(No Model.)

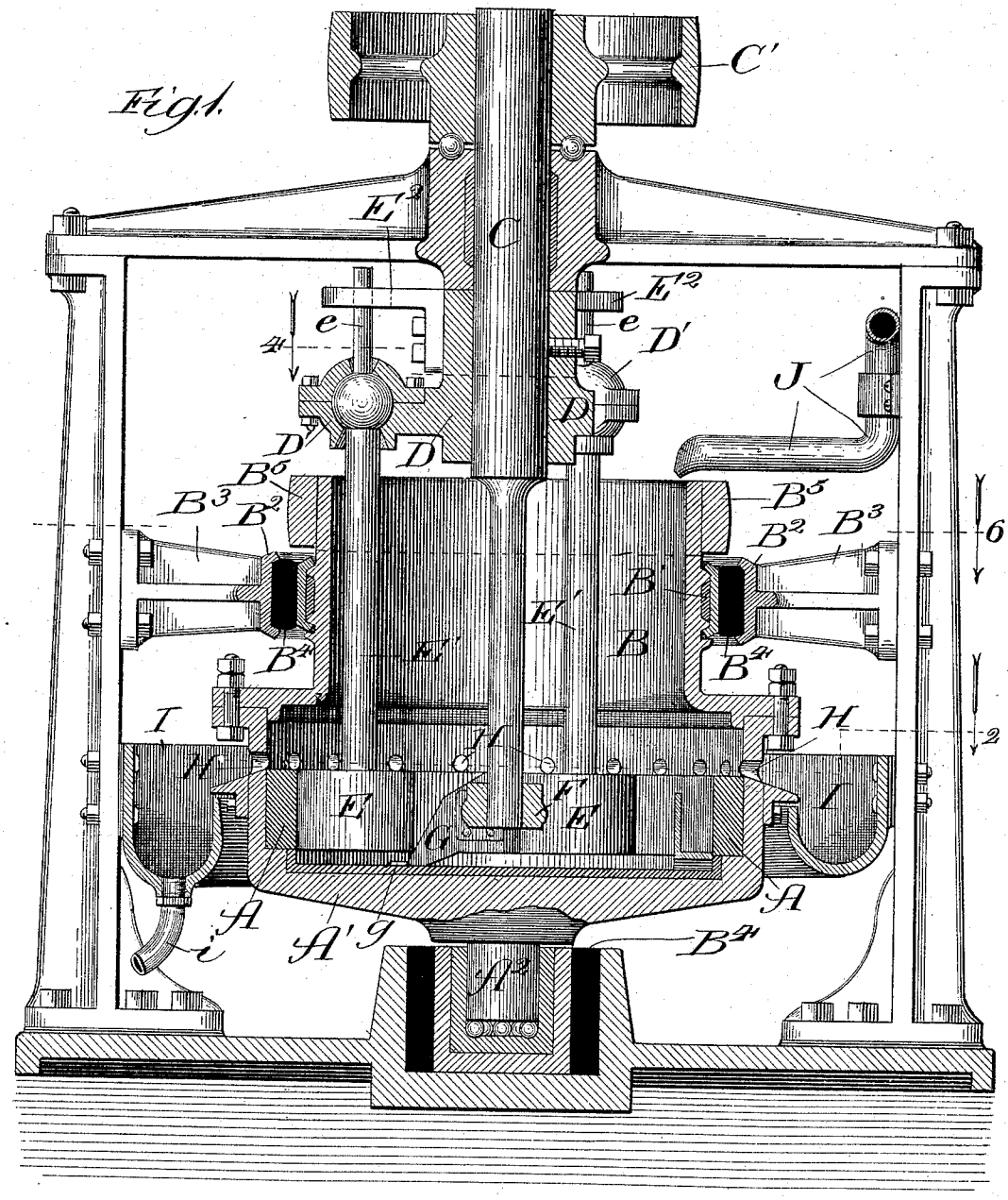
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O. B. PECK.

