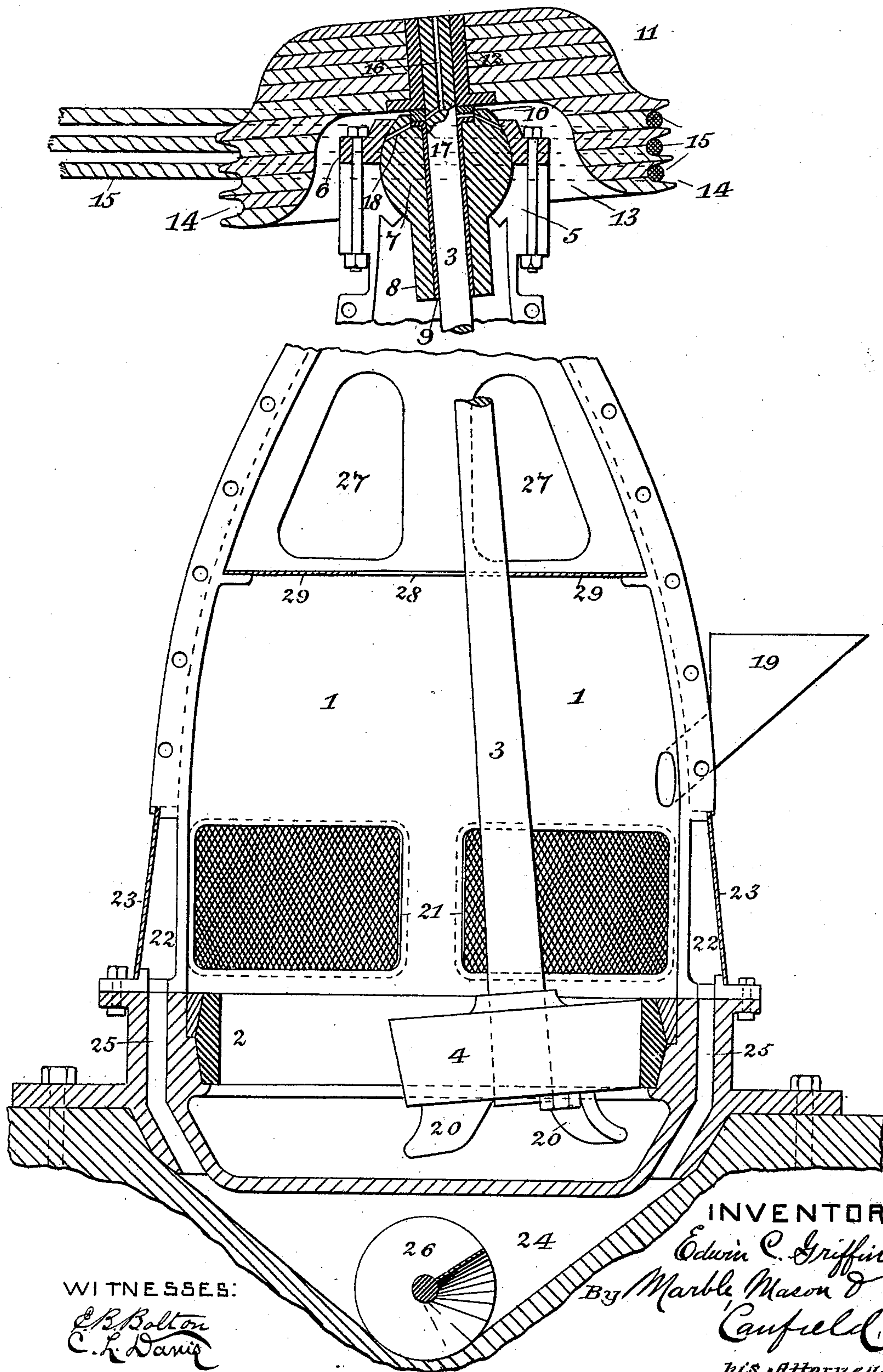


(No Model.)

E. C. GRIFFIN.
MILL AND POWER MECHANISM.

No. 464,500.

Patented Dec. 8, 1891.



WITNESSES:

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UNITED STATES PATENT OFFICE.

EDWIN C. GRIFFIN, OF WEST NEWTON, MASSACHUSETTS.

MILL AND POWER MECHANISM.

SPECIFICATION forming part of Letters Patent No. 464,500, dated December 8, 1891.

Application filed March 31, 1891. Serial No. 387,099. (No model.)

