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O. AUSPITZER

METHOD AND APPARATUS FOR COMMINUTING SOLIDS AND FORMING COLLOIDAL SOLUTIONS

Filed July 23, 1925

Fig. 1.

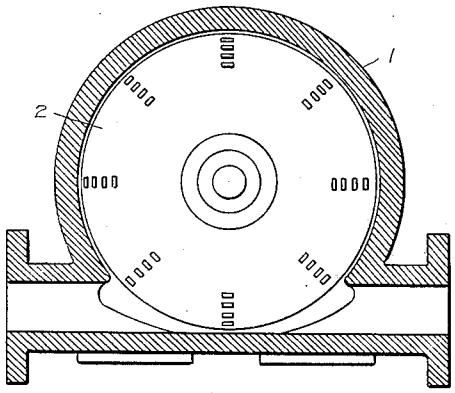


Fig. 2.

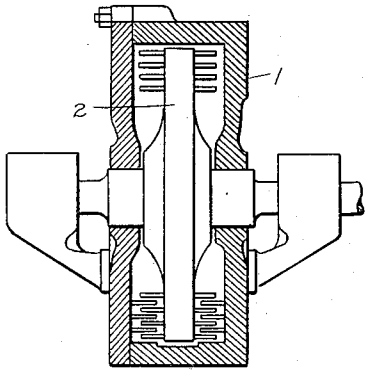
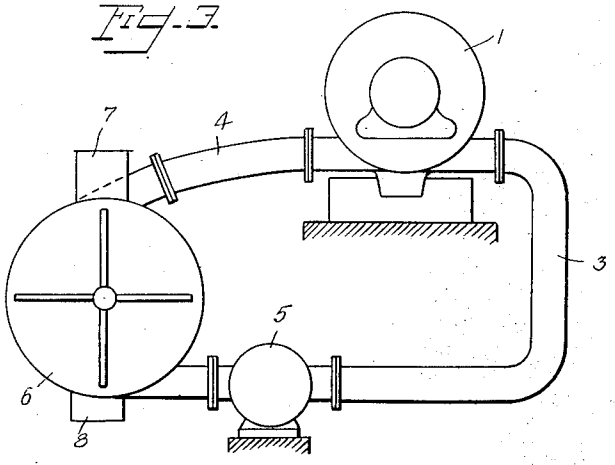


Fig. 3.



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UNITED STATES PATENT OFFICE.

OTTO AUSPITZER, OF NEU ODERBERG, CZECHOSLOVAKIA.

METHOD AND APPARATUS FOR COMMINUTING SOLIDS AND FORMING COLLOIDAL SOLUTIONS.

Application filed July 23, 1925. Serial No. 45,606.

To all whom it may concern:

Be it known that I, Dr. OTTO AUSPITZER, citizen of Austria, residing at Neu Oderberg, Bohumin, Czechoslovakia, have invented new and useful Improvements in Methods and Apparatus for Comminuting Solids and Forming Colloidal Solutions, of which the following is a specification.

Attempts have long been made to construct grinding mills capable, with a moderate consumption of power, of giving better results, in respect of the fineness of the product, than the existing ball mills, disintegrators or the like. These endeavors have been greatly assisted by the experiments of Plauson, which showed that quick-running wet mills form an excellent means of facilitating the transformation of solid particles into colloidal solutions.

Nevertheless, all the wet mills constructed up to the present have been attended with the serious defect that a very considerable portion of the power is consumed by the friction between the rotating material and the sides of the vessel. Even Plauson's clever idea of checking the rotation of the material in the mill by mounting the beater mechanism eccentrically, failed to stand the test of practice, and, even in his mill, rotation of the material takes place.

With the intention of economizing power by preventing the said internal friction, I have devised a method and apparatus in which the material issues from the mill at a point directly behind that at which the beaters exert their action, and is then conveyed, at a moderate speed and outside the mill, back to the point of disintegration in the mill by means of a pump.

An apparatus of this kind, for carrying out the method in question, is illustrated diagrammatically and by way of example in Figs. 1–3, in which:—

Fig. 1 is a sectional end elevation of a disintegrator, according to this invention, showing the arrangement of the admission and discharge pipes;

Fig. 2 is a sectional side elevation of the disintegrator, while

Fig. 3 is a diagrammatic illustration of the complete circuit showing the arrangement of pump and storage vessel.

