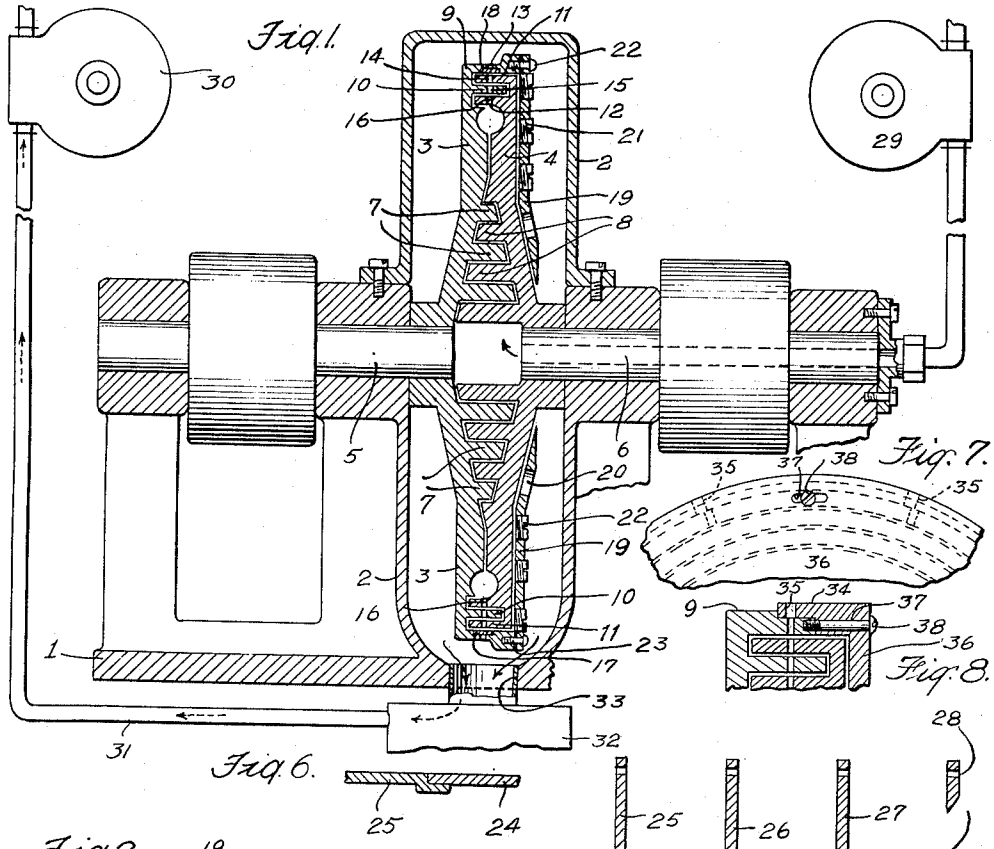
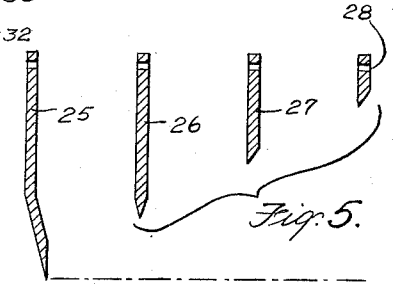
April 17, 1928. 1,666,640