To all whom it may concern:

Be it known that I, EDWIN C. GRIFFIN, a citizen of the Dominion of Canada, residing at West Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Mills and Power Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates, generally, to pulverizing-mills, and particularly to that class thereof in which the reduction or pulverization of ores and other substances is accomplished by the revolution of a roll or rolls within and against the inner surface of rings or annular dies, and in which said roll or rolls are held in contact with said rings or annular dies by centrifugal force when the mills are in operation; and it consists in the improvements in the construction, arrangement, and combination of parts disclosed in the following specification, and pointed out in the claims.

The objects of my invention are the production of a mill in which ores or other substances may be cheaply and rapidly crushed and pulverized or reduced to a powder, to effect the application of the power employed directly to the roll-shaft whereby the roll will be caused to positively rotate against the annular die, gyrate around the inner surface of the same, and by its rotary momentum and centrifugal force crush and pulverize the material between the same and said die, and to provide a method of doing this in which the pulley to which the power is applied is attached rigidly and directly to the roll-shaft, and not, as has heretofore been the case, by means of a universal joint or connection. These objects are accomplished by the mechanism illustrated in the accompanying drawings forming part of this specification, in which similar numerals of reference designate like parts wherever found, and which represents in central vertical section a pulverizing-mill provided with my improvement, parts being broken away in order to more clearly show the construction thereof.

This invention is an improvement on that for which Letters Patent of the United States were granted to James K. Griffin on August 20, 1889, No. 409,579, and relates particularly to the means for supporting and operating the grinding-roll and roll-shaft shown and described in said patent, all as hereinafter described.

Referring to the drawing, the reference-numeral 1 designates the casing of the grinding-chamber, preferably formed in two separable parts arranged to be bolted together, as shown, and 2 the annular die located therein. This chamber or die, however, may be of any known or preferred construction, and constitutes no part of this invention, but is shown only for the purpose of illustrating the operation of the invention claimed herein, which consists of the means employed for supporting the roll-shaft 3 and grinding-roll 4 attached to said shaft, and for revolving the roll 4 around the inner surface of the annular die 2. At the top of the shell or casing 1 and preferably formed therein is a spherical socket 5, provided with a cover 6, also having a spherical under surface, which is securely bolted, as shown, or otherwise secured to the casing or shell 1. In the spherical socket 5, and kept from upward movement by the cover 6, is a ball 7, preferably provided with an elongated downwardly-extending portion 8. The top of this ball 7 is preferably partially flat, as shown, and through the center thereof and the elongated portion 8 is formed a bearing or journal preferably provided with a bushing 9 of any desired anti-friction composition, and around the upper part of this journal in the ball 7 is formed a circular depression somewhat larger than the same, in which rests a thrust-ring or washer 10. Resting upon this thrust-ring 10 and supporting the roll-shaft 3, which passes through the journal in the ball 7 is a pulley 11, preferably of wood and of the form shown. This pulley 11 is provided with a central metallic hub 12, through which passes the roll-shaft 3, and by which the pulley is rigidly secured to such shaft in any desired manner. This pulley 11 is provided on its under surface with a central depression 13, and upon the lower portion of

its periphery with a driving-surface preferably having grooves 14 for the reception of driving-ropes 15, as shown.

Through the top portion of the shaft 3 passes an oil-hole 16, adapted to register with corresponding holes or grooves 17 in the thrust-ring 10 and like holes 18 in the ball 7, by means of which the running parts of the device are kept thoroughly lubricated while running by the introduction of oil through the hole 16.

With the construction described, when the pulley 11 is revolved by means of the driving-ropes 15, or otherwise, rotary motion is thereby transmitted to the roll-shaft and to the grinding or pulverizing roll 4, attached thereto, and it will be seen that the roll-shaft being supported by the ball 7 has perfect freedom of movement at all times to swing in any desired direction without impeding or interfering with its rotary motion, the device by which the shaft is supported constituting a perfect universal joint.

It will be seen, upon an examination of the drawing, that by constructing the pulley 11 in the form shown and with the central depression 13 the center of the driving-face thereof and the center of the ball 7 are brought into the same horizontal plane, and, although the device will work when the driving-face of the pulley is above or below the center of the ball 7, the best results are obtained by the form of construction shown, the driving ropes or belt having then less tendency to interfere with the free oscillation of the roll-shaft than when in any other position.

Although I prefer to use a wheel grooved, as shown, one provided with flanges, or even perfectly plain, may be used; but upon a plain wheel the belts have a tendency to run off, and those with grooves or flanges are for that reason much to be preferred. It is evident that a toothed wheel or pulley, or a wheel driven by any device other than a belt or belts, may be substituted for the pulley 11 without departing from the scope of my invention.

