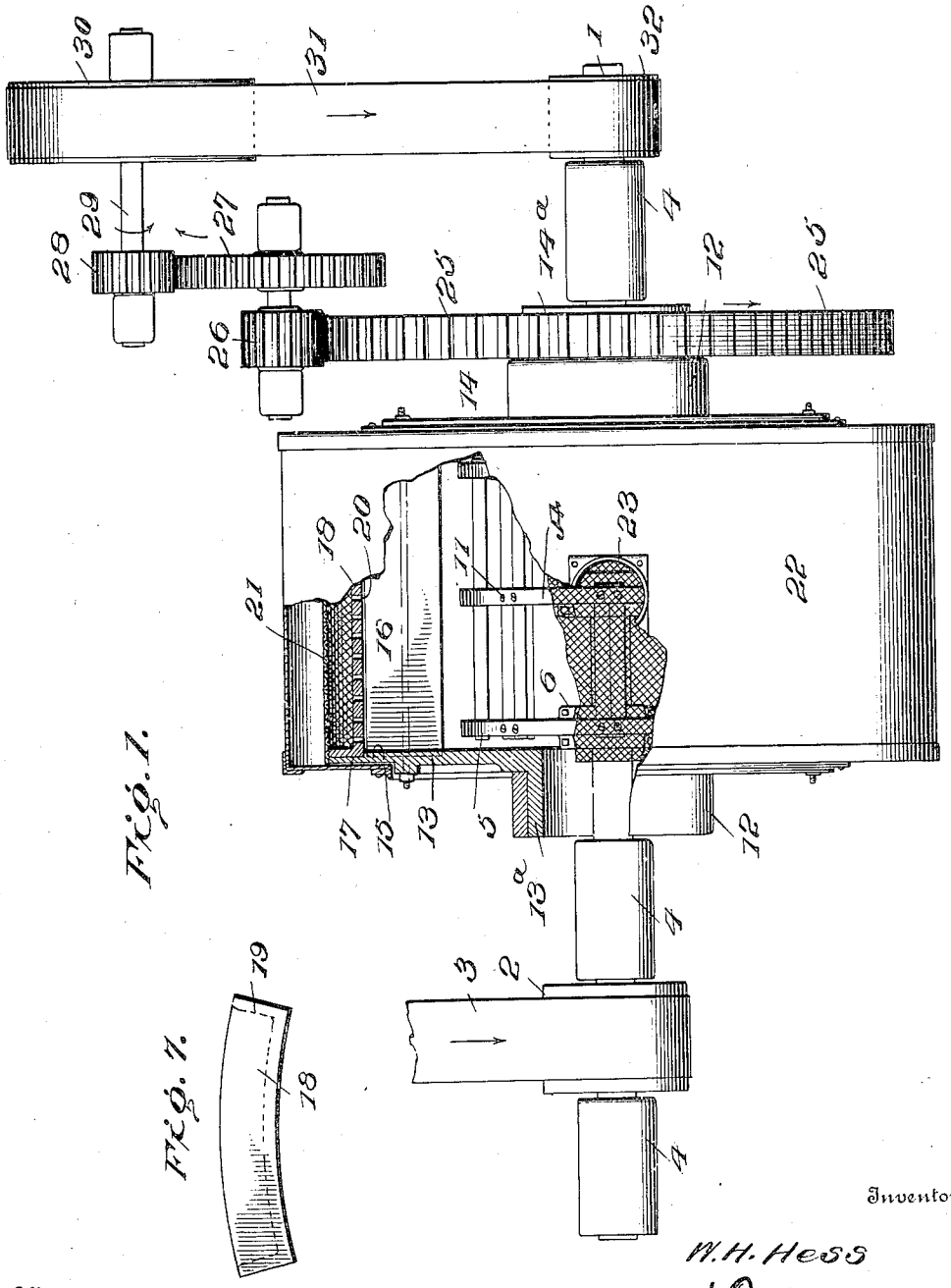


Fig. 1.

Fig. 2.

Witnesses

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3 SHEETS—SHEET 2.

FIG. 2.