B. CUNNIFF

DISINTEGRATOR

Filed April 28. 1926





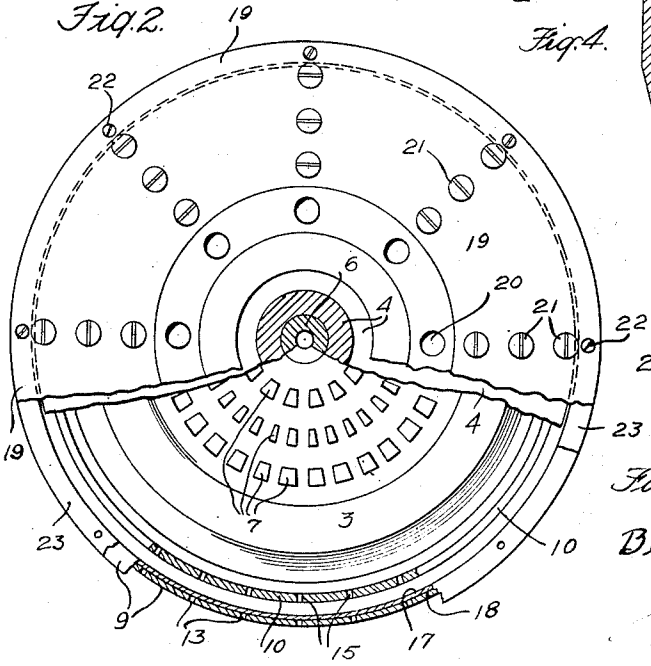
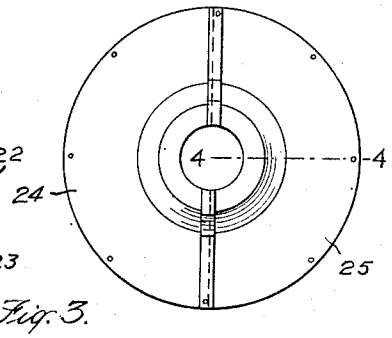


Fig. 4.



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Patented Apr. 17, 1928. 1,666,640

UNITED STATES PATENT OFFICE.

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DISINTEGRATOR.

Application filed April 28, 1926. Serial No. 105,058.

The present invention relates to an improvement in disintegrators, more particularly of the type in which the material to be treated is introduced between opposed material treating members associated with means for producing relative rotation between them. One type of disintegrating device is illustrated in the patent to Povey, No. 1,489,787 and, in some respects, the present invention is an improvement thereon. In using disintegrating machines of this type it has been found that different materials and different degrees of fineness of the same material required different periods of treatment. It is therefore proposed to provide means whereby the pressure and the time during which it is necessary to subject the material to disintegrating action can be readily controlled. Stating it another way, an object of the invention is to provide means whereby, with given power and speed factors, the rate of movement through the machine of the material treated can be regulated to produce the maximum or any desired degree of disintegration for that particular material and whereby said rate can readily be changed to accommodate a different kind of material or a different degree of fineness requiring a different rate of feeding through the disintegrator.

It has been found in practice that some materials may be reduced to a satisfactory degree of fineness by a single passage through a machine of the Povey type, whereas other materials can be reduced to a similar state of fineness only by several repeated passages through such a machine. According to the present invention it will be possible to retain any given material within the effective zone of operation any required time and subject materials to certain predetermined pressures so that the whole amount of disintegration can take place in a single continuous operation.

One form of apparatus embodying my invention is illustrated in the drawings accompanying the present specification and in which

Figure 1 is a central longitudinal section,

Figure 2, a side elevation with portions broken away to show relatively interiorly disposed portions,

Figure 3, a detail illustrating a modified form of retaining plate,

Figure 4, a section on the line 4—4 of Figure 3,

Figure 5, fragmentary section of various interchangeable plates having openings of different sizes,

Figure 6, a detail section illustrating the overlapping joint formed by the two cooperating sections of the plates illustrated in Figure 3.

Figure 7, a detail fragmentary view of rotatably adjustable retaining plate, and

Figure 8, a fragmentary radial section of said modification showing exterior adjustable band movable with said plate.

The disintegrating apparatus illustrated diagrammatically in Figure 1 comprises a base 1 having a housing 2 adapted to accommodate a pair of rotors 3 and 4 mounted on the shafts 5 and 6 respectively, one or both of said shafts being rotatable by any suitable means, not shown. The rotor 3 is provided with a plurality of projections 7 which cooperate with projections 8 on the rotor 4 to form between them a passageway of generally zigzag direction through which material to be treated is passed by reason of centrifugal force developed during rotation of one or both of said rotors or through external head or pressure. In the form of apparatus herein illustrated, the rotor 3 has a peripheral wall or flange 9 and an annular projection 10. The rotor 4 has a peripheral wall or flange 11 and an annular projection 12. The peripheral flange 9 is provided with a plurality of radially arranged openings 13 while the flange 11 and the annular projections 10 and 12 are provided with similar openings 14, 15 and 16, respectively. As set forth in the Povey patent, it is contemplated that these radial openings cooperate with each other and with the adjacent surfaces to produce certain desired results

in disintegrating the materials treated. However, under ordinary conditions of operation some materials are not retained in the effective treating zone sufficiently long to be reduced to the desired degree of fineness. In order to apply my invention to this machine I have provided in the flange 9 a device for closing all or part of the openings 13 by means of a metallic band 17 inserted preferably in an annular recess 18 cut in the underside of said flange 9. Where all of said openings are thus closed, the material to be treated will be deflected toward the free edge of said flange and between the inner surface of flange 9 and the outer surface of flange 11.

