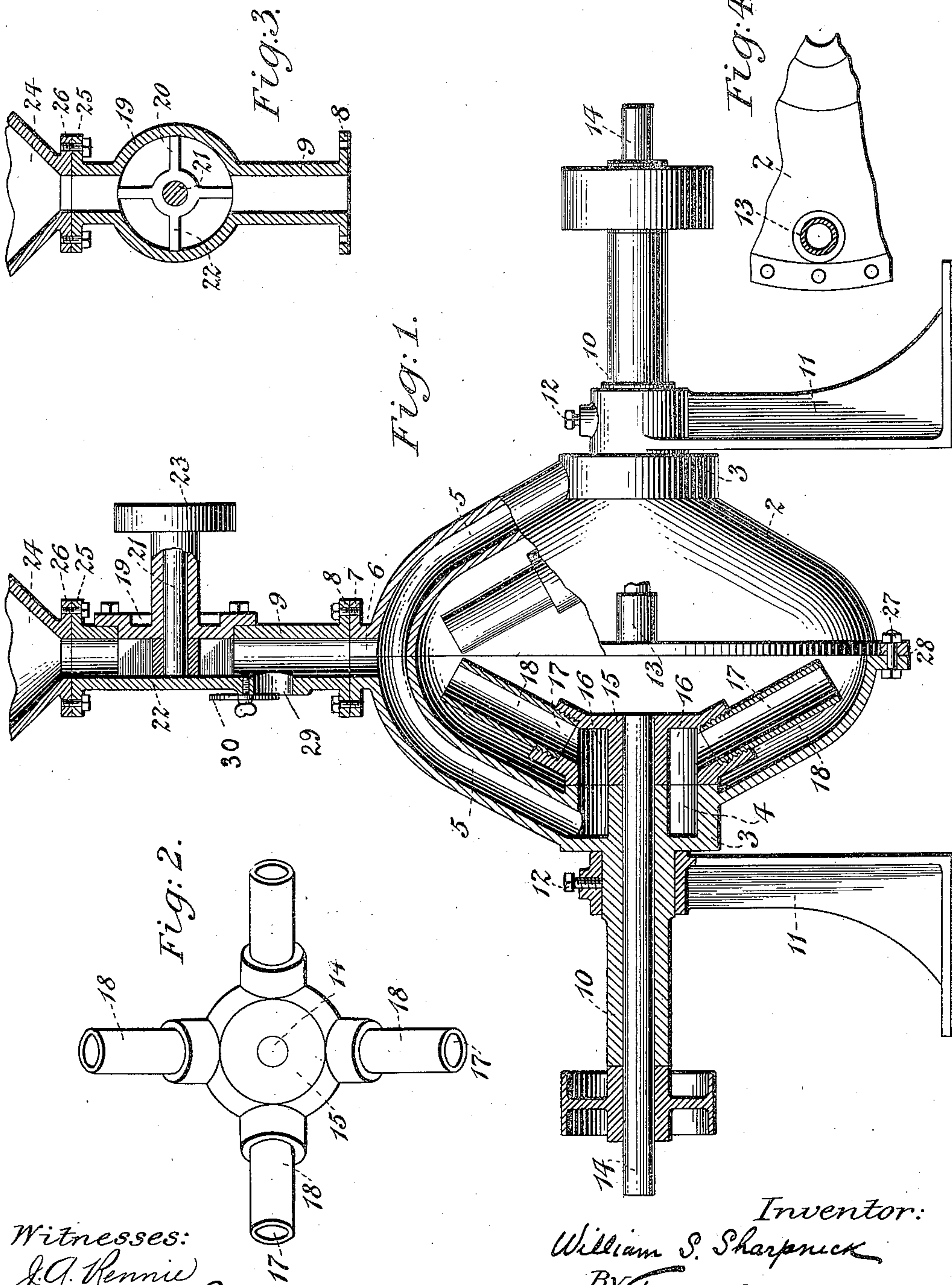


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W. S. SHARPNECK.
PULVERIZER.

APPLICATION FILED AUG. 31, 1906.



Witnesses:

J. A. Rennie

Henry R. Bauer

Inventor:

William S. Sharpneck

By *Chas. H. Powersock*

his Attorney

UNITED STATES PATENT OFFICE.

WILLIAM S. SHARPNECK, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO FREDERICK C. VEHMEYER AND ONE-SIXTH TO LEE O. GILLILAND, OF CHICAGO, ILLINOIS.