CENTRIFUGAL ORE PULVERIZER.

No. 497,204. Patented May 9, 1893.

Fig. 1.



Witnesses:
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Inventor:
Orrin B. Peck.
By Banning & Banning & Payson,
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

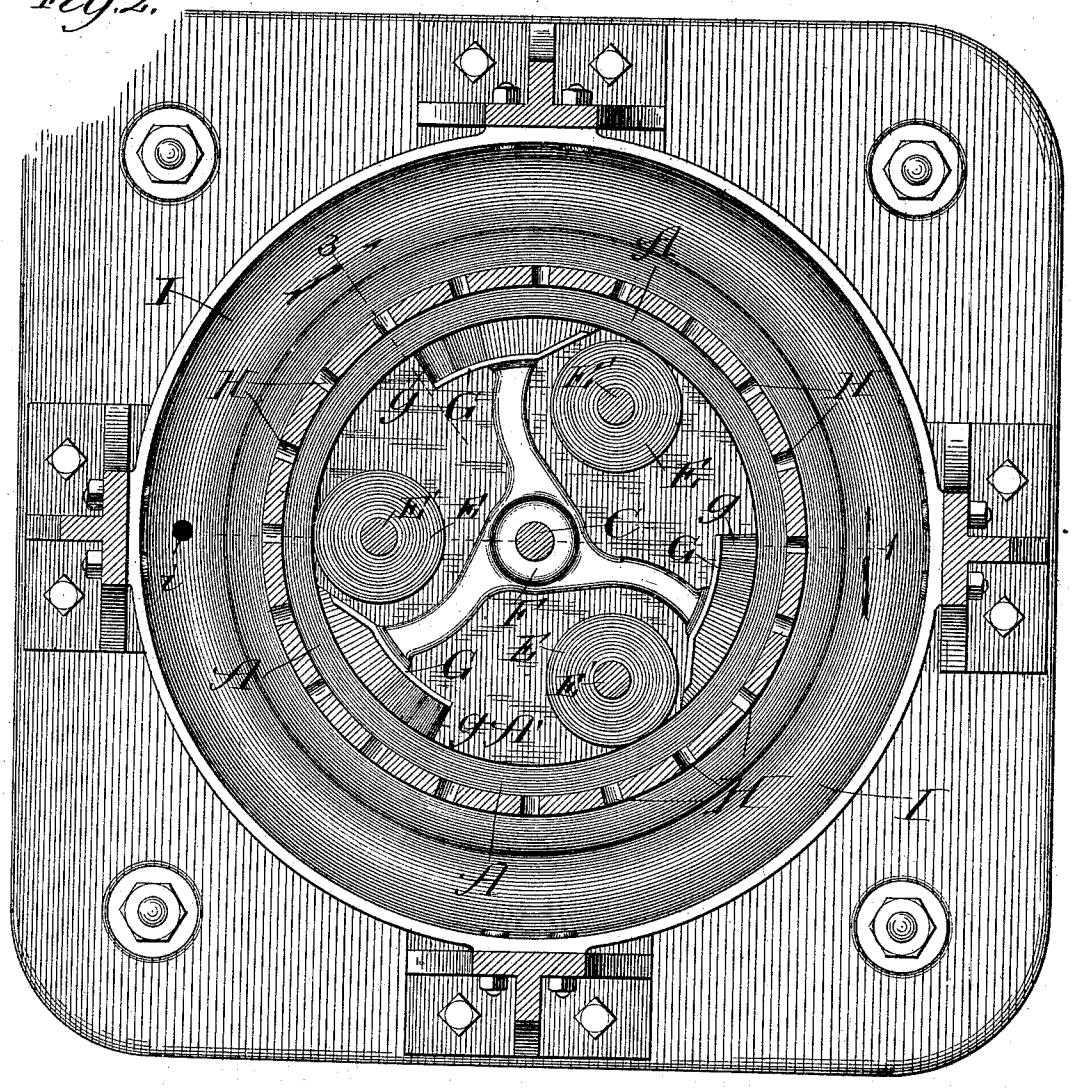
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No. 497,204. Patented May 9, 1893.