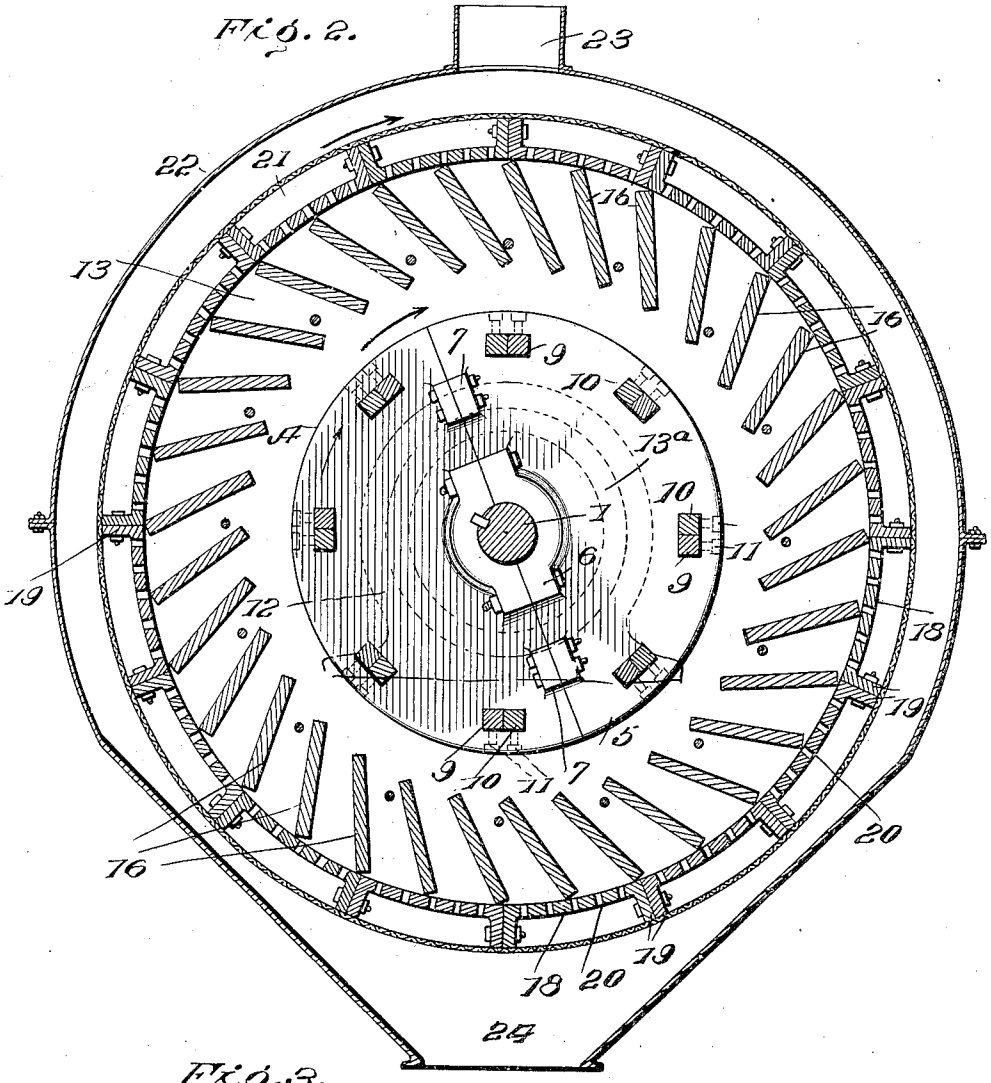
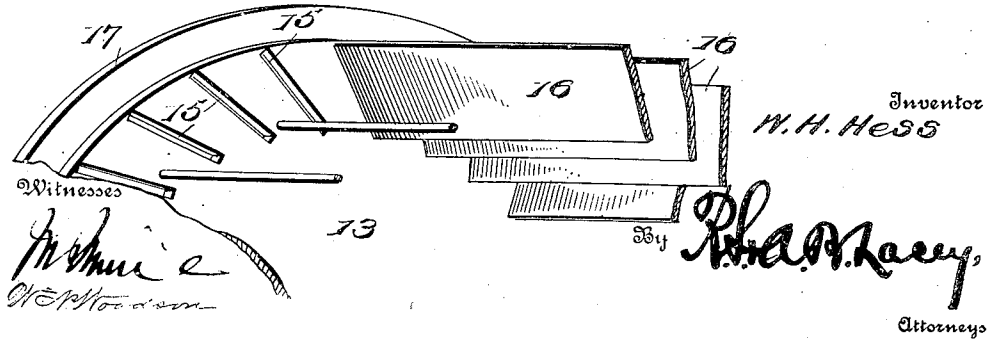