PULVERIZER.

No. 861,324.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM S. SHARPNECK, a citizen of the United States, and a resident of the city of Chicago, Cook county, and State of Illinois, have invented certain new and useful Improvements in Pulverizers, of which the following is a specification.

This invention relates to pulverizers and has particular reference to pulverizers which depend upon centrifugal force as one of the chief agencies of pulverization, in combination with a striking surface against which the material to be pulverized is projected.

While the above principles of operation are well known, this invention contemplates several novel features of construction and principles of operation to improve or enhance the effectiveness of the forces referred to.

The general objects of the invention are to provide a pulverizer peculiarly adapted for pulverizing coal and the like and is an improvement upon my invention described in Letters Patent No. 255,890 granted to me April 4, 1882, wherein several sources of feed and hollow shafts are necessary features, but dispensed with in my present invention, which among other improvements, accomplishes the work with a single source of feed; to provide a stronger, more uniform and powerful machine; to simplify and reduce the number of parts, and to so relate or combine the crushing forces as to obtain the greatest possible efficiency.

The invention consists of novel details of construction hereinafter described, illustrated in the drawing and incorporated in the claims.

The invention will be better understood by reference to the accompanying drawings forming a part of this specification, and in which—

Figure 1 represents a partly sectional elevation of my pulverizer; Fig. 2 is a plan view of the hollow shaft hubs and the arms thereon; Fig. 3 is a sectional view of the feed control mechanism shown in Fig. 1 and taken on a plane at right angles to the plane thereof; Fig. 4 is a fragment of the case wall showing the discharge or outlet opening through which the pulverized material is forced out.

In the drawings 2 is a substantially circular-oval shell preferably cast in two halves and when thus cast same is provided with the integral bearing portions or hubs 3 having annular passages 4 and a hollow rib or passage 5 communicating with said openings in the hub. The passage 5, as shown, leads to both sides of the case which are substantially identical. An opening 6 at the top or substantially central portion of the passage 5, having exterior flanges 7 adapted to be clamped to the flanges 8 of the supply pipe 9, admits the material to be crushed or pulverized to both hubs of the case. The long journal bearings 10 form a continuation of the

hub 3 and are supported on suitable pedestals or bases 11 provided with set screws 12 which hold the bearings 10 securely in place. An outlet or discharge opening 13 is provided for the pulverized material. Mounted in the bearings 10 are shafts 14 provided on their outer ends with suitable driving pulleys or gears and on their inner ends which project into the case 2 are hubs 15, secured in any suitable manner to the shafts 14. Said hubs 15 contain annular passages or channels 16 which register with the channels 4 in the case hubs. Inclined radial openings 17, which are screw threaded, open into the passages 16. As shown, four of these are provided, though they may be of any suitable number. Screw threaded pipes or hollow arms 18 are fitted into the openings 17. Said pipes or hollow arms incline toward each other and toward the center of the case and are rotated at a suitable speed in opposite directions upon the shafts 14. The supply pipe 9 is provided with the enlarged or circular portion 19 in which is seated a feed regulator 20, which consists of a shaft 21 bearing a feed wheel 22 rotated at a predetermined speed by means of the pulley 23 which may be suitably connected with the driving mechanism. The supply pipe 9 terminates at its upper end in the hopper 24 secured to said pipe by the flanges 25 and 26 on the pipe and hopper, respectively. Bolts 27 secure the two halves of the shell or casing together, and each of said halves is provided with the flange 28 for that purpose. An air inlet 29 which may be wholly or partially closed by the pivoted disk 30 provides for a regulated supply of air through the pipe 9.

The operation of my invention is as follows: The shafts 14 are rotated at a high speed in opposite directions and shaft 21 of the feed mechanism is also rotated at a corresponding, but relatively slow speed. The arms or pipes 18 being revolved upon their respective shafts at a high speed, the centrifugal force causes a vacuum therein setting up a strong suction through the passages 6, 5, 16, and 17 and the hollow arms drawing the material therethrough which is thrown with considerable force from the outer ends of the arms. As the latter are inclined towards each other and rotate in opposite directions, the material from the oppositely rotating arms meets at an angle and with a force substantially double that of the speed of one series of arms. The material thus partially broken up is then deflected toward the inner walls of the casing and rebounding is again struck with great force by the arms or ground therebetween. The powerful suction of air into the casing tends to create a strong pressure therein which is relieved through the outlet opening 13 through which the centrifugally condensed or compressed air rushes taking the finely pulverized particles along. Particles too heavy to be carried by said current of air will re-