Fig. 2.



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(No Model.)

3 Sheets—Sheet 3.

O. B. PECK.

CENTRIFUGAL ORE PULVERIZER.

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Fig. 3

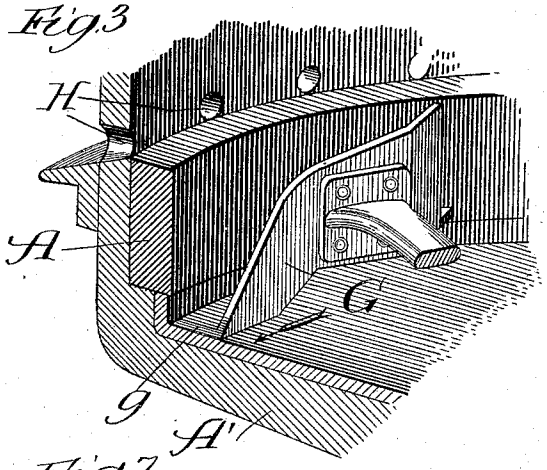


Fig. 7.

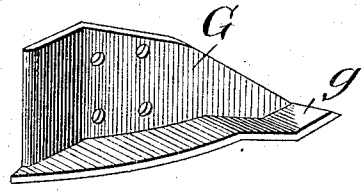


Fig. 4.

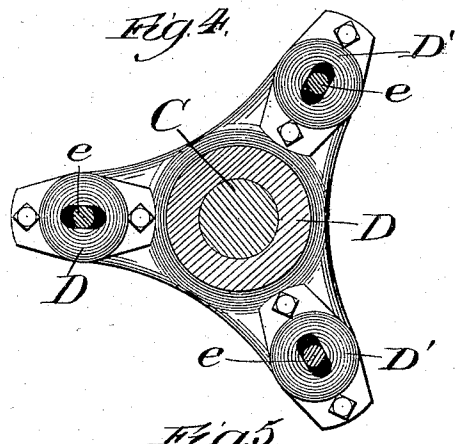


Fig. 5.

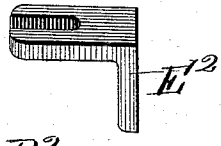


Fig. 6.

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UNITED STATES PATENT OFFICE.

ORRIN B. PECK, OF CHICAGO, ILLINOIS, ASSIGNOR TO MELINDA PECK, OF SAME PLACE.

CENTRIFUGAL ORE-PULVERIZER.

SPECIFICATION forming part of Letters Patent No. 497,204, dated May 9, 1893.

Application filed May 31, 1892. Serial No. 434,971. (No model.)

To all whom it may concern:

Be it known that I, ORRIN B. PECK, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Centrifugal Ore-Pulverizers, of which the following is a specification.

The object of my invention is to provide means to hold by the action of centrifugal force the material to the surface on which it is being pulverized, and prevent the same from moving away from the face of the pulverizers until sufficiently reduced to a fine and powdery condition; and my invention consists in the process and features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 represents a vertical section, partly in elevation, of my improved pulverizers, taken in the line 1 of Fig. 2, looking in the direction of the arrow. Fig. 2 is a plan view of a section taken in the line 2 of Fig. 1, looking in the direction of the arrow. Fig. 3 is a detailed perspective view, taken in the line 3 of Fig. 2, looking in the direction of the arrow. Fig. 4 is a plan section, taken in the line 4 of Fig. 1, looking in the direction of the arrow. Fig. 5 is a perspective view of a detail hereinafter described. Fig. 6 is a plan section, taken in the line 6 of Fig. 1, looking in the direction of the arrow; and Fig. 7 is a perspective elevation of a scoop or plow hereinafter described.