FIG. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

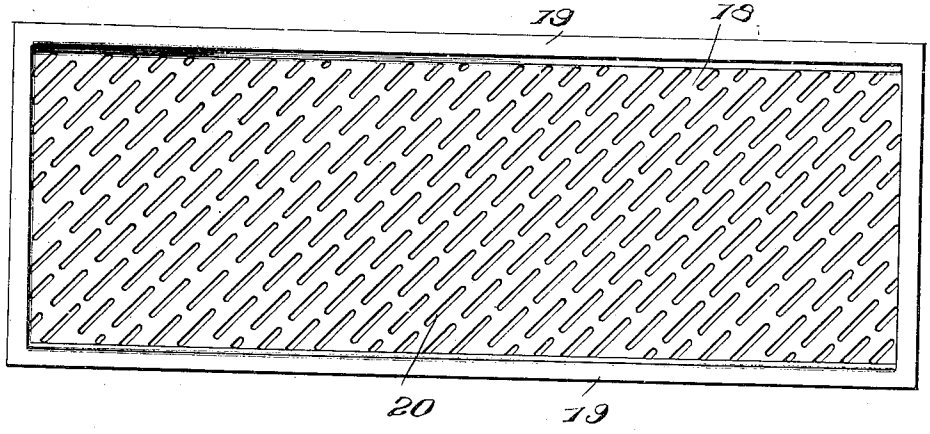


Fig. 5.

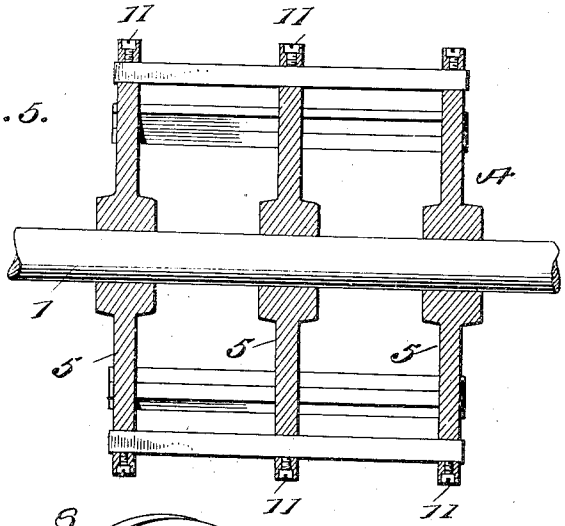
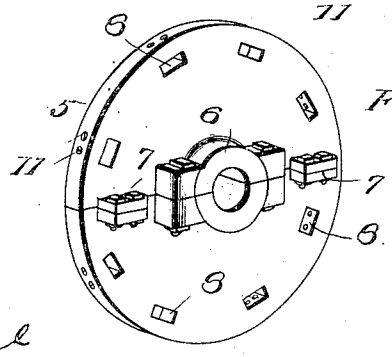


Fig. 6.



Witnesses

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WILLIAM H. HESS, OF DEWEY, OKLAHOMA.

PULVERIZER.

No. 910,196. Specification of Letters Patent. Patented Jan. 19, 1909.

Application filed April 30, 1907. Serial No. 371,069.

To all whom it may concern:

Be it known that I, WILLIAM H. HESS, citizen of the United States, residing at Dewey, Oklahoma, have invented certain new and useful Improvements in Pulverizers, of which the following is a specification.

This invention contemplates certain new and useful improvements in machines for pulverizing stone, slate and similar material, and relates more particularly to that type of pulverizing machine which operates upon the material in suspension.