main in the casing under the pulverizing forces until reduced to impalpability or light or small enough to be carried through the opening 13 in the manner stated. The fineness of pulverization is largely determined by the amount of air admitted through the air inlet 29. A free supply of air through the opening 29 would create a very great rush of air through the outlet 13, carrying therewith larger particles than would be the case if the air inlet 29 should be partially closed limiting the volume of air admitted. A suitable discharge pipe is secured in the opening 13, the sectional lines indicating its position, which may lead to a storage bin not shown. The amount of material admitted to the pulverizer is also controlled by the feed regulator 20.

The substantially ovate-circular chamber, together with the inclined arms parallel with the walls of said chamber, causes the material therewithin to be constantly exposed to the full force of the pulverizing mechanism, the inclined walls tending to gather and keep the material at the peripheral center where it will be reached by both series of arms, instead of permitting some of the material to get out of reach of the maximum force part of the time, as is the case where the walls of the chamber are straight. The passage 5 communicating with both inlets of the casing also equalizes the distribution, since the normal suction through both series of arms is the same. If, on the other hand, one branch of the passage 5 should receive coarser material than the other branch which would tend to choke it up, said other branch would take care of the larger quantity while the other was clearing itself and resuming its full share of the work.

The cost of construction is very much reduced and the strength of the parts enhanced by dispensing with hollow driving shafts, and the latter are difficult of access in case of clogging. The single feed pipe supplying the casing also affords uniform regulating means for both sets of arms.

It is obvious that numerous modifications may be made in the minor details of my device by one skilled in the art to which it appertains, without departing from the spirit of my invention, and I therefore do not limit same to the specific constructions herein shown and described.

I claim as my invention—

1. In a pulverizer, the combination of a circular chamber whose walls incline towards the periphery of said chamber, annular axial passages in opposite sides of said

chamber, an arched passage communicating with both of said axial passages, two series of independently-mounted hollow arms providing passages opening into said axial passages, and means for supplying material to said arched passage and for rotating said hollow arms.

2. In a pulverizer, the combination of a circular-ovate chamber, a hollow hub in each side of said chamber, an arched passage common to both of said hollow hubs, a driven shaft mounted in each of said hubs, a series of hollow arms on each of said shafts and within said chamber, said arms communicating with the interior of said hollow hubs and said passage being provided with an inlet for the material to be pulverized, means for regulating the amount of material admitted therethrough, and means for rotating said shafts in opposite directions.

3. In a pulverizer, the combination of a pulverizing chamber, two series of hollow arms rotatively mounted therein, a passage common to and communicating with both of said series of hollow arms, means for feeding material into said passage, means for forcing regulated quantities of material through said passage and for regulating the quantity of air admitted therethrough, and means for rotating said hollow arms.

4. In a pulverizer, the combination of a pulverizing chamber provided with suitable inlet and discharge passages, two series of hollow arms mounted for rotation in opposite directions in said chamber and disposed to conduct the material to be pulverized into the peripheral center of said chamber, a passage common to and communicating with all of said arms, means for forcing regulated quantities of material through said passage and into said arms, and means for rotating said arms.

5. In a pulverizer, the combination of a pulverizing chamber tapered from its axial towards its peripheral center, two series of hollow arms inclined toward each other and revolubly mounted in said chamber, a closed passage in said chamber which is common to all of said arms, a feed-pipe leading into said passage, a feed-wheel in said feed-pipe, means for rotating said feed-wheel and forcing material through said pipe in predetermined quantities, and means for rotating said arms in opposite directions at the same rate of speed, said chamber being provided with a suitable outlet.

6. In a pulverizer, the combination of a pulverizing chamber having a wide axial portion, two series of radial arms inclined to parallel the walls of said chamber and revolubly mounted therein, means for rotating said arms, an arched passage common to and communicating with all of said arms, a feed-pipe opening into said passage, said feed-pipe being provided with a valve-controlled air-inlet, a feed-wheel in said feed-pipe, and means for rotating said feed-wheel and said arms, said chamber being provided with a suitable outlet for the pulverized material.

In witness whereof, I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

WILLIAM S. SHARPNECK.

Witnesses:

JOHN H. ROLLINS,
RAY ELIUSOFF.