It will be understood that great difficulty is experienced in crushing or pulverizing ores or similar materials to a high degree of fineness by any of the methods now in use, where the crushing power is applied by rolls, stamps, mullers or similar means, owing to the fact that it is difficult, if not impossible to hold or maintain the material, as it approaches a high degree of fineness, onto or in contact with the crushing surface, to enable the crushing power or blow to be applied to it for further reduction. By my invention I obviate this difficulty.

In making my improvements in centrifugal ore pulverizers for reducing ores to a fine or powdery condition, I make a rotatable die or pulverizing ring or surface A, suitably supported in a pan or vessel, A′, by which it may be rotated and the material supplied.

I have shown means for supporting and rotating the pulverizing ring or surface, as a pan or vessel, but as its chief object is to support and rotate the pulverizing ring, it may be considered rather in the nature of a frame work, and other means employed for supplying the material to the pulverizing ring. For convenience of description, however, I will speak of it as a pan. It is supported on a shaft or trunnion, A^2, suitably stepped in a bearing to sustain its weight.

I prefer to provide the pan with an upwardly extending portion, B, suitably supported by a side bearing, B′, arranged in a ring, B^2, surrounding the upwardly extending portion of the pan, and connected by brackets, B^3 to the frame work. The various bearings for carrying and maintaining the supporting pan in proper position, are preferably given a capacity for lateral vibration by arranging them in rubber packings, B^4, which lessens and softens shocks or vibrations when the apparatus is in operation. The upwardly extending portion of the pan B is provided with a pulley or belt surface, B^5, which may be connected by a belt with any suitable motive power to impart the desired speed of rotation to the supporting pan and the pulverizing ring.

Supported in the upper portion of the frame work of the apparatus, I arrange a shaft C, provided with a pulley or belt surface C′ which may be connected by a belt to an engine or other motive power to give it the desired position. This pulley is preferably located centrally with the axis of the supporting pan, and it has fixed to a hub or spider, D, particularly shown in Fig. 4, which has as many projecting arms as desired, and which is carried around in the rotation of the shaft. Each of the arms of the hub is provided preferably with a ball bearing, D′. Cylindrical pulverizers or rollers E, arranged on shafts E′, are suspended from the ball bearing D′, with their pulverizing surfaces in proximity to the inner surface of the pulverizing ring. I prefer to make these pulverizers cylindrical, as shown, but do not wish to confine myself to that form in all of the applications of my invention. Owing to the fact that they are suspended in the ball bear-

ings D′, they are permitted some movement toward and from the axis of the pulverizing ring, as hereinafter explained. To prevent them, however, from oscillating back and forth in the path of their travel, I provide the shafts E′ with upward extensions, *e*, passing through the slots of brackets, E^2. One of these brackets is particularly shown in Fig. 5, and will be readily understood from an inspection of it. The shaft C is extended down below the hub to near the bottom of the supporting pan, and a hub F mounted on it. This hub is provided with arms *f*, extending out to near the pulverizing ring. Scoops or plows G are arranged at the ends of the arm *f*, with their plowing edges, *g*, adapted to project upon or close to the bottom of the supporting pan to plow up the material and carry it back and assist in distributing it upon the pulverizing surface or ring. This will be understood from an inspection of Figs. 2 and 3 of the drawings, where the scoops or plows are shown in their operative position.

The supporting pan above the pulverizing surface is provided with a series of perforations, H, through which the material, when sufficiently pulverized or reduced, may be discharged into a receptacle or curbing, I, arranged around the supporting pan, whence it may be carried off through a pipe or conduit, *i*.

To introduce the material into the apparatus for reduction, a pipe or chute, J, may be arranged in any suitable position for the purpose.

As above described, and as shown in the drawings, the pulverizers are carried around, and rotated by frictional contact with the pulverizing surface, and to that end they are shown as cylindrical and rotatable. I do not desire, however, to limit myself to either of these features, except when mentioned in the claims, as I contemplate using pulverizers that are not cylindrical or rotatable, and which are not carried around, in which case other means than centrifugal force may be employed to force or hold the pulverizers against the pulverizing surface, although I prefer to use the apparatus as shown in the drawings.