The primary object of the invention is to provide a durable and efficient construction of machine of this character which is capable of producing within the machine and without the necessity of outside screening, pulverized stone of any desired degree of fineness and the invention consists of certain constructions and arrangements and combinations of the parts which I shall hereinafter describe, together with the advantages thereof, and then point out the novel features in the appended claims.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction and the means for effecting the result, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a top plan view of a pulverizing machine embodying the principles of my invention, parts being broken away to show the interior construction. Fig. 2 is a transverse sectional view of the machine on an enlarged scale. Fig. 3 is a detail perspective view of a portion of one of the heads of the cylinder, and several breaker plates in connection therewith. Fig. 4 is a detail plan view of one section of one of the screens. Fig. 5 is a longitudinal sectional view through the pulverizer cage. Fig. 6 is a detail perspective view of one of the disks of said cage. Fig. 7 is an end view of one of the sections of one screen.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The main shaft 1 of my improved pulverizing machine is shown in the present instance as provided with a pulley 2 over which the belt 3 extends, so as to drive said shaft from an electric motor or any other suitable source of power. The shaft 1 is mounted to turn in bearings 4 of which in the present instance there are two at one side of the machine and one at the other. The pulverizer cage is mounted fast on shaft 1 and comprises a series of heads or disks 5 spaced from each other on the shaft and preferably constructed in halves so as to facilitate their application to and removal from the shaft, said halves being clamped to the shaft by means of hub bosses 6 and lateral extensions 7 bolted together, as shown. The several disks 5 are formed near their margins with preferably rectangular openings 8, the openings of the respective disks registering and receiving a series of breaker bars 9 that are preferably rectangular as shown, and that are backed by supporting or reinforcing bars 10, as best seen in Fig. 2. These bars are held in place preferably by means of countersunk set screws 11 and they are set far enough back from the margins of the disks 5 to leave sufficient metal beyond them so as to withstand the centrifugal strain of the rapidly rotating cage.

Within hollow bearings 12 the tubular lateral extensions 13^a and 14^a of heads 13 and 14 are journaled, the shaft 1 extending entirely through the said hollow extensions 13^a and leaving a space around the shaft at one of the extensions, as best illustrated in Fig. 1, so as to provide an entrance opening for feeding the material into the machine. The said heads 13 and 14 are formed near their margins with a circumferentially extending series of oblique slots or grooves 15, and the breaker plates 16 are held at their ends in said grooves and extend from one head to the other, said plates being spaced from each other as shown, and being manifestly held at angles to the radius of the heads, as best seen in Fig. 2. Beyond the series of breaker plates 16, the said heads are formed with annular recesses 17 in which the sections 18 of the cylindrical screen are fitted. Each of these sections 18 is provided with outstanding flanges 19 on all sides and the several sections are secured together by bolts extending through the abutting side flanges, as best seen in Fig. 2 of the drawings. The several sections 18 are each formed with a series of obliquely extending slots 20.

A secondary or supplemental screen 21, preferably of wire mesh of the requisite degree of fineness, incloses the primary screen which is composed of the sections 18, said screen 21 being secured to the main or primary screen in any desired manner so as to turn therewith. A casing 22 incloses the screens so as to prevent the dust from flying and to serve as a means for directing the pulverulent material to the discharge mouth or chute 24, and the casing is provided at its top as shown, with an air inlet 23.

A gear wheel 25 is secured to the extension 14^a of the head 14 and said gear wheel meshes with a relatively small pinion 26 on the same shaft with a gear wheel 27. The gear wheel 27 meshes with a pinion 28 on a countershaft 29. A pulley 30 is fast on the shaft 29 and a belt 31 operatively connects said pulley 30 with a smaller pulley 32 on the main driving shaft 1. Thus it will be seen that, through the instrumentality of the gearing just described, the cylinder which is composed of the series of breaker plates, the screens, and the heads carrying said screens is driven from the main shaft 1 of the pulverizer cage.