Although I prefer to have the shaft 3 revolve within the ball 7, as well as the ball 7 in the socket 5, it is evident that, if desired, the ball 7 may be rigidly secured to such shaft 3 and revolve therewith, or although capable of oscillation be made non-revoluble, and that instead of the form of universal joint herein described any other form thereof may be employed without departing from the scope of my invention, so far as it relates to the combined pulley and roll-shaft supported by a universal joint, whereby the roll-shaft and roll attached thereto have perfect freedom to swing in any direction without impeding or interfering with the rotary movement thereof, and whereby when the pulley is revolved the roll-shaft and roll are given a radial rotary movement, and the roll-shaft and roll are gyrated around the central axis of the mill, the roll being held in contact with the

annular die in the grinding-chamber when the mill is in operation by centrifugal force, and falling away from said die when the mill is not in operation by gravity.

The operation of the device is as follows: The material to be pulverized is introduced within the grinding-chamber by means of a spout 19 or in any other desired manner, and is taken up by the plows or stirrers 20, attached to the bottom of the roll 4, and is thrown against the annular die 2, where it is operated upon and crushed or ground by the roll 4, and this operation is repeated until the material has been reduced to the required degree of fineness, when it is discharged through the screens 21 in the casing 1 into the annular chamber 22 between the casing 1 and the sheet-iron cover 23, from which it passes into a receptacle or hopper 24 by means of passages 25, formed in the annular base of the mill, from which it is removed by a conveyer 26. The operation of discharging the pulverized material through the screens 21 may be greatly facilitated by fans or vanes (not shown) attached to the roll-shaft immediately above the roll in connection with the stirrers or plows 20, as they operate to cause an increased circulation of air through the mill and force the air, together with the pulverized material, out through the screens 21 into the chamber 22. The air is drawn into the mill through the openings 27 in the casing 1, and down through the central hole 28 in the horizontal partition 30, in which the shaft 3 revolves by the stirrers or plows 20, and also by the fans or vanes mentioned, when the same are used, which thus also operates to keep all dust or pulverized material within the mill. This feature of construction, however, constitutes no part of the invention claimed herein, and the fans or vanes are therefore not shown.

It is evident that many changes and modifications other than those mentioned may be made in the construction, combination, and arrangement of the various elements of the invention described herein without departing from the scope thereof, and I do not limit myself to the exact form shown, and it is also evident that the power mechanism, consisting of the pulley and the shaft rigidly attached thereto and supported in such a manner as to be free to oscillate in all directions, which constitutes the main feature of my invention, is applicable to many uses other than that in connection with which it is here illustrated and described.

Having now fully described my invention, its construction, and operation, what I claim, and desire to secure by Letters Patent, is—

1. In a pulverizing-mill, the combination, with an annular die, of a roll-shaft and roll supported by a universal joint or coupling, and a pulley mounted on the roll-shaft, substantially as shown and described.

2. In a pulverizing-mill, the combination, with an annular die, of a roll-shaft and roll

supported by a universal joint or coupling, and a pulley rigidly mounted on said shaft, whereby the shaft and roll may be rotated and the roll gyrated around the annular die, substantially as shown and described.

3. In a pulverizing-mill, the combination, with a frame or support, of a roll-shaft and roll, the roll-shaft and the frame or support being connected by a universal joint or coupling, and a pulley mounted on the shaft, substantially as shown and described.

4. The combination, in a pulverizing-mill having an annular die located in the grinding-chamber thereof, of a frame or support, a roll-shaft and roll, the shaft and the frame or support being connected by a universal joint or coupling, and a pulley mounted on the shaft, substantially as shown and described.

5. A shaft supported by a universal joint or coupling and capable of being revolved and oscillated in all directions, in combination with a pulley rigidly secured to the shaft in such manner that the center of the driving-face thereof and the center of the universal joint are in the same plane, substantially as shown and described.

6. The combination, in a pulverizing-mill provided with a grinding-chamber having an annular die located therein, of a roll-shaft provided with a roll revolvably supported by a universal joint in such manner as to be ca-

pable of oscillation in all directions, and a driving-wheel or pulley rigidly secured to the roll-shaft in such manner that the center of the driving-face of the pulley and the center of the universal joint or coupling are in the same plane, substantially as shown and described.

7. In a pulverizing-mill, the combination, with an annular die located in the grinding-chamber thereof, of a roll-shaft provided with a roll, a ball through which the shaft passes, constituting a bearing and support for the same, supported in a socket above the grinding-chamber in such manner as to be capable of oscillation in all directions, and a pulley secured to the roll-shaft above the ball, substantially as shown and described.

8. A shaft supported by a universal joint or coupling and capable of being oscillated in all directions as well as rotated, in combination with a pulley secured thereto having a central depression in the face thereof nearest the supporting universal joint, substantially as and for the purposes set forth.

Signed at the city and county of New York, in the State of New York, this 28th day of March, A. D. 1891.

EDWIN C. GRIFFIN.

Witnesses:

J. P. GRIFFIN,
C. L. DAVIS.