In operation, as the invention is shown, the material to be reduced or pulverized, is introduced into the rotatable supporting pan, whence it is carried by the action of centrifugal force against the rotatable pulverizing surface, and held by such force upon its inner surface. The pulverizers are carried around and thrown out by the action of centrifugal force against the pulverizing surface. Their frictional contact with such surface will cause them, when made cylindrical and rotatable, to rotate on their respective axes as they are carried around. The material being treated, while held against the pulverizing surface, is thus passed over and crushed by the pulverizers as they are carried around. The pulverizing rollers being supported in ball bearings, are permitted to yield away from the pulverizing ring, as rendered necessary by the quantity and character of the material between them and the surface. The force with which they bear against the pulverizing surface to crush and reduce the material deposited thereon is determined by the speed with which they are carried around, and the amount of centrifugal force developed. The centrifugul force developed by the rotation of the pulverizing ring operates to hold the material upon it in place to be acted upon, and the centrifugal force developed by the speed with which the pulverizers are carried around operates to furnish them with pressure or crushing power. The speed of rotation of the pulverizing surface also determines the speed of rolling friction between it and the pulverizers, when they are made rotatable, and the sharpness or quickness of the blow exerted on the material and the reducing power of the pulverizers under varying conditions.

From the above description it will be apparent that in my form of pulverizer the material being treated not only remains relatively in the same place on the pulverizing surface as it is subjected to treatment, but that the greater the amount of centrifugal force developed the more firmly, closely and securely will the material be held and retained on the surface. In these respects my pulverizer differs materially from those constructions in which the material is constantly shifting, traveling or rolling along the separating surface and from which it is the more rapidly thrown off and discharged the greater the amount of centrifugal force developed. It results that according to my method and construction I am able to rapidly and thoroughly pulverize materials that can be pulverized but slowly, if at all, by the former constructions and methods. I desire in this case to claim both the process and the apparatus by which it is carried out or effectuated.

What I regard as new, and desire to secure by Letters Patent, is—

1. The process of pulverizing ores and other material, which consists in holding the material in place relatively the same by the action of centrifugal force to prevent its escape from pulverizing agencies while being reduced to the desired degree of fineness, substantially as described.

2. The process of pulverizing ores and other material, which consists in holding the material in place relatively the same by the action of centrifugal force and pulverizing agencies in place upon it against the action of centrifugal force, whereby the material is prevented from escaping from the pulverizing agencies while being reduced to the desired degree of fineness, substantially as described.

3. In centrifugal ore pulverizers, the combination of a rotatable pulverizing surface

adapted the more securely to retain the material to be pulverized upon it and maintain the pulverizers against the material the greater the amount of centrifugal force developed, means for rotating such surface, pulverizers movable against the pulverizing surface by the action of centrifugal force, and means for driving the pulverizers around on the pulverizing surface independently of the rotation of the latter, substantially as described.

4. In centrifugal ore pulverizers, the combination of a rotatable pulverizing surface adapted the more securely to retain the material to be pulverized upon it the greater the amount of centrifugal force developed, means for rotating such surface, pulverizers provided with shafts or spindles mounted in bearings permitting movement of the pulverizers toward or from the pulverizing surface, and means for driving the pulverizers around on the pulverizing surface independently of the rotation of the latter, substantially as described.

5. In centrifugal ore pulverizers, the combination of a rotatable pulverizing surface adapted the more securely to retain the material to be pulverized upon it and to maintain the pulverizers against the material the greater the amount of centrifugal force developed, means for rotating such surface, pulverizers provided with shafts or spindles mounted in bearings permitting movement of the pulverizers toward the pulverizing surface under the action of centrifugal force, and from such surface against the action of centrifugal force, and means for driving the pulverizers around on the pulverizing surface independently of the rotation of the latter, substantially as described.

ORRIN B. PECK.

Witnesses:
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SAMUEL E. HIBBEN.