If desired, the extent of opening of the holes 13 may be controlled by an exteriorly applied band 34, Figure 8, having holes 35 drilled in it to correspond to the holes in the rotor but of a slightly larger diameter. This ring may be moved or slipped slightly one way or the other so that the holes in the rotor may be opened or closed to any desired extent, dependent on the characteristics of the treated material and the degree of fineness desired.

In Figure 8, the band 34 is shown as a flange integral with the plate 36 which is provided with a slot or slots 37, Figure 7, through which extend bolts 38 whereby the plate 36 is secured to the flange 9 in any position to effect a desired degree of opening or closing of the holes 13 by the band 34.

It will of course be understood that the rotors may have any suitable interior surface contour and the peripheral flange portion may and preferably will be made without the radially arranged openings 13. Whatever the form in these respects, one of the rotors as 3 has a wall or retaining plate as 19 forming an extension of or secured to the flange 9 by any suitable means as screws 22 and overlapping a portion of the exterior surface of the other rotor 4. In effect, rotor 3 substantially encloses rotor 4 except to the extent that the wall or plate 19 has a central or other discharge opening. As shown in Figure 2, the wall 19 may be provided with a plurality of discharge openings 20 arranged in concentric groups or otherwise. These openings are threaded to receive screw plugs 21. Thus by inserting or removing plugs 21, it is possible to effect discharge of the treated material through said openings at any desired distance, radially measured, from the periphery of the rotor 4 and also vary the pressure under which the work on the material is being done.

An annular ring or washer 23 is inserted between the plate 19 and the edge of flange 9 to increase the space between said plate and the outer face of rotor 4 where necessary or desired. It is contemplated that washers of different thicknesses may be interchangeably employed to vary this spacing to accommodate different kinds of materials or to conform to other variable operating conditions.

In place of the disc-like plate 19 shown in Figures 1 and 2, I may use any other suitable means for retaining the treated material as it emerges from the annular space between peripheral portions of the rotors. For example, the sections 24 and 25, when secured to the flange 9, cooperate to form a material retaining plate which can be interchanged with other plates as 26, 27 and 28, Figure 5, having central openings of different areas and therefore permitting discharge of treated material through said respective openings at different distances from the periphery of rotor 4.

Under some circumstances, it will be advantageous to introduce pressure behind the body of the material being treated and, under others, to create a vacuum, or partial vacuum in advance thereof, or both conditions may be desired simultaneously. For such purposes the material may be fed under pressure through the hollow shaft 6 by suitable means such as the pump 29. To produce a condition of vacuum or partial vacuum in advance of the material, a suction pump 30 is in operative communication with the interior of housing 2 through a pipe 31. A container 32 of any desired or suitable type is positioned to receive material discharged through a discharge opening 33 in the housing 2.

In operation, material to be treated is introduced in such a manner as to be moved in ordinary conditions toward the peripherally disposed annular space between the rotors by reason of centrifugal force due to rotation of one or both of said rotors or by external head or pressure. There are conflicting theories as to what causes the disintegration of solid particles so treated. Whatever the fact may be, I have found that the use of an annular plate as 19 or its equivalent obstructs or delays the discharge of material from the space between the rotors. It is reasonable to believe that this obstruction is due to back pressure of centrifugal or other force generated in the mass of material lying between the rotors 4 and plate 19. The effective mass of such material may be varied by permitting discharge thereof at greater or less distance from the periphery of rotor 4. Furthermore, it is believed that centrifugal force will constantly tend to retain the heavier or less disintegrated particles in the distingrating zone so that, generally speaking, as the width of the annular ring or the discharge distance is increased, the discharged particles of a given material under treatment will be those which have been reduced or disintegrated

to the smallest dimensions. In most cases the proper discharge distance required to produce a predetermined fineness of a given material will be ascertained by trial and experiment. For example, I have found in using a mill having rotors of 10 inches diameter that mica was disintegrated or reduced to particles of a fineness of 20 microns while barytes was disintegrated to a fineness of 2 microns with the discharge distance the same in both cases; also that by increasing the discharge distance from 1 inch to 3¼ inches I was able to increase the fineness of graphite from 15 microns to 2 microns.