From the foregoing description in connection with the accompanying drawings, it will be seen that I have provided a pulverizing machine in which the screens revolve, as well as the pulverizer cage. Machines that are built with stationary screens manifestly do not have sufficient screening surface for the finer grades of grinding, because the screens when stationary cannot keep up with the capacity of the mill and consequently the screens must be made of coarse mesh and the finer grades of pulverulent materials obtained by screening operations outside of the pulverizing machine. Machines with stationary screens are also objectionable in that the stationary screens cause wear of the hammer and also much unnecessary consumption of power. It is also to be observed that the breaker plates are placed at such an angle that the material will be carried up and dumped on top of the breaker bars and not before it reaches the top. The material may be kept in the mill until the desired fineness is obtained, as the material is returned to the breaker bars when it will not pass the fine or secondary screen, or when it will not even pass the cast sectional screen. In the practical operation, the pulverizing cage is run at a very high speed and the cylinder with its breaker plates and screens at a slower speed. As the plates take up the material, they carry it up until the slope is such that the material falls on to the pulverizing cage below. These plates, it will be seen, serve a plurality of functions, to wit: The material in a more or less shattered condition is thus thrown against them, whereupon additional breaking takes place, and the said plates serve to protect the screens from the impact of the flying material, as well as serving as revolving carriers to carry the material and drop it upon the rapidly rotating pulverizer cage. The space between the revolving hammers or cage and the breaker plates is of considerable advantage as it permits of the impingement of material against material, causing it to be ground against itself.

In this machine there are, as above described, two revolving screens, one of which may be termed the main or primary, and the other the secondary screen. The primary screen next to the series of breaker plates is preferably made in cast sections and it is noted that it serves, together with the breaker plates, to protect the secondary or outside screen which may be of any desired fineness or mesh, according to the degree to which it is desired the material shall be ground. When the material reaches this degree of fineness it will pass out of the mill, but all of the tailings will be returned to be further acted upon by the pulverizer cage. The sectional main screen is so constructed that by removal of one screen section, two breaker plates may be removed, allowing entrance into the interior of the mill for purposes of repair or the like.

Referring particularly to my novel construction of pulverized cage, it is obvious that it will require less power to drive it than for the hinge hammer type of revolving cages, and that it will make less air current and hence less dust. By providing backings 10 for the hammer bars 9, the latter can be worn nearly out before renewal is necessary. Furthermore, it is obvious that the said hammer bars may be renewed at slight expense and without the necessity of doing away with the entire cage or with any portion thereof except the bar which is to be replaced. The disks 5 serve as fly wheels to always maintain the cage in balance, which is an important feature of a fast revolving cylinder.

Having thus described the invention, what is claimed as new is:

1. In a pulverizing machine, the combination of a rapidly rotating pulverizer cage formed with a peripheral row of breaker bars, means for rotating the pulverizer cage, a slowly rotating cylinder inclosing the pulverizer cage, means for rotating the cylinder, a primary screen applied to the periphery of the cylinder, a secondary screen also applied to the periphery of the cylinder and inclosing the primary screen, the said secondary screen being spaced from the primary screen and having a finer mesh than the same, and an annular series of breaker plates carried by the cylinder within the primary screen for successively elevating the material with-

in the cylinder and dropping it upon the exterior of the pulverizer cage so that it is broken by impact with the rapidly rotating breaker bars until it is sufficiently fine to pass through the two screens.

2. In a pulverizing machine, the combination of a shaft, a pulverizing cage mounted on the shaft, hollow bearings surrounding the shaft, a cylinder journaled upon the hollow bearings and inclosing the pulverizer cage, means for rotating the cylinder, and means carried by the cylinder for coöperating with the pulverizer cage to break up the material therein.

3. In a pulverizing machine, the combination of a shaft, a pulverizer cage mounted upon the shaft, means for rotating the shaft, hollow bearings surrounding the shaft, a cylinder journaled in the hollow bearings and inclosing the pulverizer cage, means for transmitting motion from the shaft to the cylinder, a screen carried by the cylinder, and means carried by the cylinder for shielding the screen from the impact of material discharged by the pulverizer cage.

4. In a pulverizing machine, the combination of a shaft, a pulverizer cage mounted upon the shaft, means for rotating the shaft, hollow bearings surrounding the shaft, a cylinder journaled upon the hollow bearings and inclosing the pulverizer cage, a primary screen carried by the cylinder, a secondary screen also carried by the cylinder and inclosing the primary screen, breaker plates carried by the cylinder for dropping the material within the cylinder upon the pulverizer cage and coöperating with the primary screen to protect the secondary screen, and means for transmitting motion from the shaft to the cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. HESS. [L. S.]

Witnesses:

ADRIAN DE YONG, Jr.,

C. H. SPAYDS.