Referirng to the drawings 1 is the casing of a disintegrator, 2 the beater mechanism, 3 and 4 are pipes forming a circuit in which are connected a pump 5 and a storage vessel 6, the latter having a charging opening 7, through which the material to be treated is introduced. The material is then fed, by means of the pump 5 and the pipe 3, to the disintegrator 1, whence it is conveyed through the pipe 4 to the vessel 6, where it can be discharged through the opening 8. The working operation is, in general, intermittent, inasmuch as the vessel 6 is first charged, and the mass is then repeatedly passed through the disintegrator 1 until the desired degree of fineness has been attained. If, however, the vessel 6 be made of sufficient capacity, and the pipes 3, 4 and the openings 7, 8 suitably arranged, the work may be carried on continuously, with an uninterrupted feed of material through 7 and a continuous discharge through the opening 8. On the other hand, it is not advisable to dispense with the vessel 6 altogether, since it is of advantage that none of the material under treatment should be present, outside the sphere of operation of the beater rods, in the pulverizing apparatus. In order to ensure this advantage, the admission and discharge conduits of the material passing through the disintegrator 1 are so arranged (Fig. 1) that the feed pipe 3 and the delivery pipe 4 together constitute a tangent to the casing of the disintegrator, so that the material, as it were, merely flows past the same. The employment of an apparatus of this kind has revealed the unexpected fact that not only is the prime object of saving power achieved to a most satisfactory degree, but also that the comminution and colloidalization can be effected in a considerably better manner than with any hitherto known means. The theoretical explanation of this was at once revealed when experiment demonstrated that the liquid material issued from the mill at a velocity of only 0.7 metre, whilst the beaters attained a peripheral velocity of 150 metres. Hence, in the mill according to the present invention, the full velocity of the beaters is exerted on the relatively stationary material, whereas in all other wet mills, even that of Plauson, only the difference between the velocity of the beaters, on the one hand, and of the equally rapidly rotating liquid material, on the other, comes into operation. This relatively stationary condition of the liquid allows for the first time a true beating action

to be exerted on the liquid, which thus acts as an anvil.

It has also been ascertained that it is particularly advantageous, according to the present invention, to give to the delivery pipe 4, for the material under treatment, a shape which corresponds exactly to the parabolic trajectory which the material would spontaneously describe in issuing freely from the casing of the disintegrator.

With regard to the operations to which the described method is applicable the following may be specified by way of example: the fine crushing of ores preliminary to the flotation process; preparation of china clay, earth colours, graphite, loading ingredients for the paper, rubber and cosmetic industries, and the preparation of colloidal solutions of solid bodies, and of emulsions of two liquids. The sphere of application of the invention is practically unlimited.

What I claim and desire to secure by Letters Patent is:—

1. The herein described method of comminuting solids and forming colloidal solutions, which consists in causing a stream of a mixture of solids and liquid to flow in a substantially straight constrictedly confined course through and at one side only of the path of movement of a disintegrator whereby said stream will be acted upon without being carried along with the disintegrator.

2. The herein described method of comminuting solids and forming colloidal solutions, which consists in causing a stream of a mixture of solids and liquid to flow at a relatively low speed in a substantially straight constrictedly confined course through and at one side only of the path of movement of a rapidly moving disintegrator, whereby said stream will be acted upon by the disintegrator without being carried along by the latter.

3. The herein described method of comminuting solids and forming colloidal solutions, which consists in causing a stream of a mixture of solids and liquid to flow at a relatively low speed in a constrictedly confined straight course through a part only of the orbit of a rapidly rotating disintegrator, whereby said stream will be acted upon by the disintegrator without being carried around therewith.

4. An apparatus of the character described, comprising a disintegrator casing and a disintegrator movably supported therein, and admission and discharge conduits alined with one another at a substantial distance below the centre of movement of the disintegrator to form together a single tangent to the disintegrator casing.

5. An apparatus of the character described, comprising the combination with the elements claimed in claim 4, of a continuation of the discharge conduit curved at an arc corresponding to the trajectory which the material would normally describe in issuing freely from the disintegrator casing.

6. An apparatus of the character described, comprising the combination with the elements claimed in claim 4, of a continuation of the discharge conduit curved at an arc corresponding to the trajectory which the material would normally describe in issuing freely from the disintegrator casing, and means for circulating a mixture of solids and liquids through said conduits and disintegrator.

In testimony whereof I affix my signature.

DR. OTTO AUSPITZER.