By similar means I am able to reduce the globule size of liquids and semi-liquids and to control the pressure and time factors required to reduce liquids and semi-liquids to predetermined globule size. In treating viscous materials or materials developing friction in their passage through the machine it will be advantageous to apply pressure or suction or both to control the rate of discharge and consequently the time of treatment for any increment of material.

I claim as my invention:

1. A disintegrator comprising opposed material confining and treating members, means for effecting relative rotation between them to produce centrifugal movement of the material treated, said members being positioned and adjusted to provide a channel between their respective inner opposed surfaces and one of the said members having an annular flange adapted to form with said other member a material discharge channel and port at one side of said other member and in free communication with said first mentioned channel.

2. A disintegrator comprising material treating and confining members having opposed spaced peripherally disposed surfaces, means for effecting relative rotation between them, means for conducting material under pressure into effective contact with said surfaces, one of said members having a side wall spaced from the other member to form a discharge channel communicating with the space between said peripheral surfaces and provided with a discharge opening between said space and the axis of rotation of said members.

3. A disintegrator comprising material treating members having opposed peripherally disposed surfaces, means for effecting relative rotation between them, means for conducting material under pressure into effective contact with said surfaces, one of said members having a side wall spaced from the other member to form a discharge channel communicating with the space between said peripheral surfaces and provided with a discharge means positioned between said space and the axis of rotation of said members, and means for varying the relative position of said discharge means with respect to said space between the peripheral surfaces of said material treating members.

4. A disintegrator comprising material treating members spaced apart to afford a channel between interior faces thereof, means on one of said members overlapping the periphery of said other member and overlying and spaced from an exterior surface thereof to form continuously with said first mentioned channel an outlet for movement of the material in a direction opposite to that of the material moving between said interior surfaces of the members, and means for counteracting centrifugal force in said discharge channel to discharge the material therefrom.

5. A disintegrator comprising opposed material treating members, means for effecting relative rotation between them to produce centrifugal movement of the material treated, material retaining means on one of said rotors overlapping a peripheral portion and an exterior lateral portion of said other rotor and having a centrally disposed discharge opening, and means for causing material to discharge through said opening.

6. A disintegrator comprising opposed spaced material confining and treating members, means for effecting relative rotation between said members, one of said members having a peripheral wall enclosing the periphery of the other member and spaced therefrom to form a discharge passage, and an annular flange continuous with said peripheral wall and positioned opposite an exterior surface of said other member, the space between the opposed inner surfaces of said treating members and between said peripheral wall of one member and the periphery of the other member and between said flange and the exterior surface of said other member being continuous and forming a continuous channel for the passage and discharge of material being treated.

7. A disintegrator comprising opposed material treating members, means for effecting relative rotation between them, means for introducing material between opposed surfaces of said members, and one of said members having outlet means positioned opposite an exterior surface of said other member and between the center and the periphery thereof.

8. A disintegrator comprising opposed material treating members, means for effecting relative rotation between them, means for introducing material between opposed surfaces of said members, and one of said members having outlet means positioned opposite an exterior surface of said other member and between the center and the periphery thereof, and other outlet means posi-

tioned opposite the periphery of said other member, and means for adjusting the extent of opening of said other outlet means.

9. A disintegrator comprising opposed material treating members, means for effecting relative rotation between them, means for introducing material between opposed surfaces of said members, and one of said members having outlet means positioned opposite an exterior surface of said other member and between the center and the periphery thereof, and other outlet means positioned opposite the periphery of said other member, and means slidably mounted in position to control the extent of opening of said other outlet means.

In testimony whereof, I have signed my name to this specification this 22nd day of April, 1926.

BERNARD CUNNIFF.